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Advantages of Manifold Valves Used with Pressure Instruments

Tino Goncalves - Ashcroft

ADVANTAGES OF MANIFOLD VALVES

Introduction:

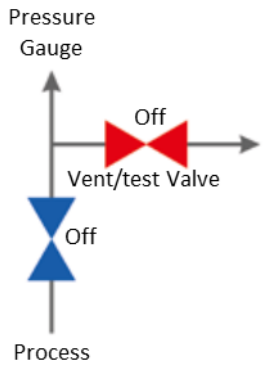
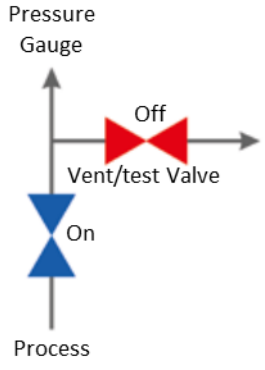
Pressure spikes above the pressure instrument capabilities can cause permanent damage to mechanical and electrical components. Or worse, injury can occur to personnel from unintentional pressurized systems. With people, processes and profits in jeopardy, manifold valves are essential in pressure applications. From safety to instrument protection, manifold valves are used to isolate, control, bleed and calibrate pressure instruments without process interruption. Manifold valves are used with pressure gauges, pressure switches, pressure transducers and transmitters. The most common manifold valves are direct or remote mount. Depending on the application one type can significantly improve the system performance over the other. For example, the direct mount valve manifolds are tailored to improve efficiency and to reduce energy costs. Shorter path flows reduce pressure drops and heat fluctuations, improving the overall energy efficiency of a system. In contrast, remote valve manifolds can be used to reduce or increase process temperature to protect instruments from temperatures beyond their limits. This paper highlights the benefits and usage of most common manifold valves such as block and bleed, three and five-valve configurations.

Block Bleed Manifold Valve:

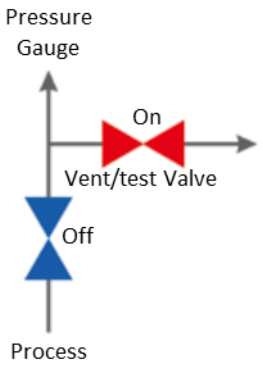
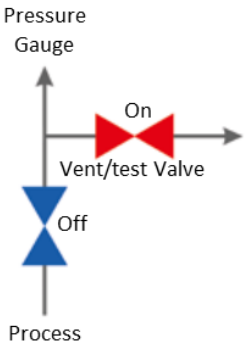
Figure 1 – Ashcroft T6500 Pressure Gauge with Block Bleed Valve Manifold

Block and bleed manifold valves are designed to work with most pressure devices such as pressure gauges, pressure transmitters and pressure switches. Block and bleed manifold valves consist of a block valve and a bleed valve. It permits pressure bleeding and instrument calibration without physically removing the instruments from the process. It also prevents initial pressure pikes and isolates instruments from the process to safely remove instruments for maintenance or calibration. Below are some of the benefits and procedures to safely set-up, zero, calibrate and remove a pressure instrument from service.

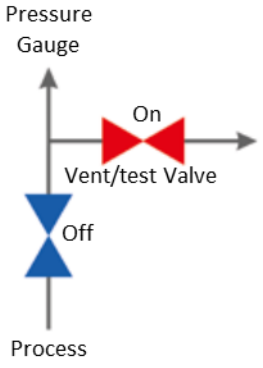
Procedure to Set-Up a Pressure Gauge with a Block and Bleed Manifold Valve

1. Ensure that both valves are closed.	
2. Open the process valve slowly to prevent pressure surge. 3. Inspect for leaks. 4. System is under normal operation.	

Procedure to Zero and Calibrate a Pressure Gauge with a Block and Bleed Manifold Valve

1. Close process block valve. 2. Attach tubing to bleed port if necessary.to prevent spillage. 3. Open vent/test valve to bleed out any pressure trapped between the valve and pressure gauge. 4. Verify zero pressure reading on the pressure gauge.	
5. Connect a pressure source to pressure vent test port and keep test valve open. 6. Apply pressure per calibration procedure data points. Verify or adjust per gauge specifications.	

Procedure to Remove a Pressure Gauge from Service with a Block and Bleed Manifold Valve

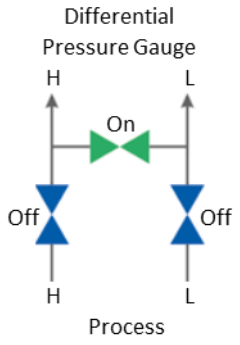
1. Close process block valve. 2. Open vent valves to remove process pressure from the system. 3. Remove pressure gauge from the manifold.	

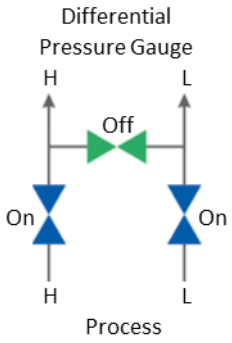
Three-Way Direct Mount Valve Manifold:

Figure 2 – Ashcroft 5503 Differential Pressure Gauge with Three-Way Direct Mount Valve Manifold

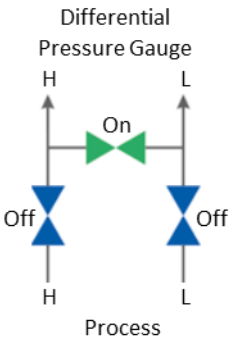
The three-way manifold valves are used with differential pressure gauges, differential pressure transmitters and differential pressure switches. They consist of two block valves and an equalizer valve. The three-valve manifold prevents installation pressure spikes by equalizing high and low pressure ports, isolates the process, and permits instrument removal without interrupting the process. Below are some examples and procedures to safely set-up, zero and remove the differential pressure instrument from service.

Procedure to Set-Up a Differential Pressure Gauge into Service with Three-Way Manifold Valve

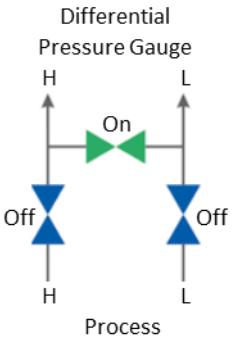
1. Ensure that all valves are closed. 2. Open the equalizer valve to ensure that pressure is equal on high and low pressure ports of the differential pressure gauge. 3. Open the process high port valve slowly and check for leaks.	

4. Close equalizer valve to isolate the high pressure from the low pressure. 5. Open the process low pressure valve to apply the process low pressure to the differential pressure gauge to establish the working differential pressure. 6. System is under normal operation.	

Procedure to Zero a Differential Pressure Gauge with Three-Way Manifold Valve

1. Close the low process block valve. 2. Open the equalizer valve to ensure the same pressure on both sides of the transmitter. 3. Close the high process block valve. 4. Verify zero differential pressure reading on the differential pressure gauge.	

Procedure to Remove a Differential Pressure Gauge from Service with Three-Way Manifold Valve

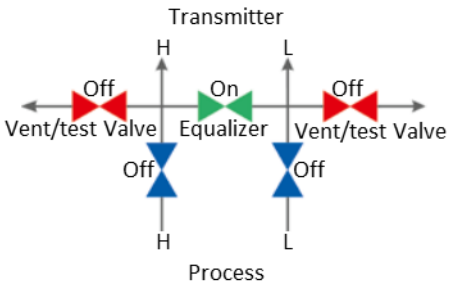
1. Close the low block valve. 2. Open the equalizer valve to maintain the same pressure on both sides of the transmitter. 3. Close the high block valve. 4. Remove differential pressure gauge from the manifold.	

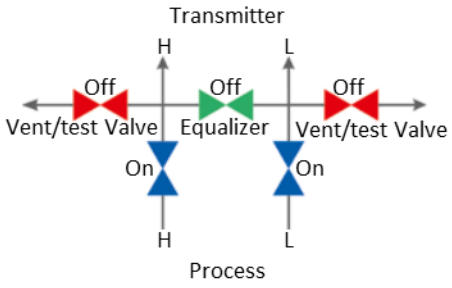
Five-Way Direct Mount Manifold Valves:

Figure 3 – Ashcroft GC52 Differential Transmitter with Five-Way Direct Mount Valve Manifold

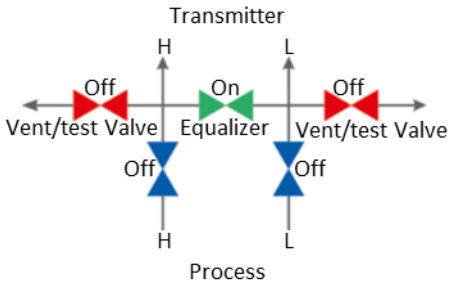
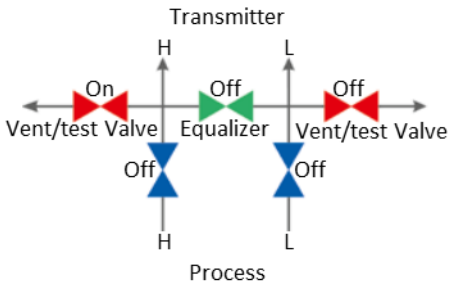
The five-way valve manifolds are the most common valve manifolds used with differential pressure transmitters, differential pressure gauges and differential pressure switches. Typically, the five-way manifold consists of two block valves, one equalizer valve, and two vent or test valves. Manifold valves prevent installation pressure spikes by equalizing the pressure to start normal operation and permits pressure bleeding and instrument calibration without physically removing the instruments from the process. It also isolates instruments from the process to safely remove the instruments for maintenance or calibration. Follow procedures below to safely set-up, zero, calibrate and remove the differential pressure transmitter from service.

Procedure to Set-Up a Differential Transmitter into Service with Five-Way Manifold Valve

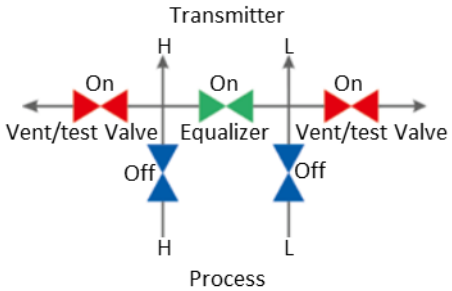
1. Confirm that all valves are closed. 2. Open equalizer valve to obtain equal pressure on both sides of the transmitter. 3. Open the process high pressure port valve slowly and check for leaks.	

4. Close equalizer valve to isolate the high pressure from the low pressure. 5. Open the process low pressure valve to apply the process low pressure to the transmitter and establish the working differential pressure. 6. System is under normal operation.	

Procedure to Zero and calibrate a Differential Pressure Transmitter with a Five-Way Manifold Valve

1. Close the high and low process block valve. 2. Open equalizer valve to ensure the same pressure on both sides of the transmitter. 3. Verify zero differential pressure reading on the transmitter.	
4. Connect a pressure source to the high test pressure port and open the test valve. 5. Close equalizer valve. 6. Open low test port and test valve to vent to atmosphere. 7. Apply pressure per calibration procedure data points. Verify or adjust per instrument specifications.	

Procedure to Remove a Differential Pressure Transmitter from Service with a Five-Way Manifold Valve

1. Close the low process block valve. 2. Open the equalizer valve to maintain the same pressure on both sides of the transmitter. 3. Close the process high block valve. 4. Attach tubing to bleed ports if necessary to direct media 5. Open vent valves to bleed any pressure trapped between the pressure gauge and the manifold. 6. Remove differential transmitter from the manifold.	

Summary:

Ashcroft manifold valves are crucial components in industrial pressure systems to protect instruments and personnel. Manifold valves are used with most pressure or differential pressure instruments such as gauges, switches, transducers and transmitters. It is important to strategically select the most beneficial manifold valve for the specific application. For example, the direct mount manifold valves are known to improve efficiency and to reduce energy costs. Shorter path flows reduce pressure drops and heat fluctuations, improving the overall energy efficiency of a system. On the other hand, remote valve manifolds are installed with siphons and/or capillary lines. Remote mount manifold valves can be used to reduce or increase process temperature to protect instruments from temperature beyond their limits. Another example would be to use a block and bleed manifold valve with a pressure gauge, pressure transducer or pressure switch since there is only one process connection. Three or five-valve manifold are used with differential pressure gauges, differential pressure transmitters or differential pressure switches. Most pressure measurement applications will benefit from using manifolds whether direct or remote mount.

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