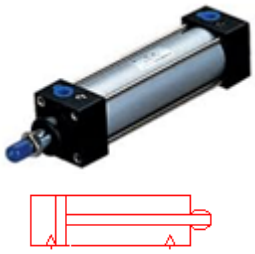
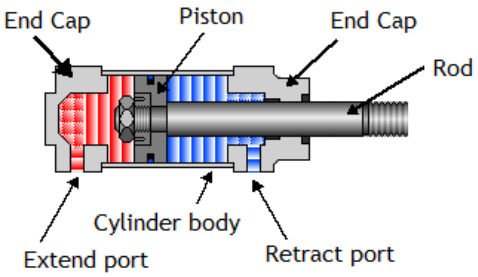
## Pneumatic Cylinder basics

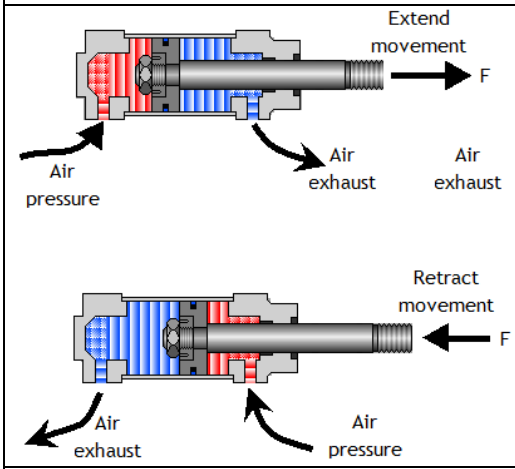


Pneumatic cylinders are one of the most common pneumatic actuators used in many industrial applications that require linear motion.
A pneumatic Cylinder is an actuator that uses the energy of compressed air to convert it in mechanical energy, in the form of a linear movement.




Cylinder components and operating characteristics:

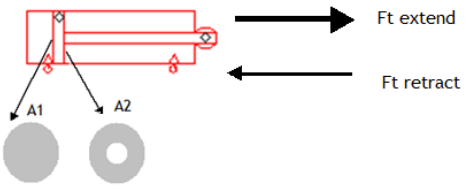
Cylinders operate typically at pneumatic pressures up to 10 bar (10^6 N/m^2).
Wide range of sizes, diameters from 2.5 mm up to 320 mm.
Strokes from 1 mm up to 2000 mm.
Available forces from 2N up to 4500N (at 6bar)
Velocity of piston rod from 0.1 m/s up to 1.5 m/s.




How it works

The compressed air acting on a piston inside a cylinder moves the piston and the rod along a linear path. By providing compressed air to one chamber of the cylinder, and removing the air from the other chamber, it is possible to extend or retract the piston rod.

The force that is available to produce the movement is dependent on the air pressure and on the size of the actuator




Ft on extended mov. = p x A1
Ft on retract mov. = p x A2

Ft ext. > Ft ret

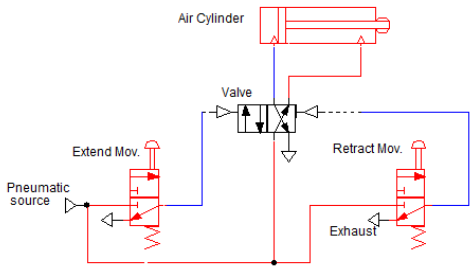
Actuating force

The theoretical force available for the extend and retract movements is dependent on the pneumatic pressure and size of piston and rod.

Ft = p x A

Where
Ft- theoretical force [N]
p – air pressure [N/m^2]
A – area of acting pressure [m^2]

In practical terms, the effective force a pneumatic cylinder can exert is considered to be 60% -80% of the theoretical force due to pneumatic and friction losses.




Basic circuit

To operate a pneumatic cylinder it is necessary to provide compressed, to adjust the pneumatic pressure and to have a control and driving system (use of pneumatic valves)

Example of a circuit to control a pneumatic actuator using pneumatic actuated valves. Two pushbutton pneumatic valves are used to control de extended and retract movements.