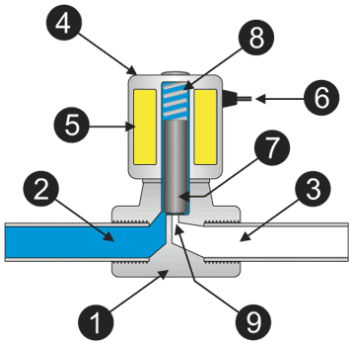
Electro-Pneumatic Solenoid Valves

Direct Solenoid Type:

In direct-acting solenoid valves the solenoid plunger, which is the soft iron core of the electromagnet part, is the only moving component and it is directly responsible for the opening and closing of the air passage through the valve. There is a rubber sealing pad on the bottom of the solenoid plunger which seals the valve closed in the de-energized state. They are typically used in applications that require low-flow or high switching speeds. The valve shown is of the normally closed type. The component parts are:



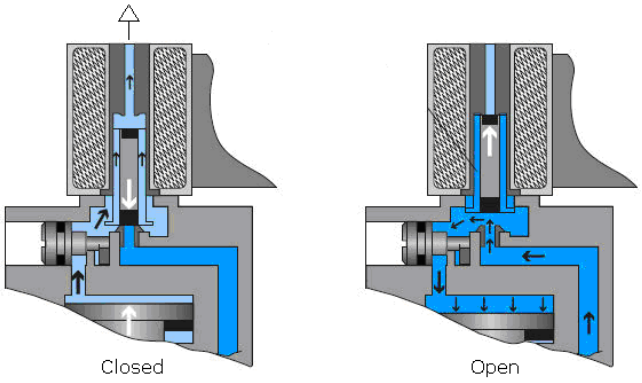
1 Valve body, 2 Inlet port, 3 Outlet port, 4 Coil, 5 Coil Windings, 6 Lead wires, 7 Plunger, 8 Spring, 9 Orifice.

If higher flow rates are required then the internal passageways must be made larger. This has the effect of increasing the general bulk of the valve therefore the valve seat will need to be larger also as will the solenoid plunger. A heavier return spring will be required and therefore a stronger electromagnet to operate the plunger. Also more power will be required to energise the solenoid. There are several knock on implications if this scenario arises.

- Higher power, so higher running cost.
- Additional switchgear may be needed for these higher powered solenoids.
- Greater heat dissipated therefore there is a need to consider how to deal with this heat.
- More physical room so containment enclosures may need to be larger.
- Possibility of larger EMF causing problems for other components in the control cabinet, EMF shielding may be necessary for some components.

Air Pilot Assist type:

With this design the electro-magnetic coil can continue to remain the same small size irrespective of the overall valve body size. Note that the solenoid is controlling a spool type directional control valve and it is air pressure doing the work of switching the spool rather than the solenoid. In effect all the solenoid must do is to provide that pilot air to the spool. In the de-energized state air in the pilot chamber is exhausted via the solenoid sleeve. It is normal to use a silencer on the top of this sleeve. In the energized state the solenoid lifts to provide pilot air to



the pilot chamber and this air pushes the spool against an opposing spring on the opposite side of the spool causing the spool to switch and the ports of the valve body (not shown) to be reconfigured.

The manual override screw (left) has a cam effect to manually lift the solenoid plunger for diagnostic purposes. However, care should be taken and the implications understood when manually operating valves outside of their intended control philosophy. Discuss!