Middlesex Gases & Technologies Inc.

Middlesex Gases & Technologies, Inc.
292 Second Street
PO Box 490249
Everett, MA 02149

CHANGEOVER MANIFOLD TUTORIAL

Many applications require a continuous supply of gas to the process, stopping the flow of gas during operations to replace empty cylinders is not an option. The laser welding operation is a perfect example of an application that may operate on a single 8 hour shift basis but requires continuous flow throughout the operating period. Stopping production to replace empty cylinders can be costly – time is money.

There are many other applications where the flow of gas must be maintained 24/7. Helium for gas chromatographs and carbon dioxide for incubators are two simple, but good examples where loss of gas flow can have very unwelcome results. These applications require continuous flow for long periods of time not only during working hours, but when the system is unattended in the evening and during weekends and holidays. Running a gas chromatograph out of helium carrier gas can result in costly repairs and days without analytical results. An incubator without carbon dioxide can result in destroyed samples and the loss of years of research.

WHAT IS A CHANGEOVER MANIFOLD?

A changeover manifold is a system of valves and pressure regulators that delivers gas to a process without gas flow interruption. Most changeovers consist of a regulator scheme that reduces the pressure in two stages to achieve a constant outlet pressure.

Users should be aware that there are systems offered that do not provide two stages of pressure reduction and that the resultant outlet pressure will fluctuate considerably as the system operates, thus requiring the addition of a line regulator down stream from the changeover to provide a consistent pressure to the process.

SELECTION CRITERIA FOR CHANGEOVER MANIFOLDS

Each application has a different set of operating parameters that must be evaluated and satisfied. Let's take a look at some key parameters that users need to understand when selecting a changeover manifold.

1. **Automatic or semi-automatic? What's the difference?**
   Some suppliers use semi-automatic and automatic interchangeably when describing a changeover manifold. In fact, they are two distinctly different systems.

   A **semi-automatic** changeover normally operates by opposing pressure differential. It switches from the "in-service" side to the "reserve" side automatically, but requires an action by the operator to switch it back from the new "in-service" side to the "reserve side." Typically this is accomplished by flipping a knob, a lever, or operating a series of valves after replacing the empty cylinders. The model 914 and 916 are typical semi-automatic changeovers.

   An **automatic** changeover manifold functions electronically. The only action required by an operator for this unit to reverse the changeover is to replace empty cylinders and to re-pressurize the depleted side. The model 918TS and 919TS are typical fully automatic changeovers.

2. **The gas supply source is important.**
   The gas supply source to a changeover may include any combination of the following:
   - A standard high pressure cylinder, such as nitrogen or helium,
   - A cylinder of liquefied gas, such as carbon dioxide,
   - A six pack, 12 pack, manifold of cylinders,
   - A cryogenic container of argon, nitrogen, oxygen, or carbon dioxide,
   - A tube trailer,
   - A bulk storage tank.

   While you have all of the above choices and perhaps others, your choice of gas source drives your choice of changeover manifolds. If high pressure cylinders are always to be your source, you have the choice of virtually any automatic or semi-automatic changeover system. Substitute a cryogenic container on one side with a high pressure source on the other side and your choices narrow depending on the operating parameters of delivery pressure and flow.

   Automatic changeovers like the **AUTO-LOGIC II** and **ULTRA-LOGIC** allow the user to start with high pressure cylinders on both sides, and then expand to a cryogenic source on one side and a high pressure source on the other side. If even higher consumption rates become required, users can easily switch to cryogenic sources on both sides. The automatic changeover may have a higher upfront cost but be more economical in the long term.

3. **What is the maximum required flow?**
   This is often the most difficult parameter for the user to specify. Knowing the maximum flow is important for two reasons. First, you must ensure that the changeover has sufficient capacity to feed the process. A greatly oversized changeover may lead to premature failure. Second, you must ensure that the gas sources are sufficient to meet the operating parameters of the application.

4. **Determine the desired gas source change out frequency.**
   To determine the gas source frequency change out time, consider the flow rate, the total hours of operation, and the time period to obtain full containers to replace the empty side of the changeover.

SUMMARY

Whatever your requirements, be sure to consider all of the elements in choosing your changeover manifold. Proper planning up front will provide benefits and smooth operations for many years. It is a good idea to discuss your application details with your supplier to ensure that you choose the correct changeover manifold with respect to your application.