SPRING CYLINDERS

FAIL-SAFE OPTION FOR EXTEND OR RETRACT POSITION

AVAILABLE IN ALL SERIES OF CYLINDERS, INCLUDING STAINLESS STEEL!

SPRING CYLINDERS

Fail-safe positioning – a condition where force is provided to the cylinder to move a load to a predetermined point when pressure is removed.

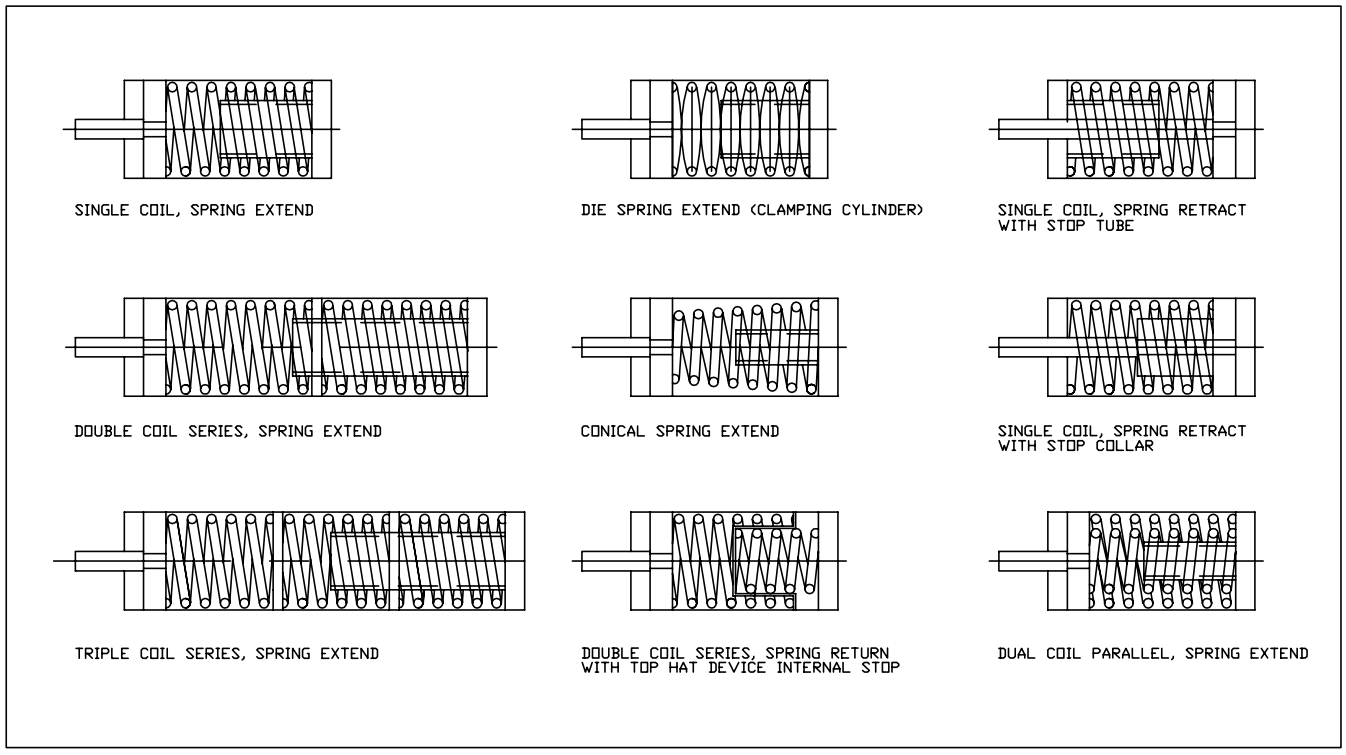
Spring designed cylinders may be the simplest way to accomplish this.

In most cases, a mechanical spring is the only device that can be coupled to a cylinder to consistently deliver a specific design force to hold a desired position when input pressure is lost – and retain that force for as long as the integrity of the cylinder assembly is maintained.

Spring extend – a spring is used so that a cylinder will stroke to the fully extended position when input pressure is removed from the rod end port. Likewise, for **spring retract**, the cylinder will stroke to the fully retracted position when pressure is removed from the cap end port.

Applications for cylinders designed with springs are virtually unlimited, many involving the important fail-safe function. Examples of uses include process-valve operators, conveyor-shift positioners, damper controls, collating machines, steam-control devices, and others where safety requires that some process absolutely must stop if system power is lost.

EXAMPLES OF SPRING CYLINDER DESIGN



SPRING CYLINDERS
FAIL-SAFE OPTION FOR EXTEND OR RETRACT POSITION (Cont.)

DESIGNING THE SPRING CYLINDER

In a *Spring Extend* or a *Spring Retract* cylinder, a spring is installed inside the cylinder tube. The spring is compressed when the cylinder is assembled. The *Spring Preload* is the force this initial compression develops. The *Spring Preload* is the force the cylinder will develop in the fail-safe position without system pressure.

It is important to correctly identify all external forces acting upon the cylinder. These external forces could include linkage friction, seal friction external to the cylinder, or process loads that act only in the extend or retract stroke. If the external forces are under-estimated, the system pressure may not be sufficient to stroke the cylinder.

It is also important to accurately determine the minimum system pressure available. The system pressure determines the bore of the spring-loaded cylinder. If the system pressure is over-estimated, the cylinder may not fully stroke.

Correctly applying the spring cylinder requires some thoughtful design decisions. Yet, the design process is not complicated if complete preliminary information is provided. Such information should include:

Operating Medium – Pneumatic

Minimum Available System Pressure – Affects the bore size

Required Cylinder Working Stroke – The resultant cylinder length depends on the bore, stroke, and spring com bination. As a rule-of-thumb, a spring cylinder's total stroke will be approximately twice the actual working stroke required. Longer lengths are not uncommon.

Spring Preload – The force (lbs) the cylinder develops in the fail-safe position

Other usual design elements of the cylinder also need to be specified; i.e., rod diameter, rod end style, mounting style, port type and port positions.

There are two additional useful terms that need not be supplied as application data, but are calculated for the design:

Spring Rate – The amount of force (lbs) developed by the spring per inch of compression

Spring Final Load – The force (lbs) developed by the spring when the cylinder is fully stroked away from its fail-safe position

ORDERING INFORMATION

The spring cylinder is a product engineered for a specific application. Please note, however, that this design is essentially a modification of any of our standard products. Therefore, you can consider the basic designs of our any of our cylinder series in your application, from our 3/4" diameter bore on up to our largest bore, including the valve actuation cylinder (VAC) and the all-stainless steel cylinder (LSSL). Contact Lehigh sales and engineering for help in selecting the best product solution for your requirement.