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Application Bulletin

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Bi-Directional Circuit Filtration

Bi-directional filtration means that when flow travels upstream through the filter, there is a reverse flow through the same pipe line. That leaves the question, "how is fluid filtered properly if it travels both ways in the system in the same line?" There are bi-directional systems that filter the fluid as it flows in one direction but when flow is reversed, it is made to bypass the filter so reverse flow is not filtered at all. Why would you want to filter fluid that flows in both directions in the same line? Take for example, a lot of hydrostatic applications, the flow is reversed forcing the fluid to flow in both directions in the same line. In main loops that have drive systems, conventional filtration cannot be used by installing two different complete filter housings with filter cartridges inside. It is the same line. You would filter the contaminants while forward flow is occurring but when reverse flow is applied, it would push the contamination that was captured by the filter back into the system.

Think of the filter itself. The fluid would flow through the filter and the perforated support tube or core. The core is always manufactured with the core on the downstream side of the filter. The media captures the contaminants exposed to the flow while the core does exactly what it is supposed to do; support the media. It strengthens and keeps the rigidity of the media and while the core is perforated it allows the clean fluid to pass through. It also keeps the media intact and helps prevent the fluid from blowing through the media if too high a pressure drop is seen. If the core was on the upstream side of the filter, the media could just blow out if a similar occurrence took place. When a filter loses its integrity, damage always occurs.

Take, for example, equipment, vehicles, and machinery that have drive systems, like 4 X 4 vehicles, off-road heavy equipment vehicles, and other machinery where the fluid flows forward and is reversed in the same line. These are usually high pressure lines, too, so critical attention should be taken. Conventional filtration is not feasible in this case installing two separate filter housings, one for fluid flow in each direction. Therefore, in main circuit lines, there is no filtration installed because of this type of application. Contamination reaches higher concentrations until the pump, motor, valves, and other components can fail dramatically.

With 80%-90% of all equipment downtime being caused by contamination, let's look at a sure-fire way to solve this issue. First of all, in order to keep the system running efficiently, there should be adequate filtration in the entire system. If you are not sure of this, contact a filter specialist for assistance. With drive systems, contamination can build up quickly through ingression, the type of contamination which is produced during servicing or equipment maintenance. Contamination can also be internally generated, which is merely caused by moving parts that are in the working in the system. Also think about normal wear and tear, component fatigue, and oxidation. Filtration should be top priority. Always remember, if the filtration breaks down, the system is going to break down. A broken system means no production which, in turn, means lost revenue.

Let's take a look at the sure-fire way to resolve any problems that may occur in drive systems. Please take a look at the following drawing. With one filter, the bi-directional flow can be solved. With a series of 1 filter and 4 check valves, this can be the remedy for bi-directional flow filtration. Sometimes these components are collectively installed in one housing. Sometimes these components are installed individually and strategically in a system by themselves.

Nonetheless, the exploded drawing shows how this bi-directional circuit works. By following the flow arrows you can see no matter which direction the flow is traveling, it enters and exits the filter in the same direction always keeping the contamination captured on the proper side of the media, the upstream side. Follow the flow through the check valves, their position and placement. You will see how this bi-directional filtration through one filter only is designed. The check valves and filter can be spec'd into a system according to flow rate, fluid type, pipe size, and working pressure. An important consideration is monitoring the filter element. Gauges or pressure drop indicator should be installed to ensure the condition of the filter is in good condition. Proper servicing is the key to keep a system operating at peak performance level.

BI-DIRECTIONAL CIRCUIT FILTRATION