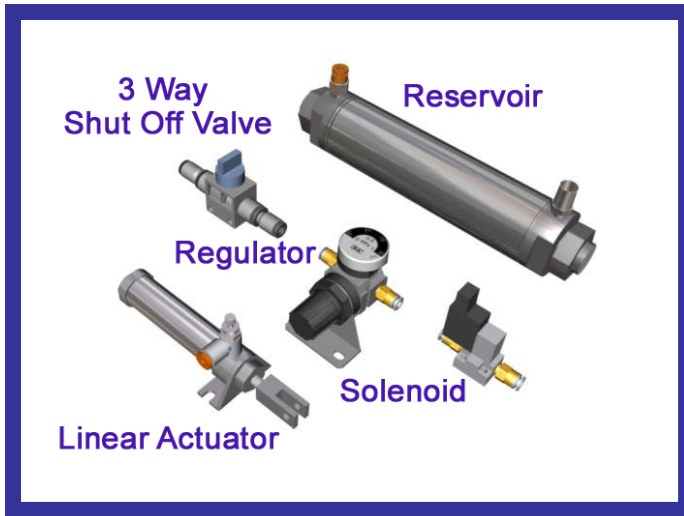




# Identify and Assemble the Pneumatic Components



## The 5 Basic Components

The Standard **GEARS-IDS™** Pneumatic system is comprised of 5 components.

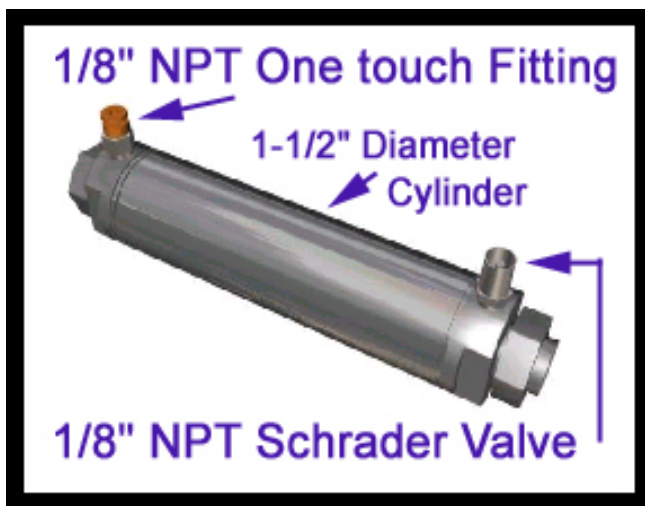
**The Reservoir** Stores Potential Energy in the form of compressed air.

**The Shut Off/Purge Valve** Isolates the stored air from the working components in the pneumatic circuit. This valve depressurizes or vents the circuit when it is closed.

**Regulator** Maintains a set pressure in the circuit.

**Solenoid** Electronically controls the flow of air to the pneumatic cylinder.

**Pneumatic Cylinder** Converts the pressurized air into the mechanical energy of a linear rod and piston.

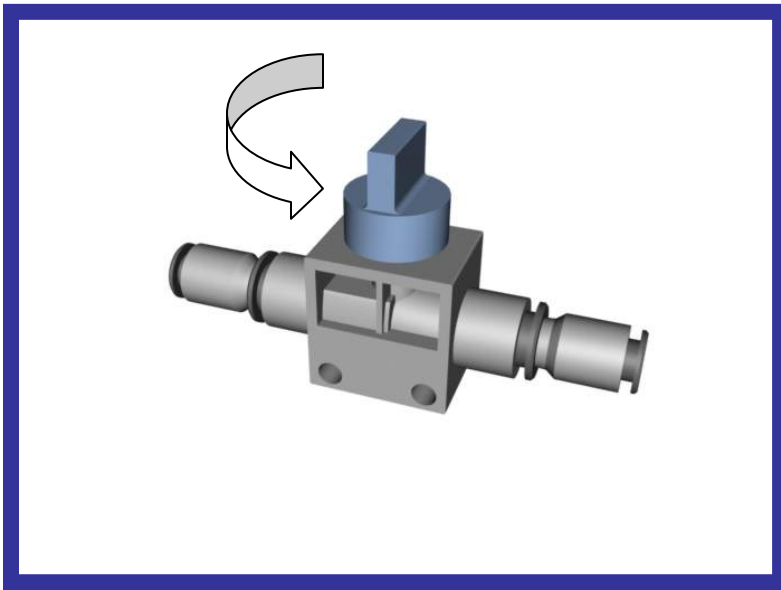


## The Reservoir

The reservoir is a stainless steel cylinder capped by two aluminum mounting plates. The aluminum end plates are each fitted with a 1/8" NPT threaded port.

A Schrader Valve fitting (Used to fill a bicycle tire) is threaded into one port and used to fill the cylinder. The other port is fitted with a one touch quick connect fitting that is used as the supply port for the pneumatic circuit.

To ensure an airtight seal, the threaded ends of the "Quick Connect" fitting and the Schrader valve are wrapped in Teflon tape prior to being threaded into the reservoir. These fittings are tightened firmly into the aluminum end caps using a 7/16" box end wrench.



## 3 Way Shut Off Valve

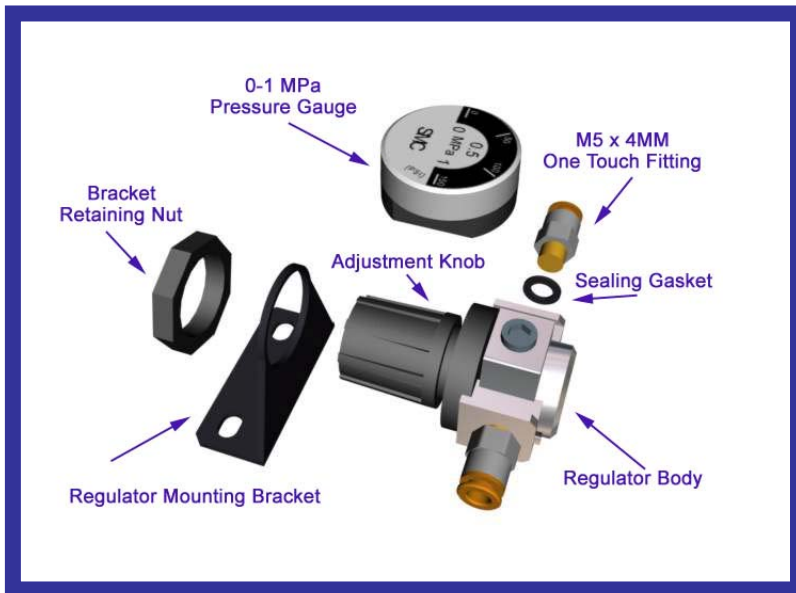
This three position valve is positioned between the reservoir and the remainder of the pneumatic circuit.

### Position One

When the valve knob is aligned perpendicular to the air flow, (as pictured on the right) the valve will not pass air to the remainder of the circuit. The valve is closed.

### Position Two

When the knob is aligned with the flow of air (turned 90 degrees from the closed position) the valve passes air to the circuit and is said to be open.



### Position Three

As the valve is turned from the open to the closed position, the valve will vent downstream circuit pressure. This helps to ensure that components downstream of the valve are deactivated.

**Note: This is a directional component. The direction of airflow through the shut off valve is designated by an arrow on the body of the valve.**

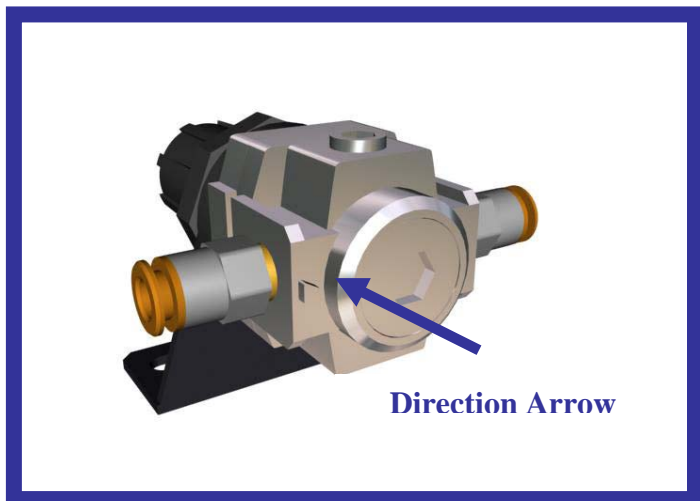
## The Regulator

The Regulator is fitted with a mounting bracket, a mounting bracket retaining nut, a 0-1Mpa gauge and two M5 x 4 MM One Touch fittings. The gauge is made airtight by sealing the gauge threads with a drop of red Loctite™ and tightening firmly by hand.

Note: The M5 x 4MM One Touch Fittings are sealed using (black) gasket sealing rings. If these rings are lost or missing the fitting will not be airtight. The M5 x 4 MM One Touch fittings can be tightened using a 5/16” box end wrench

**Caution: USE MINIMAL FORCE** to tighten these fittings. Fittings damaged by over tightening will not be covered under warrantee.

Note: The regulator is a directional component. Please note the orientation of the directional arrow on the body of the regulator. Align this arrow in the direction of the airflow. The arrow should point towards the component immediately downstream of the regulator.

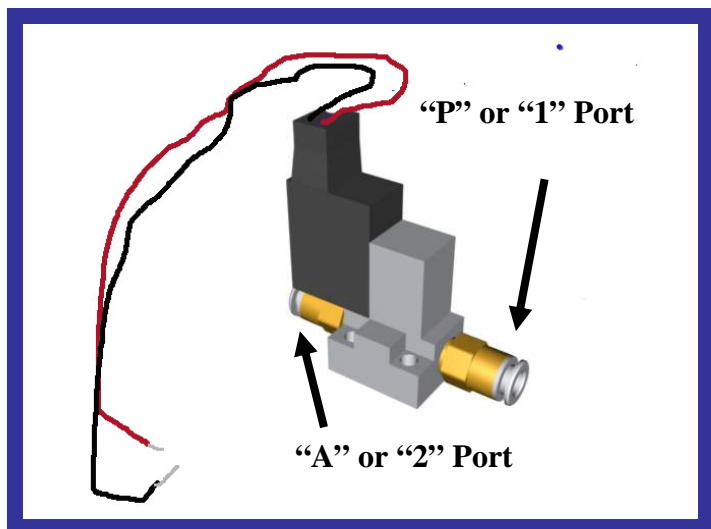


## Adjusting Regulator Pressure

Note: The pressure gauge has been removed for clarity. Pressure downstream of the regulator can be adjusted using the black plastic knob on the rear of the regulator. Turning the knob clockwise increases the force acting on the regulator spring and diaphragm, and raises the regulated pressure. Turning the knob counter clockwise reduces the force on the diaphragm and lowers the regulated pressure.

Note: The regulator setting can be “Locked” by pressing in on the regulator adjustment knob. Conversely, if the knob does not turn easily it may be in the locked position. To free the adjustment knob, pull the adjustment knob firmly outward from the body of the regulator.

in the locked position. To free the adjustment knob, pull the adjustment knob firmly outward from the body of the regulator.



## The Solenoid Valve

The solenoid valve used in the **GEARS - IDS™** Invention and Design System is an electrically operated on/off air control valve. This valve is a 3/2 valve, having 3 ports (In, out and exhaust), and two positions (Open, closed).

The valve is operated with 12 volt DC power provided from either a hand operated switch or a radio controlled switch available as an optional electrical accessory.

Note: This is a directional component. Airflow through this component enters the through the one touch fitting threaded into the port marked with either a “P” or a “1” or both. “P” denotes the pressure port. The linear actuator is connected to the port marked either “A” or “2” or both.

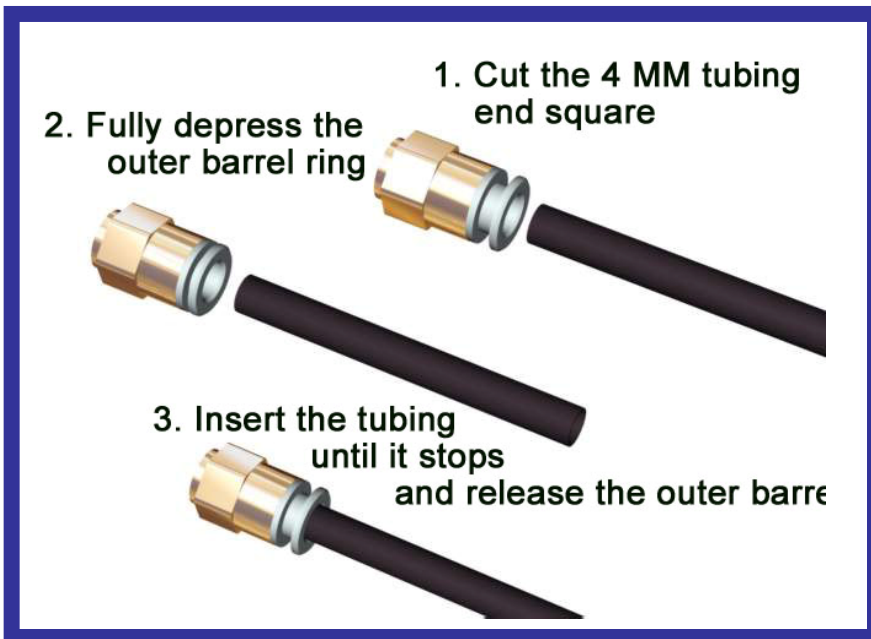
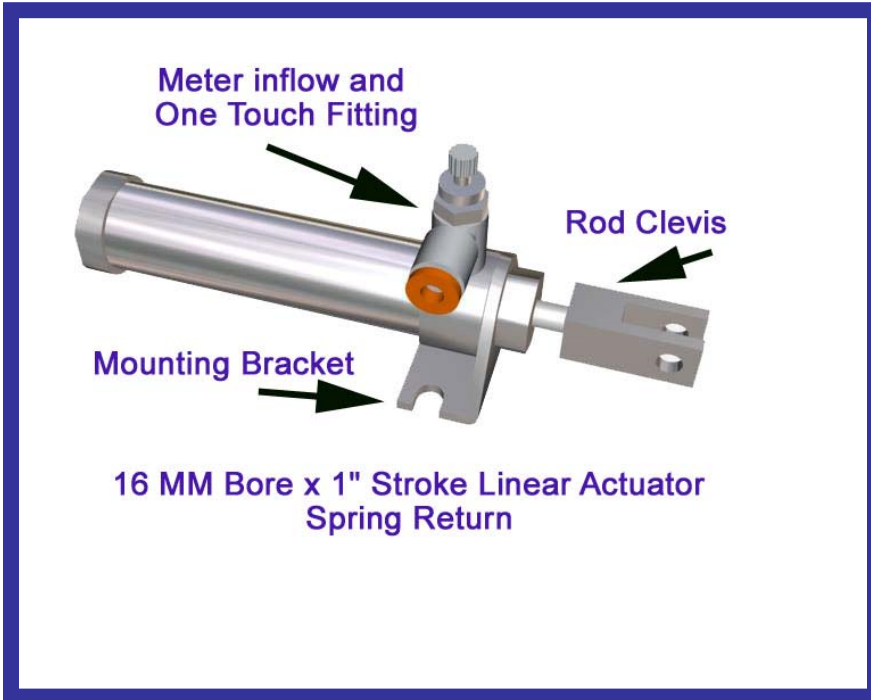
# Linear Actuator or Pneumatic Cylinder

The linear actuator, or pneumatic cylinder is the prime mover in the **GEARS - IDS™** pneumatic system.

The linear actuator uses the pressurized air in the system to perform useful work. Air pressure within the cylinder acts on a 16 MM diameter piston that is connected to the interior end of the rod. The force produced at the piston and transmitted to the rod and rod clevis is a function of the air pressure entering the cylinder. The air pressure in the system is controlled by the regulator setting.

The rod clevis can be connected to a variety of levers and mechanisms and used to increase either the speed of force of a moving component.

The linear actuator is fitted with a metered in flow valve which controls the rate at which pressurized air enters the cylinder. This in turn controls the speed with which the rod extends. This linear actuator is a single acting cylinder which uses air pressure to extend the rod and an internal spring to return the rod.

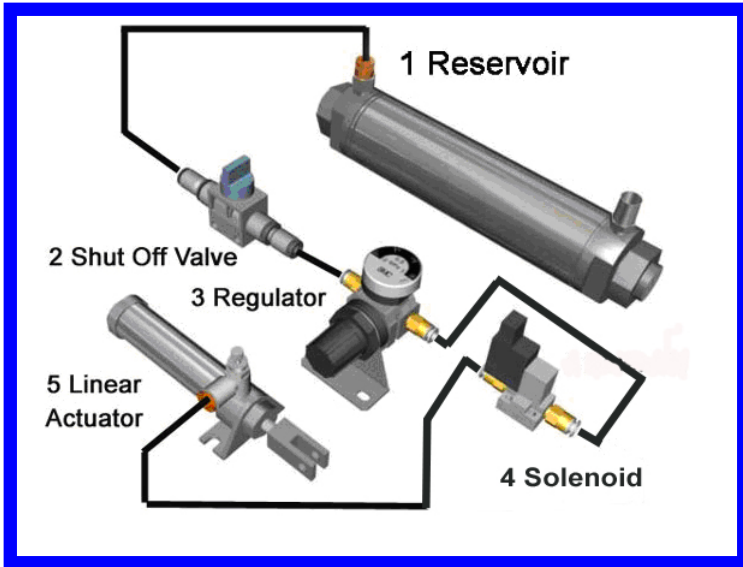


## The “One Touch” Fittings

One Touch Fittings allow rapid and repeated assembly and disassembly of pneumatic circuits.

When connecting tubing with one touch fittings, please use the procedure outlined below.

1. Cut the end of the tubing square. Use cable cutters or a razor knife.
2. Fully depress the outer barrel of the one touch fitting.
3. With the outer barrel held depressed, insert the tubing until it bottoms out inside the fitting. Release the barrel.



## The Connection Sequence

Connect the 5 components using the 4 MM tubing supplied with the **GEARS - IDS™** pneumatic kit. Connect the components in the order and arrangement illustrated in the graphic on the right.

Note: Always confirm the direction of airflow through the component BEFORE attaching the tubing.

Pressurizing the system is as easy as filling a bicycle tire. Connect the bicycle pump hose to the Schrader valve on the reservoir. Lock the pump fitting to the Schrader valve and pressurize the tank with the pump.

**CAUTION: DO NOT PRESSURIZE THE SYSTEM WITH ANYTHING OTHER THAN A BICYCLE PUMP. DO NOT EXCEED 145 PSI.**

