



About Air Cylinders

Air cylinders are the final component in a pneumatic system. Air cylinders are devices that convert compressed air power into mechanical energy. This mechanical energy produces linear and even rotary motion. The air cylinder functions as the actuator in the pneumatic system, so it is also known as a pneumatic linear actuator. The air cylinder consists of a piston, a piston rod, a cylinder tube, and end caps. As compressed air enters into a cylinder, it pushes the piston along the length of the cylinder tube. Compressed air or a spring, located at the rod end of the cylinder, pushes the piston back. Valves control the flow of compressed air to the cylinder. The choices for cylinder housing styles include the following: tie-rod, round body, pancake, rectangular, multiple bore, stainless steel, rodless, compact, miniature/micro-cylinder, clean profile and twin-rod cylinder.

The two basic types of air cylinders (based on how they perform) are single-acting and double-acting. The single acting cylinder is able to perform an operating motion in only one direction. A single acting air cylinder has air pressure on one side of a piston, supplying force and motion, and a spring supplying the return force after the pressure is released. Single acting cylinders require approximately half the amount of air used by a double acting cylinder for a single operating cycle. A double acting pneumatic cylinder has powered motion in two directions, with pressure on both sides of the cylinder piston. When a cylinder is pushed out in one direction, compressed air moves it back in the other direction. Air lines running into both ends of the cylinder supply the compressed air. The flow of compressed air is controlled with valves for both single and double acting cylinders. Other types of cylinders include rotary actuators, multiple-position cylinders, etc.

Pneumatic systems produce large linear movement and consist of an input, a process, and an output. The input is compressed air from the compressor or hand pump. The process is a valve that directs the air to the rod end or base of the cylinder. In turn, the output is an extending and/or retracting piston rod. Use of pneumatic systems is advantageous, because they can be connected with hoses, pipe, or tubing without difficulty. Air is inexpensive and plentiful and can be easily compressed and stored in tanks. Exhaust air is relatively environmentally friendly and can be vented to the atmosphere. Pneumatic systems are used to push, pull, lift and open/close in a multitude of applications. They can also hold, remove, and position materials or pieces for manufacturing.

Choosing an air cylinder for a pneumatic system can be a intimidating task. Air cylinders can be customized with a special stroke, a custom mounting style or unusual seal material. Although custom air cylinders have the advantage of exactly suiting the application, it is recommended to look for an off-the-shelf solution first, as standard air cylinders cost less and are available for quick delivery. In sizing cylinders, focus on the load, velocity and air pressure. The cylinder should be sized to move the greatest load at the lowest acceptable velocity with the minimum available pressure. Determine the stroke length, the spring force (for a single-acting cylinder) and the overall dimensions of the cylinder. The mounting style – the options for which include nose, block, universal, pivot and trunnion – is determined by the size, force and function of the cylinder. Optional components that help to improve cylinder performance or prevent problems include cushions, bumpers, stop tubes, dual pistons, flow controls, position-sensing switches and position feedback sensors.