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Best Practice for Pneumatic Systems: Air Preparation

The air we breathe is free. Compressed air, unfortunately, is not. It takes traditional energy to compress that air we breathe, creating the energy source that powers the pneumatic system found on your machine.

Who isn't looking to maximize system performance, minimize maintenance/downtime by extending the life of pneumatic components, or just control daily operating costs? Clean, dry, controllable compressed air is necessary for pneumatic system efficiency. To maximize performance and extend the life of the components doing the work in a pneumatic system, preparing that compressed air at the point of use is a requirement. Basic air preparation, or 'Air Prep', will commonly contain a filter, regulator, and possibly a lubricator in a series.

Filter

The filter should receive the supply air first. This filter will extract most moisture and air-line contaminants typically down to 5 microns, and can get as small as 0.3 microns depending on the type of filter selected.

Compressed air filters require preventative maintenance to ensure optimum efficiency and effective filtering. Like the filtering elements in your car, a compressed air filter will likely need to be replaced approximately every 4-6 months, depending on use and the condition of the incoming air. The filter will typically be visible through the bowl or sight glass for convenient self-monitoring.

Moisture extracted from the compressed air will collect in the filter bowl. This bowl needs to be monitored and drained periodically, either manually or via an optional auto-draining feature. Be sure to properly route the drainage using tubing for proper disposal (and to avoid a mess). Be sure to also monitor the condition of the bowl. Physical damage or cracking may occur due to an incompatible fluid in the upstream air. In these instances a metal bowl is the most practical solution. Extreme conditions such as high humidity and rapid temperature changes may mean additional moisture extraction is needed.

Regulator

After the filter, a pressure reducing valve, or regulator, will take that clean, dry air and provide a means to control the pressure down-stream. Working a manually controlled regulator may seem a bit counterintuitive. "Closing" the valve by turning it clockwise will actually compress the regulating springs inside the valve and allow greater pressure to pass down-stream. While a regulator will inherently effect flow in the process, best practice dictates that a regulator should be used only to regulate downstream pressure. For on/off functionality, or to control the flow of the air in your system, a simple on/off valve and a metering valve (or flow control) are recommended.

Filter/Regulator Combination

A filter/regulator combo unit provides a unitized filter/regulator system as a single unit for space savings without compromising control or filtering.

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Lubricator

Using a lubricator depends on what your system needs downstream. Add a lubricator to the system to provide downstream components with a constant supply of oil lubrication by introducing a small amount of oil to the compressed air stream. Lubricators use an adjustable visual indicator to measure the amount of oil downstream and have an oil reservoir bowl that can be visually monitored to ensure constant supply. Over the past decade, most downstream components such as valves and cylinders have transitioned to use grease lubrication instead of a lubricator, therefore eliminating the need for constant oiling.

Best Practice Tips:

- Do not work on a live system. Safety is a necessity. Make sure all of the compressed air potential energy is drained prior to performing any maintenance. Use a shut-off valve with back flow that exhausts to atmosphere and proper lock-out/tag-out procedures.
- Visually monitor filter bowls for their condition and water accumulation. Look through the bowl to monitor the condition. Monitor lubricator bowls for a steady supply of oil.
- When considering a 'dump valve' as a part of an air prep system, consider the position of this dump valve when selecting other air prep components. For example, if the dump valve is upstream of the regulator, make sure to specify a regulator with reverse flow.
- Visually monitor the condition of the air filter. Use the sight glass or transparent bowl to readily view the filter element that will be towards the top. Depending on the condition of the compressed air, filters can last as little as a few months or up to a year before they need to be replaced.
- Document your filter element observations and develop a preventative maintenance schedule for replacing filters and draining bowls based on specific system performance.
- Use a pressure reducing valve or "regulator" only for reducing pressure downstream. Resist the temptation to use a regulator as an on/off valve or to control airflow speed.
- Follow the flow arrows. Make sure to install air prep components with the proper air flow orientation. Arrows will be found on each component to signify proper flow direction.