

Experiment No. 1

Single acting cylinder

Aim:

The aim of this experiment is to understand the working principle of a single-acting pneumatic cylinder, its components, and applications, and to gain practical experience in setting up and controlling a single-acting cylinder in a pneumatic system.

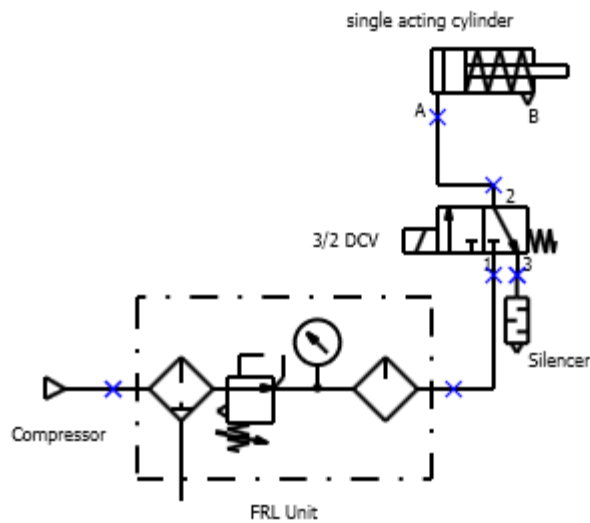
Components:

- Pneumatic compressor
- Air reservoir
- Single-acting pneumatic cylinder
- Directional control valve (3/2-way)
- Solenoid valve
- Pressure gauge
- Tubing and fittings
- Air supply and regulation equipment
- Manifold or worktable
- Tools for assembly and disassembly

Why We Learn This Experiment:

- To grasp the operation of single-acting pneumatic cylinders and their applications in industrial systems.
- To understand the control of linear motion in pneumatic systems.
- To learn about the interaction between directional control valves and pneumatic cylinders.
- To acquire practical skills in assembling and controlling pneumatic systems.
- Industrial Applications: Single-acting pneumatic cylinders find use in various industrial applications, including:
 - Manufacturing: For tasks such as material handling, clamping, and part ejection in assembly lines.
 - Packaging: In machines for pushing, lifting, or ejecting items in the packaging process.
 - Automotive: In applications like door locking, seat adjustments, and brake actuation.
 - Medical: For controlling mechanisms in medical equipment, such as hospital beds and dental chairs.
 - Aerospace: In aircraft systems for functions like locking doors and actuating landing gear.

Pneumatic Connections:



Procedure:

1. Assemble the pneumatic circuit on the worktable or manifold, ensuring all components are securely connected.
2. Connect the air compressor and reservoir to provide a stable air supply.
3. Install a pressure gauge to monitor air pressure.
4. Connect the compressed air supply to the inlet port (port 1) of the 3/2 DCV using pneumatic tubing and fittings. Ensure a proper seal and make sure the connection is secure.
5. Connect the outlet port (port 2) of the 3/2 DCV to the air input (A) port of the pneumatic cylinder using pneumatic tubing and fittings. This is the port that will push the piston in the desired direction.
6. Connect the exhaust port of the pneumatic cylinder (B) to the exhaust port of the 3/2 DCV. This is where the air will be released when you want to retract the cylinder.
7. Adjust the air supply pressure to the desired level.
8. Actuate the directional control valve using the solenoid valve to extend and retract the single-acting cylinder.
9. Measure and record the time it takes for the cylinder to perform each action.
10. Experiment with different pressure settings and observe the changes in cylinder speed.
11. Analyze and discuss the results to understand the behavior of the single-acting cylinder in the system.

Safety Considerations:

- Ensure all connections are tight and secure to prevent air leaks.
- Work in a well-ventilated area, as compressed air is used.
- Wear safety goggles and protective gear to prevent injury.
- Be cautious of high-pressure components and take necessary precautions.

Conclusion:

In conclusion, this experiment provides students with practical knowledge about single-acting pneumatic cylinders and their applications in pneumatic systems. It allows students to gain hands-on experience in controlling linear motion in a pneumatic setup. Understanding the behavior of single-acting cylinders is essential for designing and maintaining pneumatic systems used in various industries. This knowledge can be applied to real-world engineering scenarios where precise control of linear motion is required.