

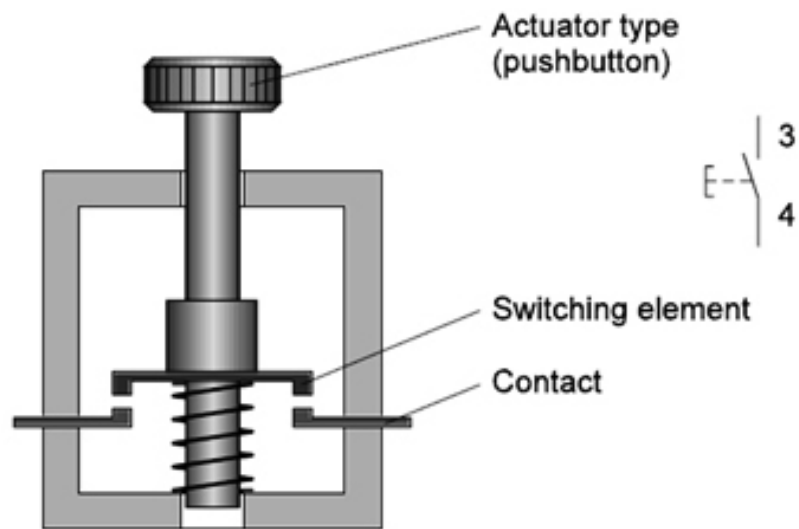
NPTEL: Automation & Controls

Module: 3 Electropneumatics

Q.1. What are normally open and normally closed contacts?

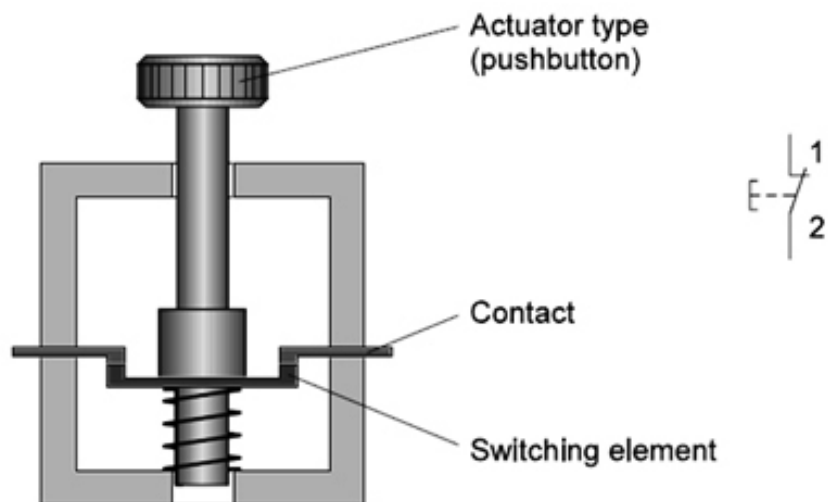
Ans: **Normally Open Contact:**

In the case of a normally open contact, the circuit is open if the switch is in its initial position (not actuated). The circuit is closed by pressing the push button – current flows to the load. When the plunger is released, the spring returns the switch to its initial position, interrupting the circuit.



Normally Close Contact:

In this case, the circuit is closed when the switch is in its initial position. The circuit is interrupted by pressing the pushbutton.



Q.2. What is electrical actuation of Directional control valves?

Ans: Directional control valves are actuated or changed from their one configuration to another with actuation methods such as manually by means of plungers, push buttons etc. In electrical actuation the DCVs are actuated by means of solenoids which when receive electrical current push forward the solenoid shaft into the valve to actuate them.

Q.3. What is the difference between a 5/2 directional control valve, single solenoid and a 5/2 Directional control valve, double solenoid?

Ans: 5/2 DCV single solenoid has 2 positions one which is actuated by a solenoid and the other is either set by default using spring force or by some manual method, whereas in the 5/2 DCV double solenoid both the positions are actuated by solenoids.

Q.4. What are sensors? How many types of sensors are used in electropneumatic systems?

Ans: Sensors are devices which measure the change in a physical quantity and passing this on to the signal processing part in a form that can easily be processed. Limit switches, proximity sensors, pressure sensors, temperature sensors are a few types of sensors used in electropneumatics.

Q.5. What is a proximity switch and what are its types?

Ans: Proximity Switches:

Proximity switches open or close an electrical circuit when they make contact with or come within a certain distance of an object. As a result, proximity switches have a long service life and high switching reliability. The following types of proximity switches are used in electropneumatics:

1. Reed switch.
2. Inductive proximity switch.
3. Capacitive proximity switch.
4. Optical proximity switch.

Q.6. What is meant by direct and indirect control?

Ans: Direct and Indirect Control:

Direct Control:

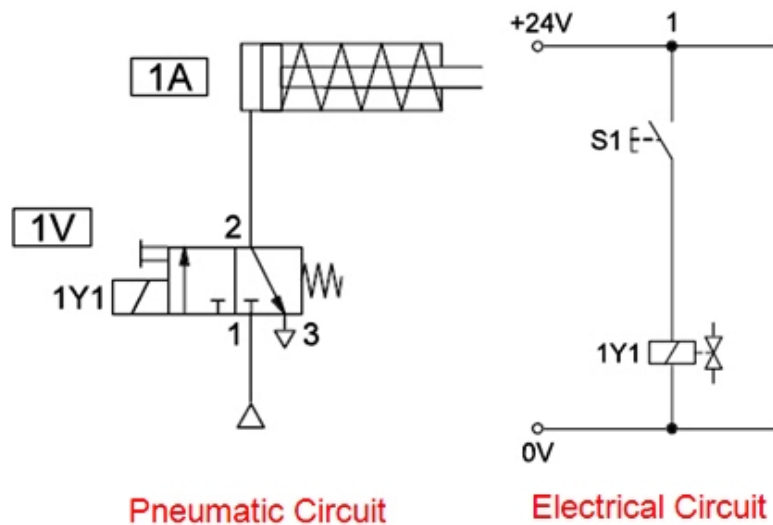
- The piston rod of a single-acting cylinder is to be extended when pushbutton S1 is pressed and retracted when the pushbutton is released.

Indirect Control:

- If the pushbutton is pressed in an indirect control system, current flows through the relay coil. Contact K1 of the relay closes, and the directional control valve switches. The piston rod advances.

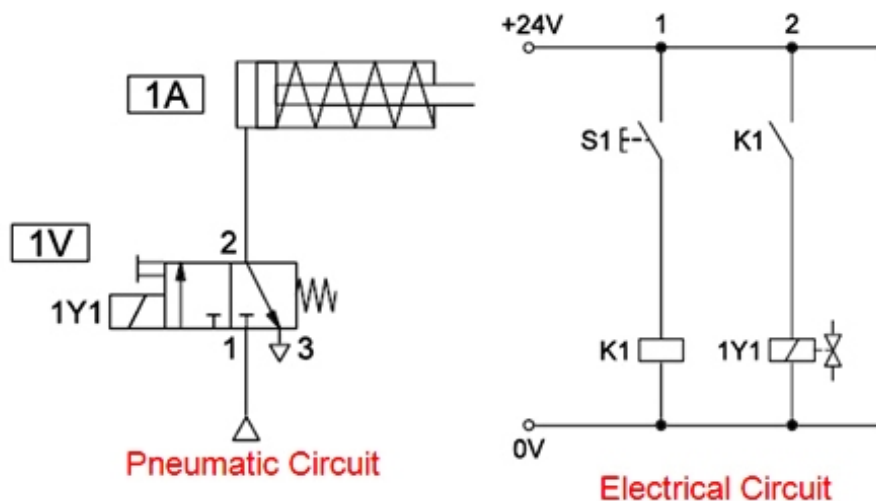
Direct Control of Single Acting Cylinder:

The electrical circuit diagram for direct control of a single-acting cylinder is shown in Figure.

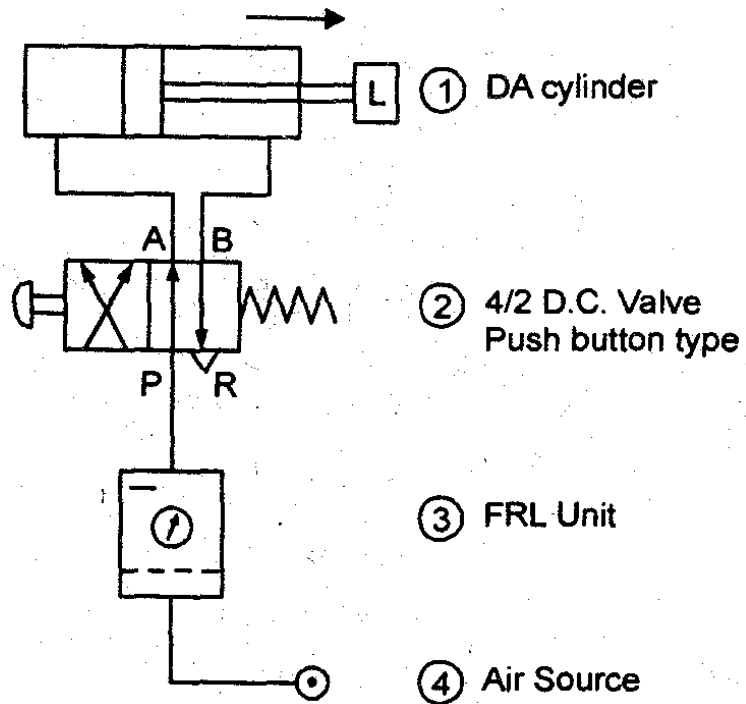


Indirect Control of Single Acting Cylinder:

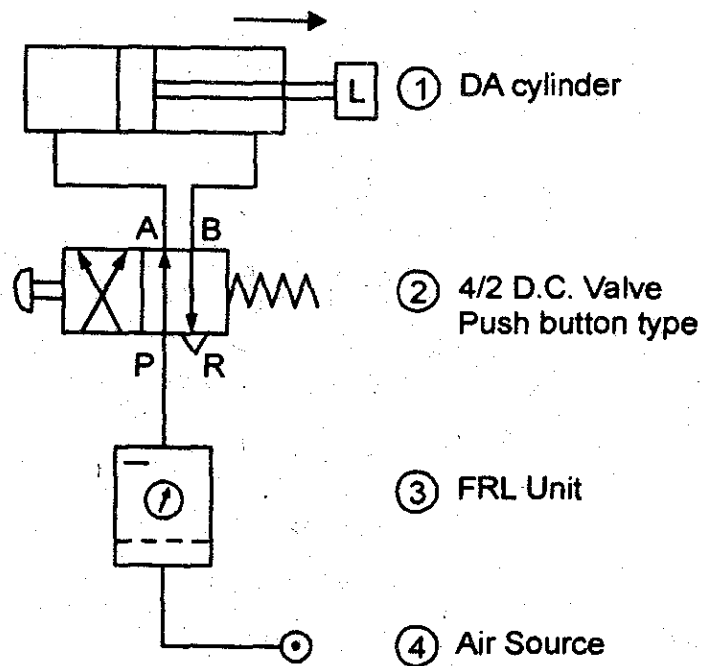
The electrical circuit diagram for indirect control of a single-acting cylinder is shown in Figure:



- Q.7.** From the pneumatic circuit given find out the following:
- (a) Position of the rod when the push button is pressed
 - (b) Position of the rod when the push button is released



Ans:



When the push button is pressed the piston rod will be retracted

When the push button is released the piston rod will be extracted.