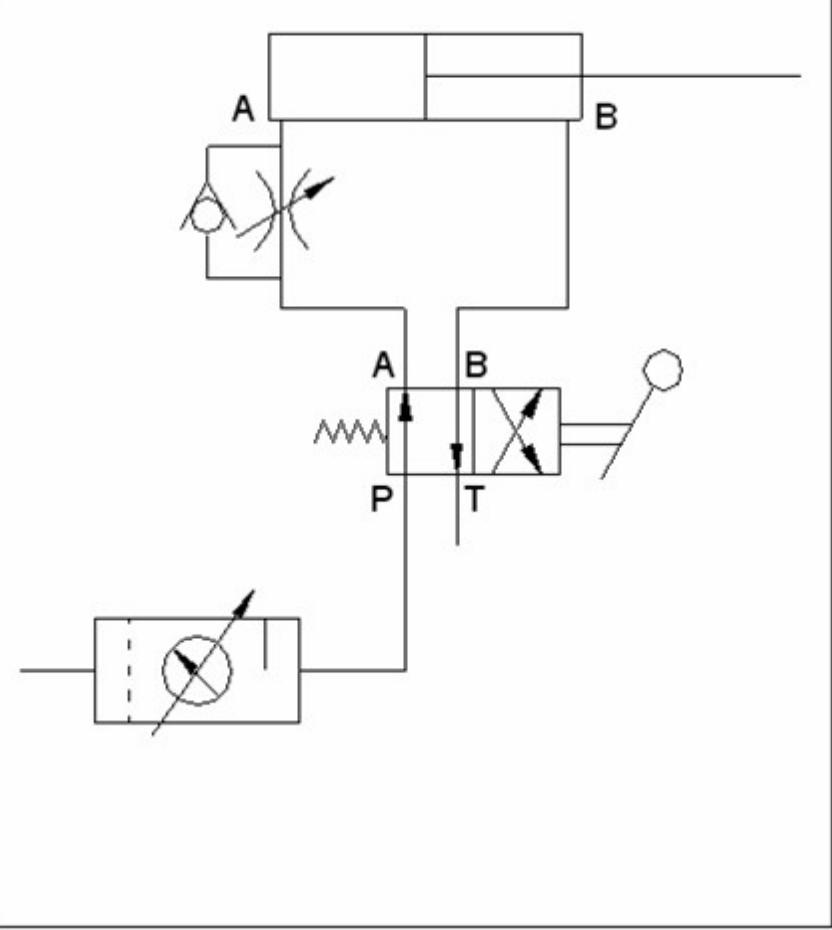


# Pneumatic Circuits

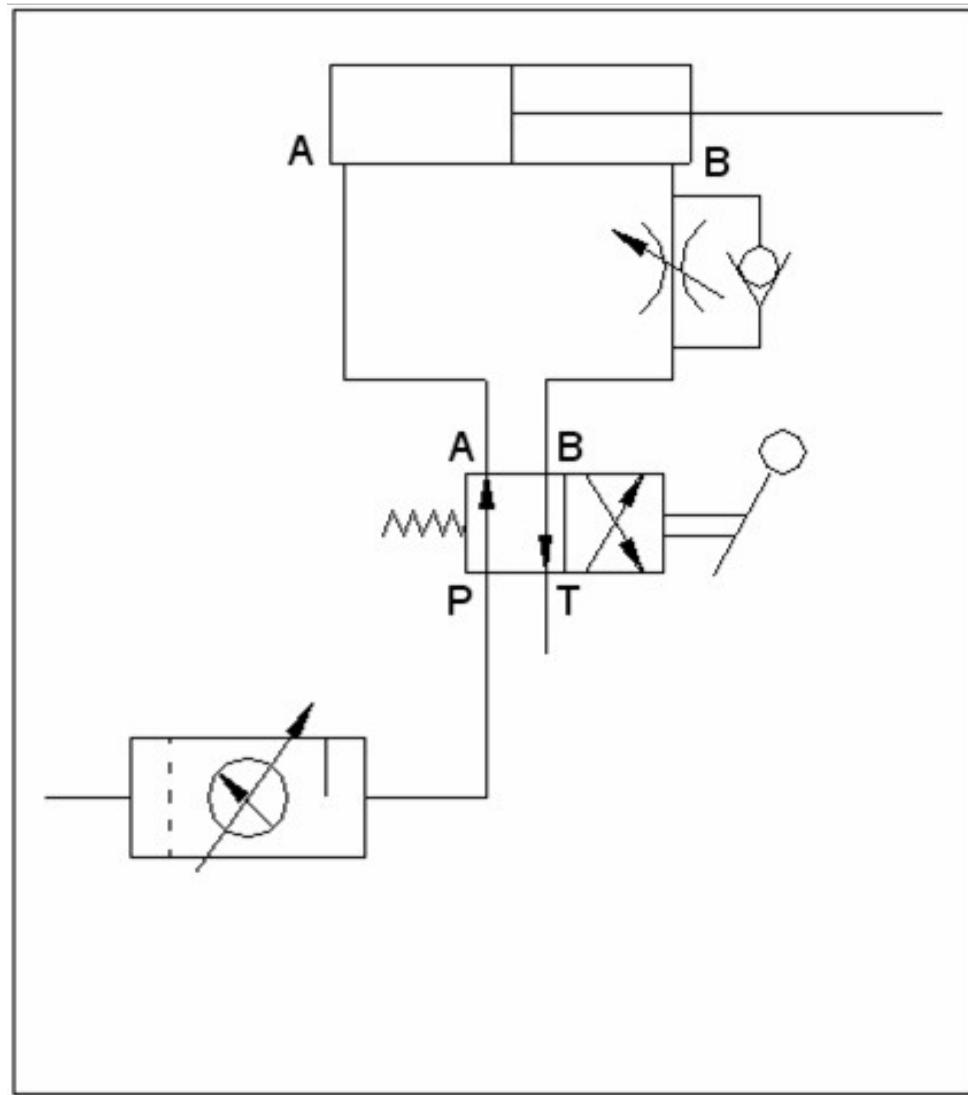
# Speed control circuits

- Meter in or throttlin



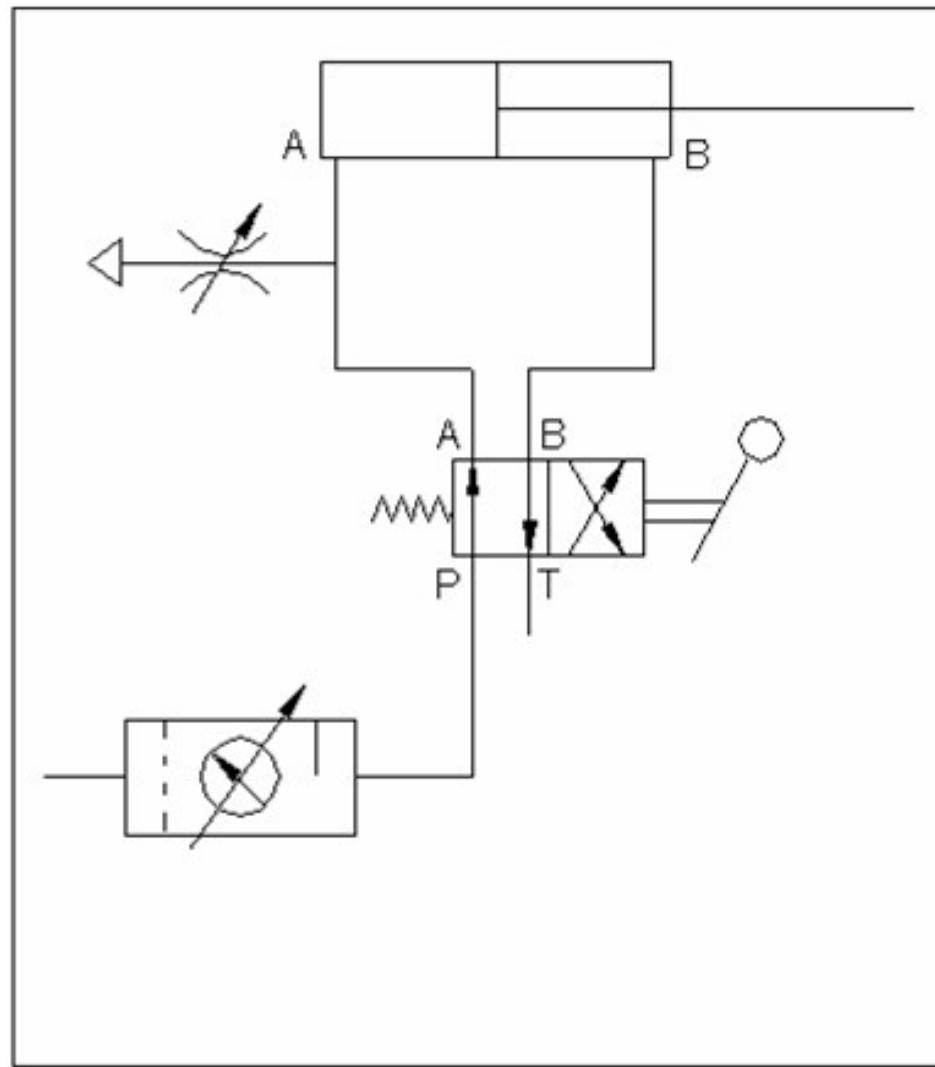
# Video 1

# Meter out or throttling out



# Video 2

# Bleed off



# Bi directional motor

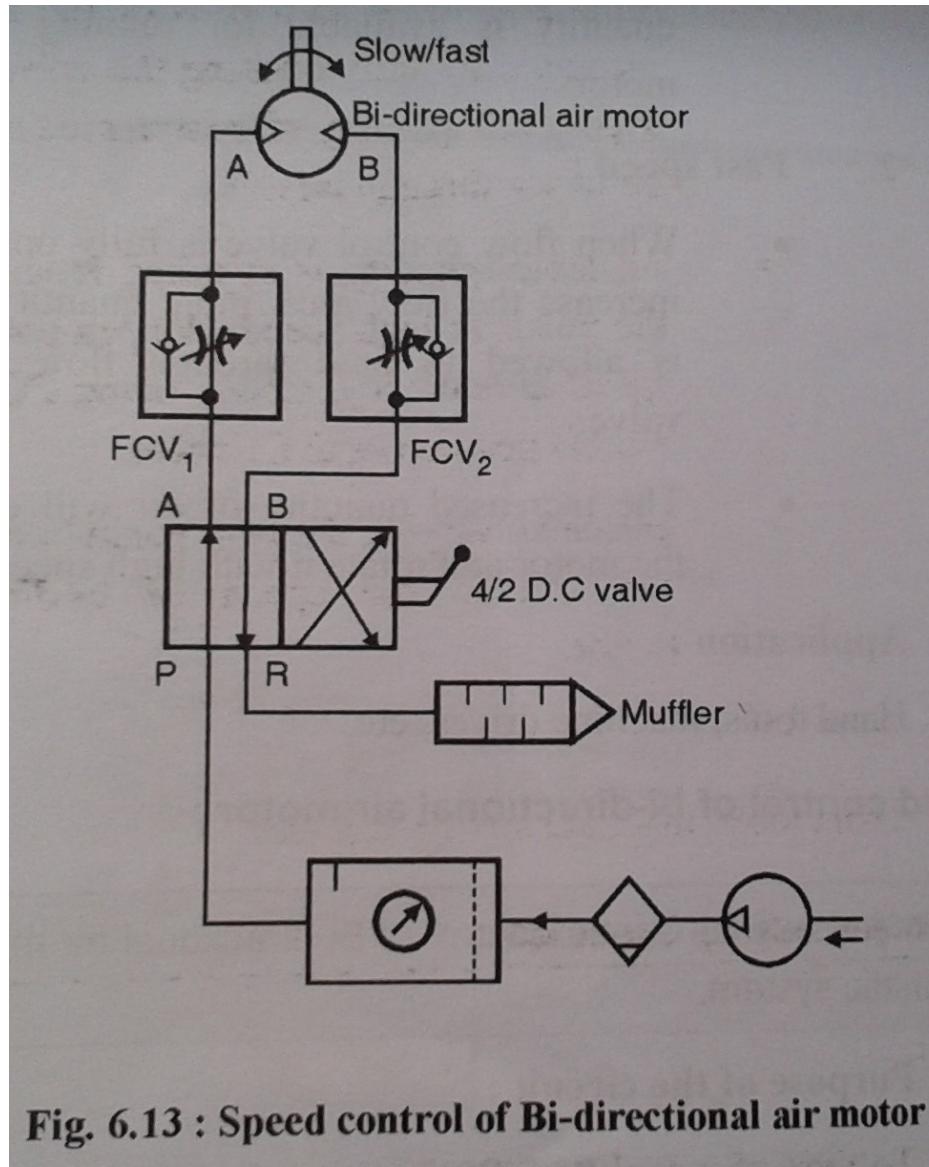
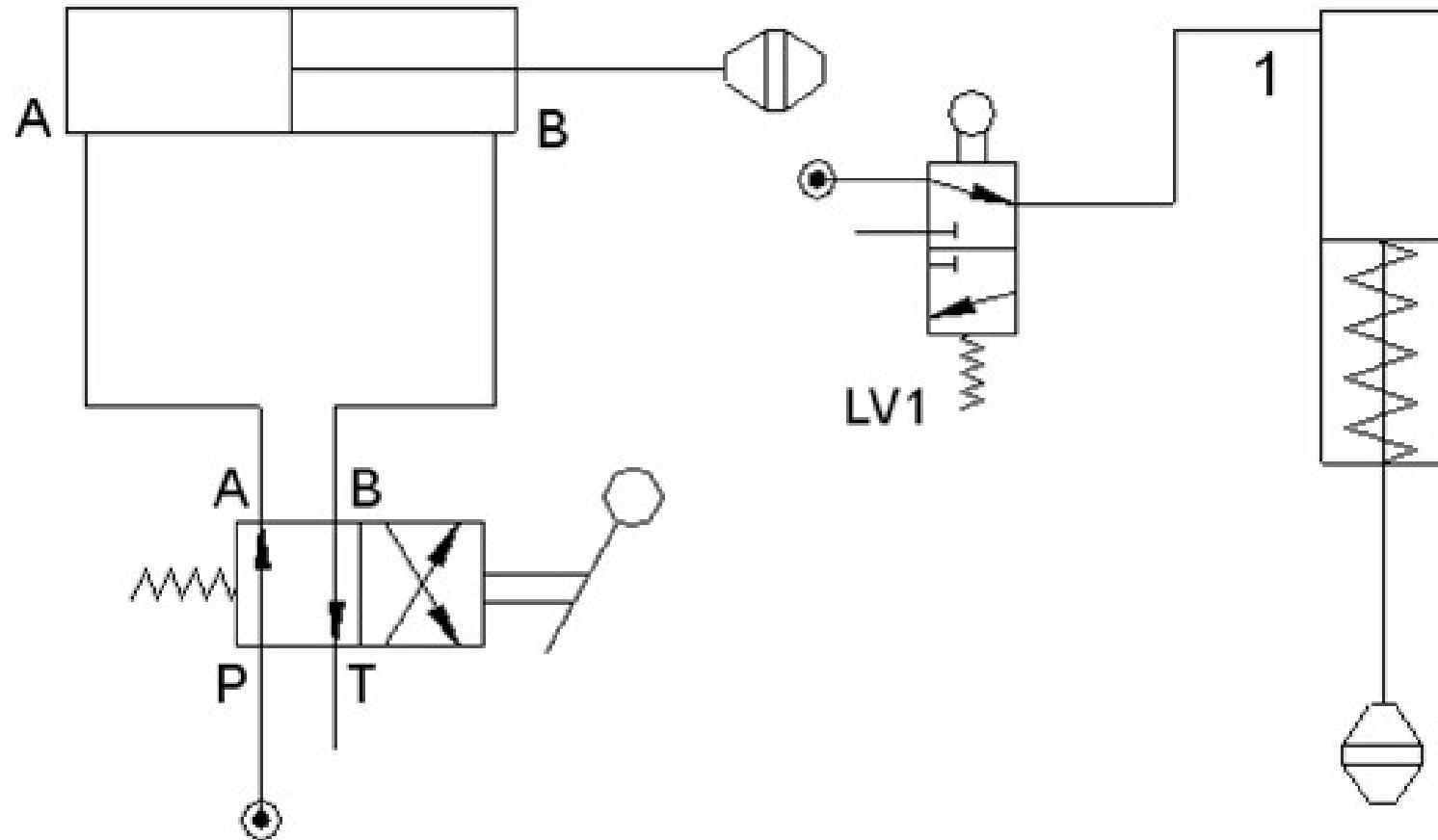
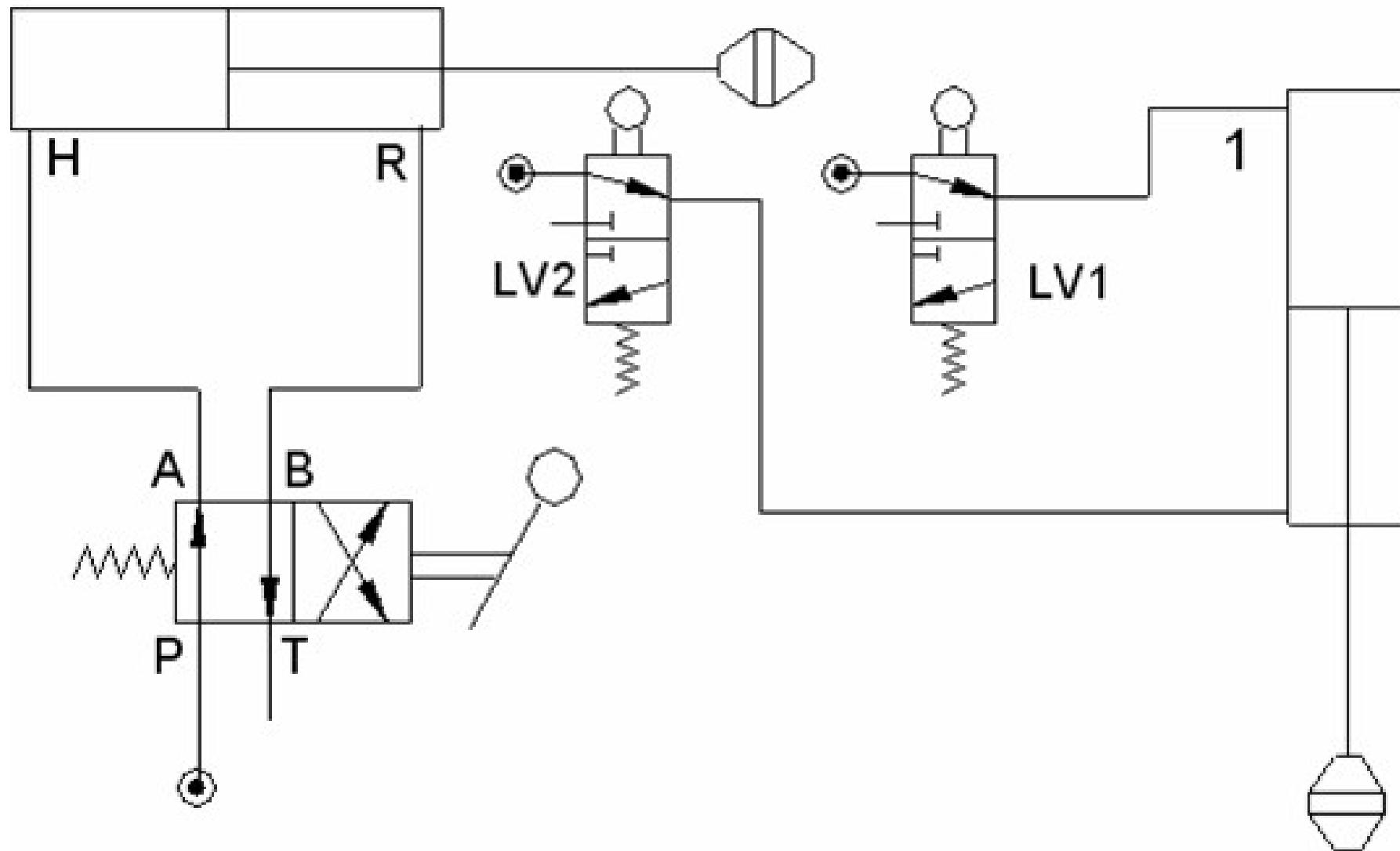
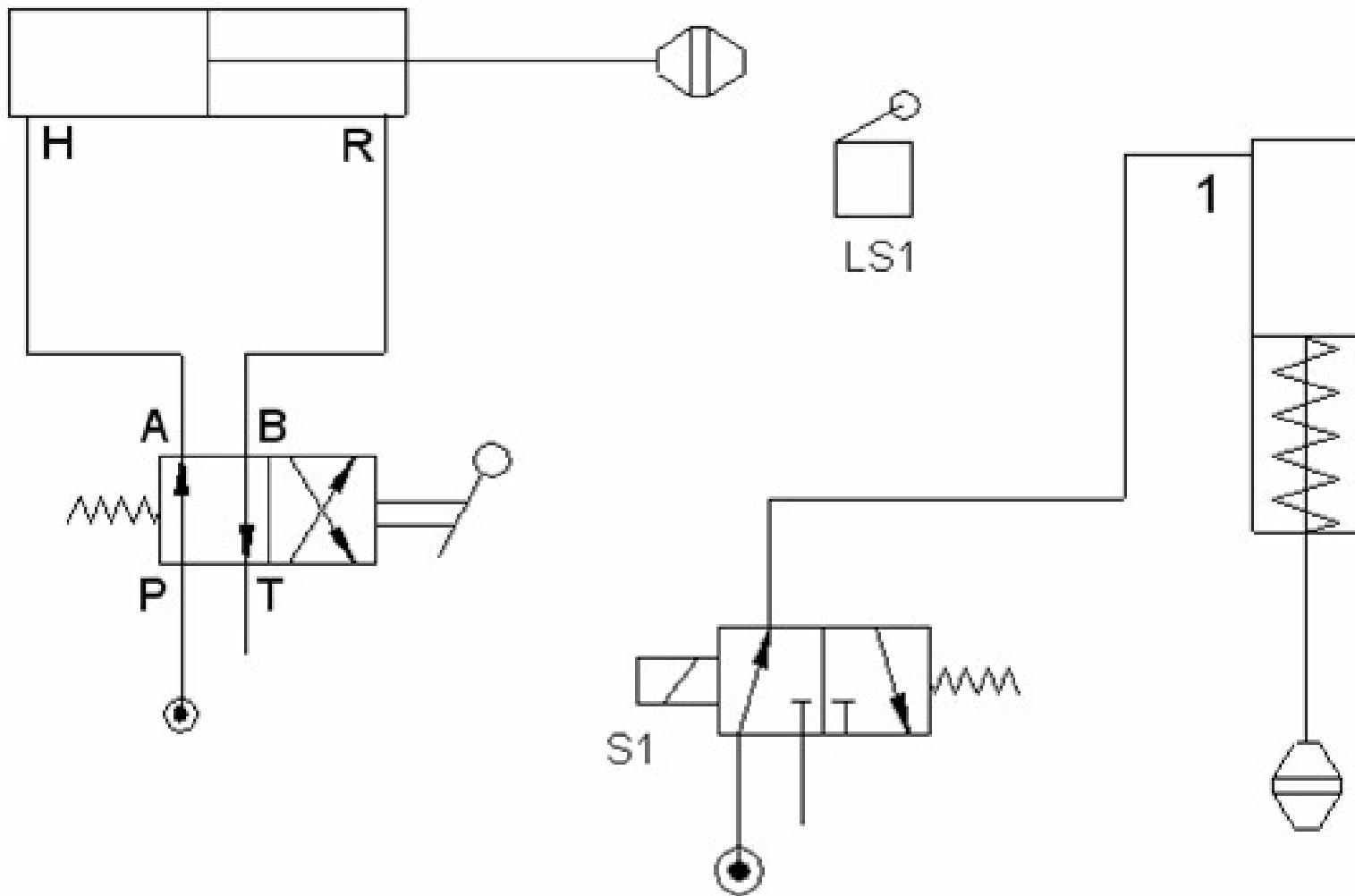


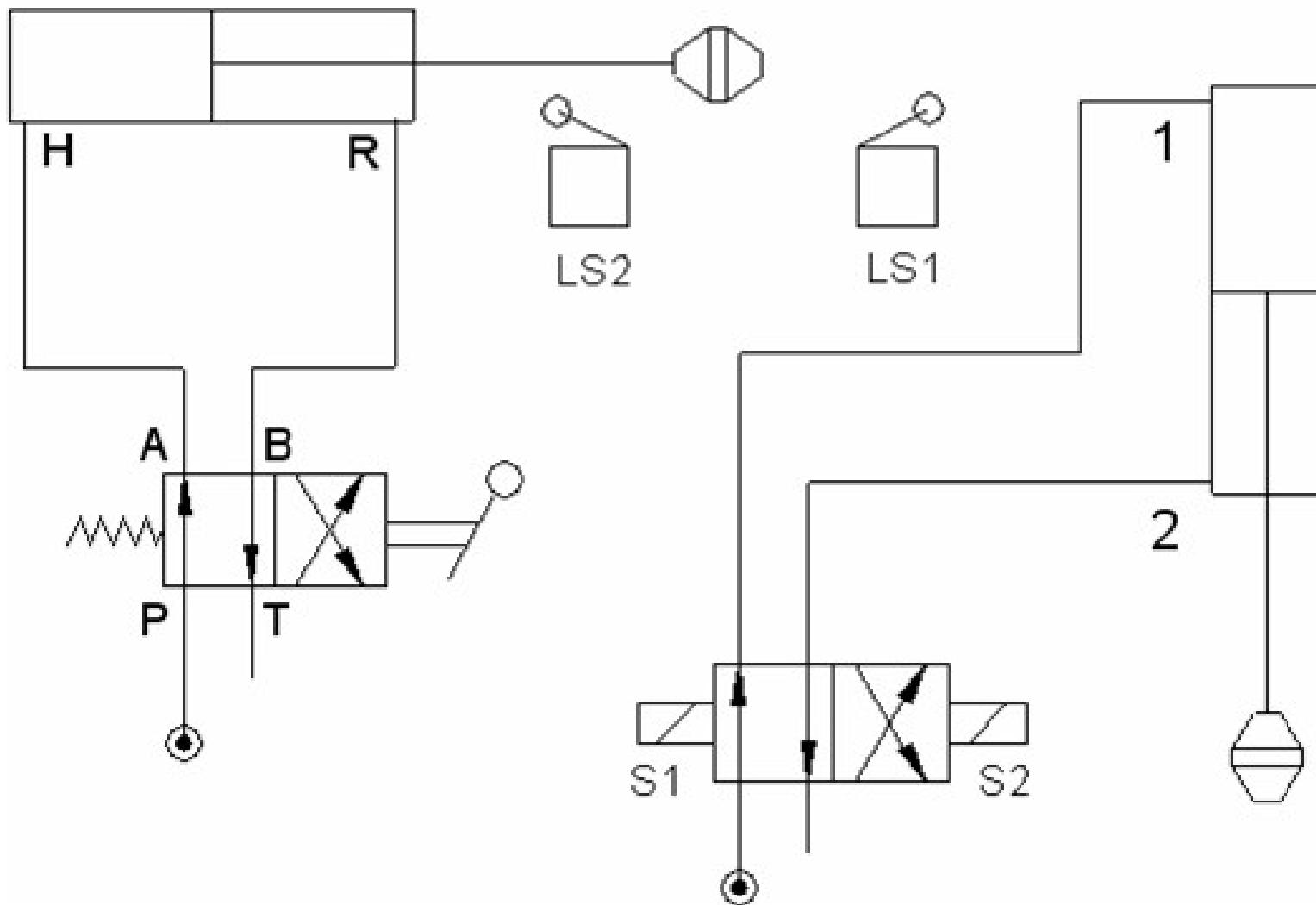
Fig. 6.13 : Speed control of Bi-directional air motor

# Sequential circuits



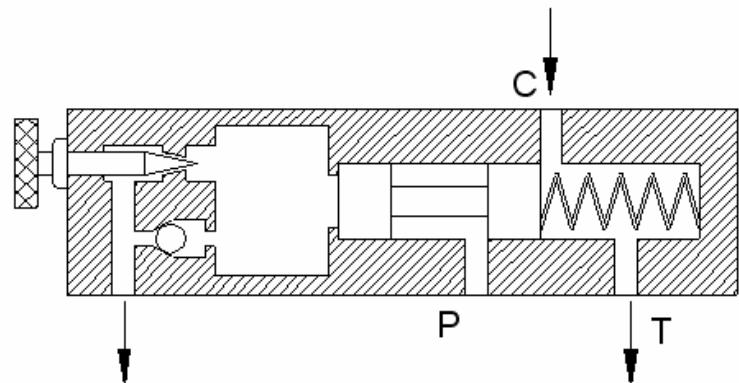
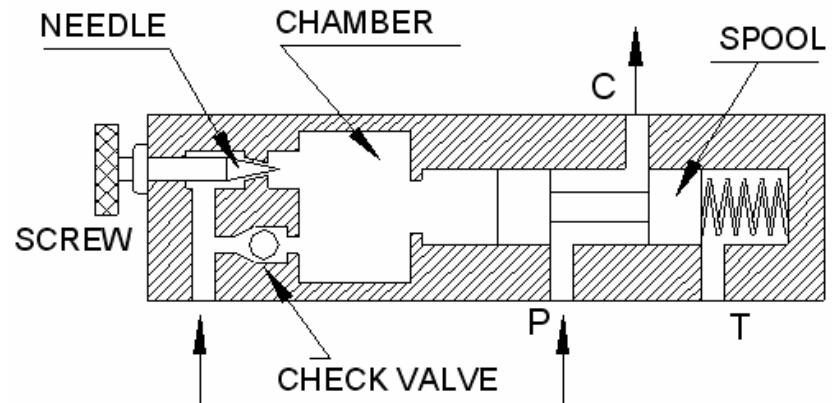




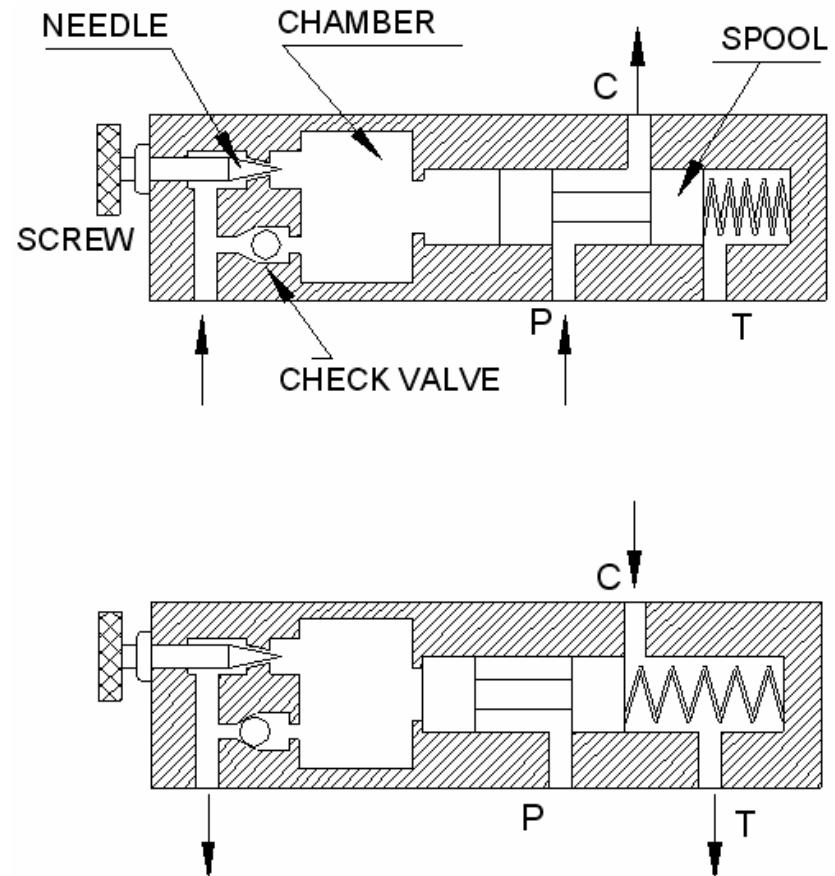


# Time delay valve

- This valve is used to have required amount of time delay between two operations.
- For example a cylinder extends first and it retracts automatically after preset amount of time.
- Figure shows a time delay valve.
- It has an in-built reservoir, flow control, a check valve, and pilot operated 3/2 direction control valve.



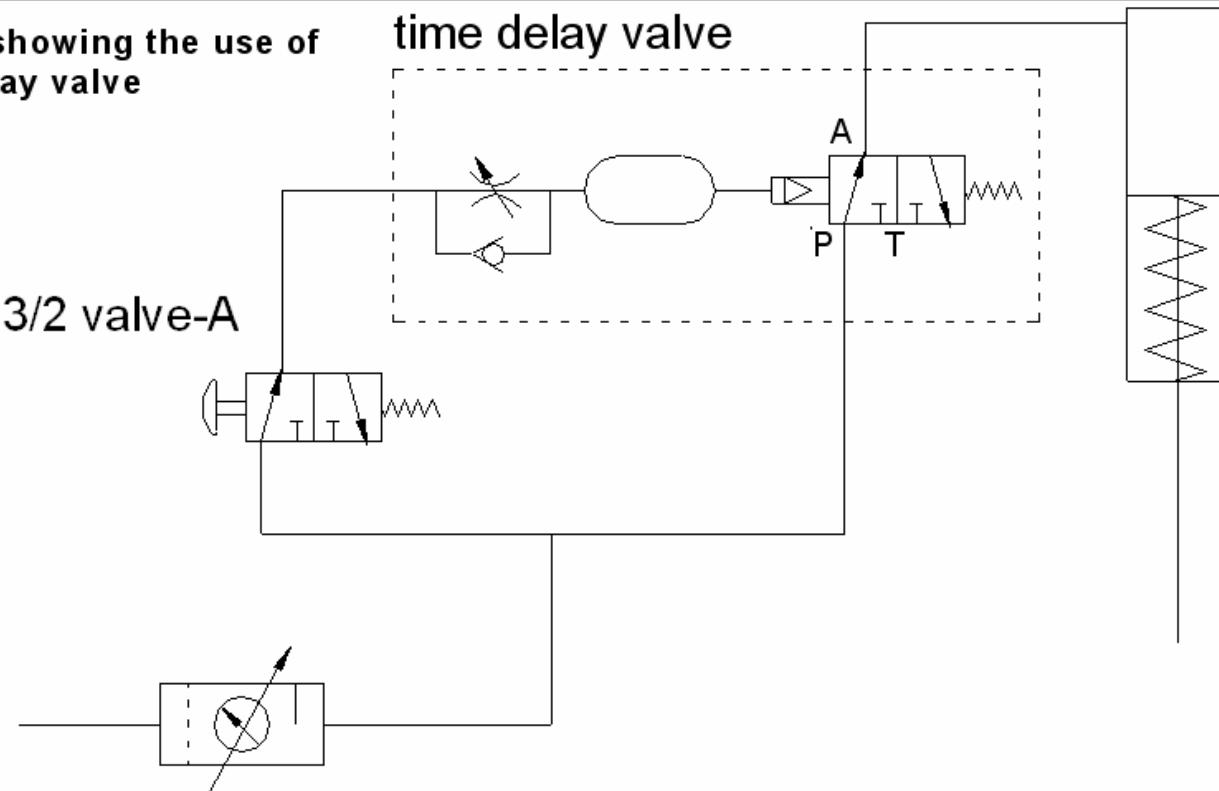
- When the fluid under pressure is admitted through inlet port of this valve, it fills in the chamber, and exerts force on the spool.
- Due to this, the spool is pressed against the spring force, making the connection from port-P to port-C.
- When the inlet port of this valve is open to oil reservoir (incase of hydraulic systems) or to atmosphere (incase of pneumatic systems), the fluid flows slowly through FCV. Hence pressure in chamber reduces slowly. Once the pressure becomes less than the spring pressure, the spool shifts back to make the connection between port-C to port-T, port-P gets closed



# Video 3

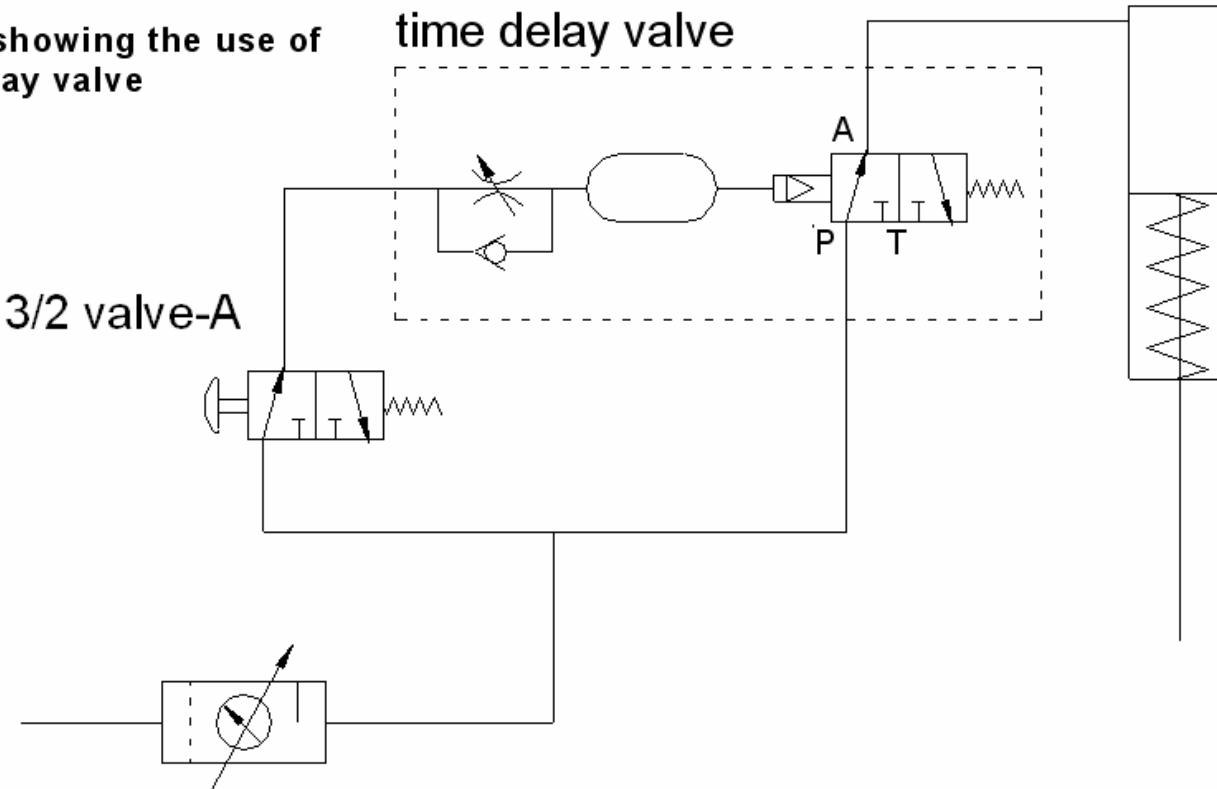
- When the push button of 3/2 valve “A” is pressed, fluid flows to inlet of time delay valve. It flows through the check valve and quickly fills in the reservoir.
- It exerts pressure on the spool of pilot operated 3/2 valve, hence the spool will shift to make the connection from inlet “P” to cylinder port “A” and hence the single acting cylinder exten

**Circuit showing the use of time delay valve**



- The spool of pilot valve will not shift back until the pressure in reservoir falls below the spring force. Fluid is leaking slowly through the flow control valve and hence pressure is dropping slowly.
- Once the pressure becomes less than the spring pressure, the spool will shift back automatically to close the inlet, and makes connection from cylinder port “A” to outlet port “T”, hence the cylinder retracts. The time of delay can be easily adjusted by adjusting the flow control valve.

**Circuit showing the use of time delay valve**



# Video 4