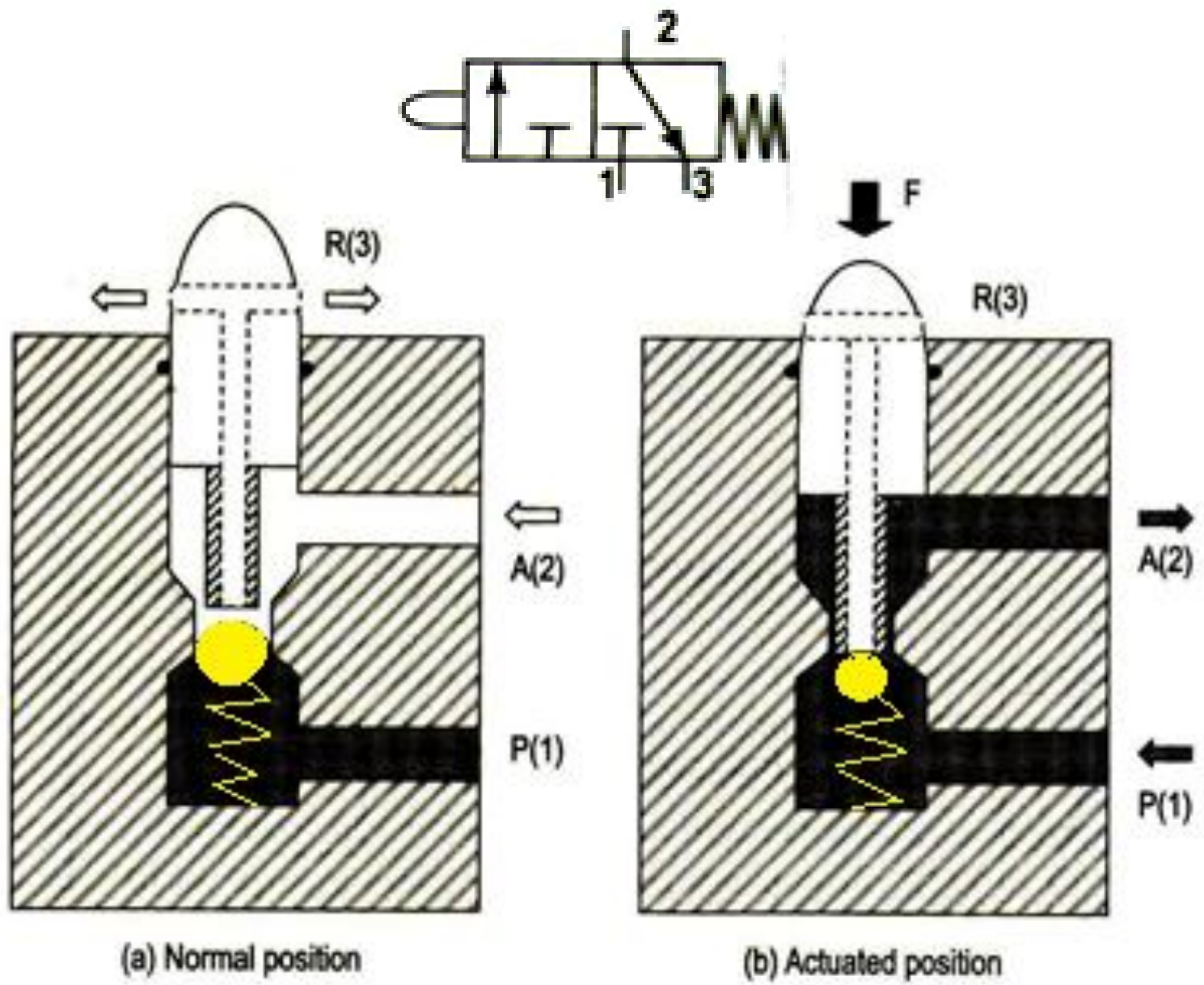
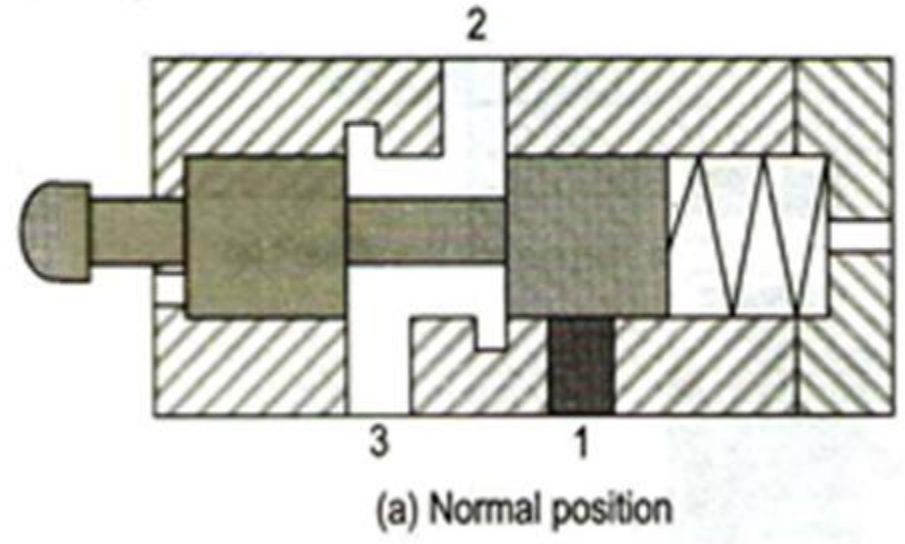
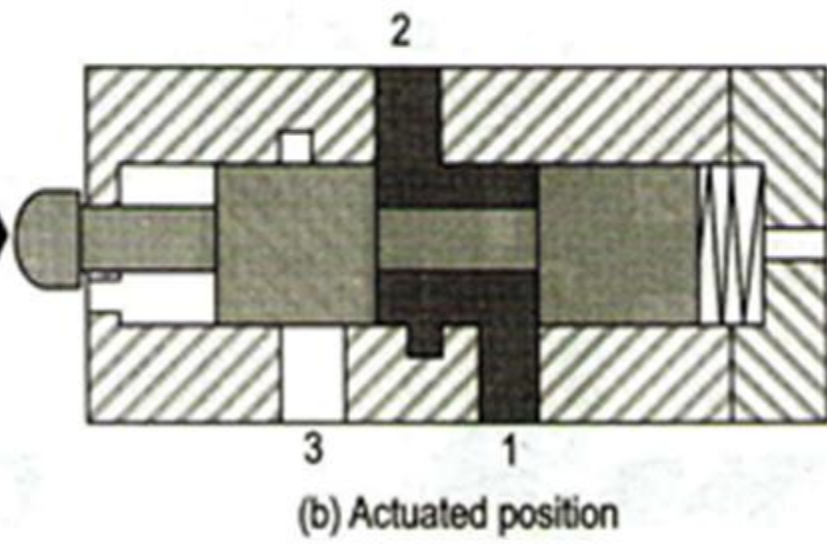
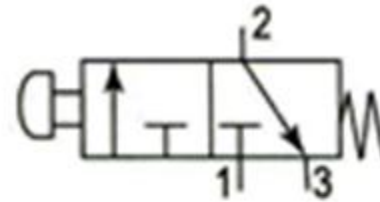


# COMPONENTS OF HYDRAULIC AND PNEUMATIC SYSTEM

PRASHANT AMBADEKAR



3/2-DC valves (NC) – ball poppet type.



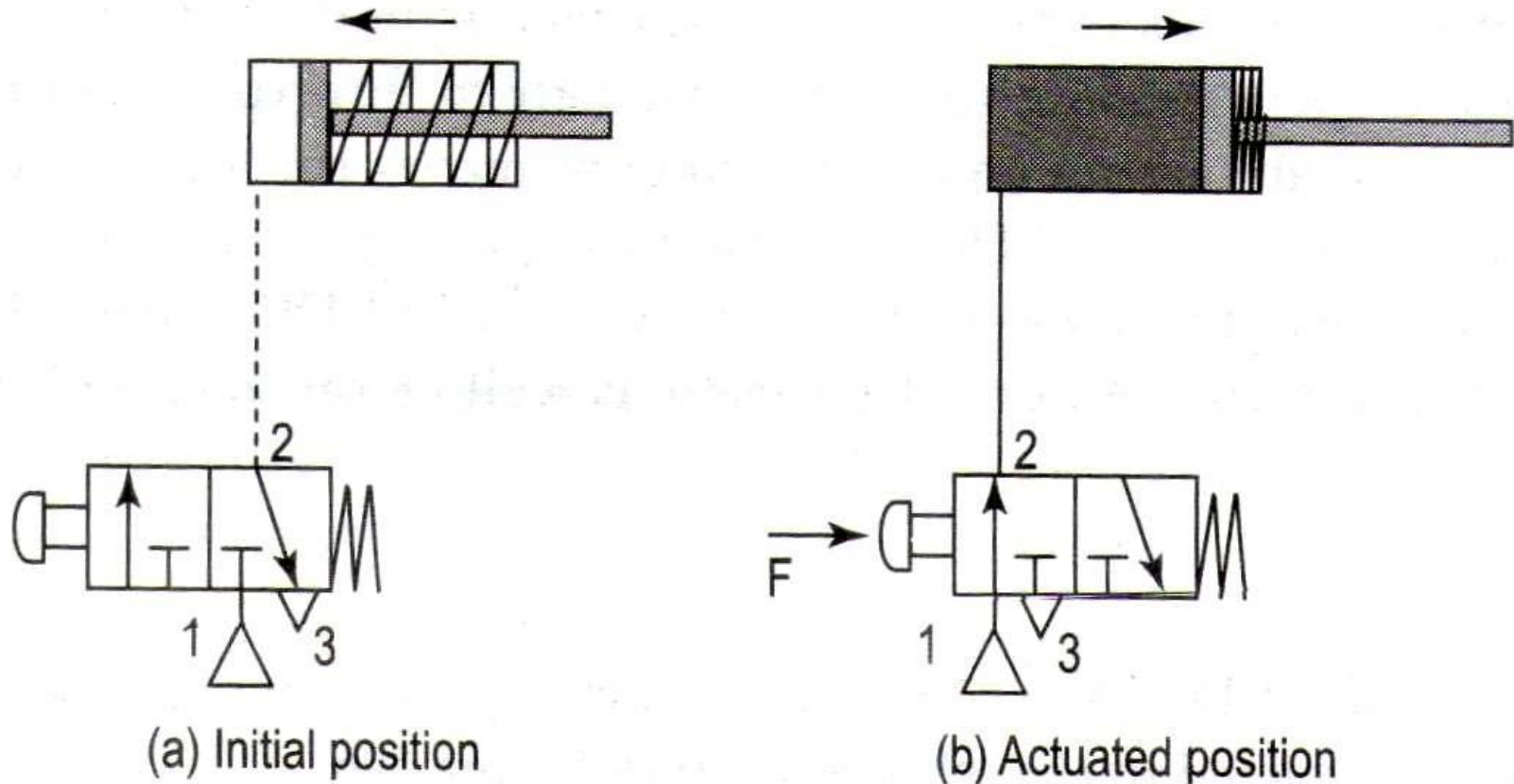
3/2 DC valve (Normally closed)- spool type

## Direct control of a single Acting Cylinder

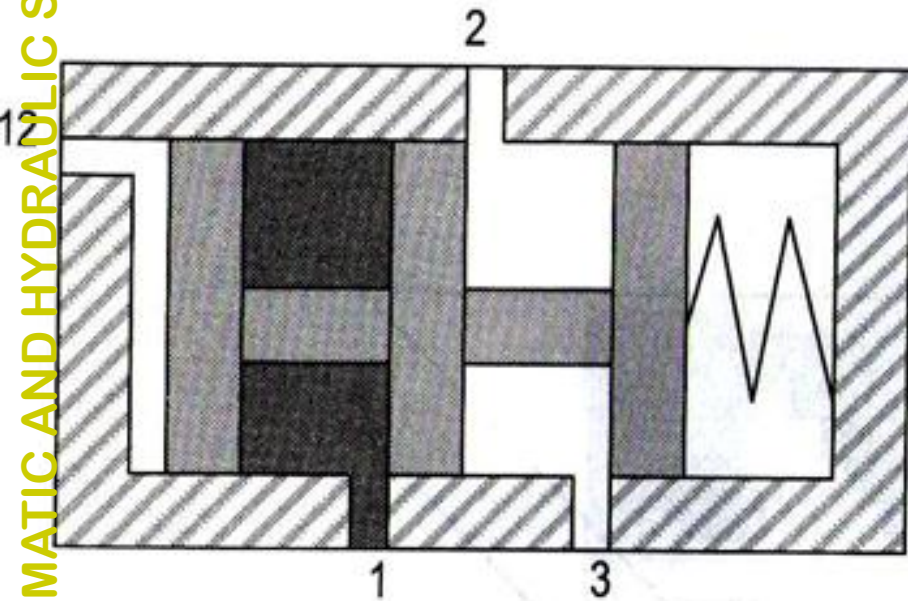
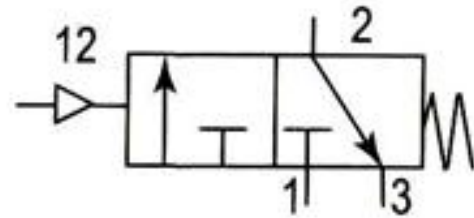
A SAC of small piston diameter is used to clamp a work piece when the push button is pressed. As long as the push button is pressed, the cylinder is to remain in clamped position. If the push button is released, the cylinder is to retract. Develop a pneumatic circuit to implement the above requirement using a 3/2 DC valve.

## Direct control of a single Acting Cylinder

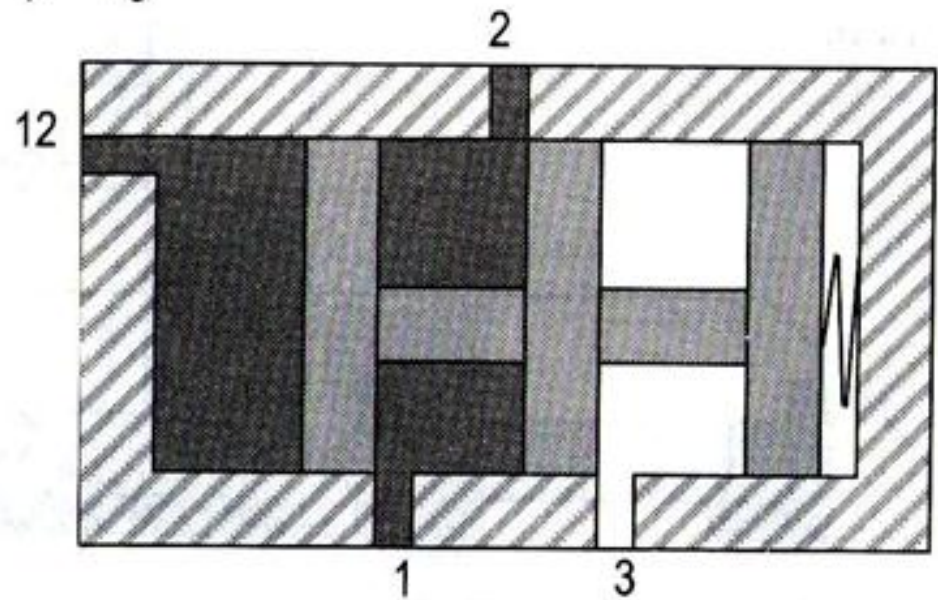
A SAC of small piston diameter is used to clamp a work piece when the push button is pressed. As long as the push button is pressed, the cylinder is to remain in clamped position. If the push button is released, the cylinder is to retract. Develop a pneumatic circuit to implement the above requirement using a 3/2 DC valve.



Two positions of the circuit for the direct control of single-acting cylinder



(a) Normal position



(b) Actuated position

Pneumatically actuated 3/2-DC valve.

# Indirect control of a single Acting Cylinder

A SAC with large piston diameter is used to clamp a work piece.

Upon operation of a 3/2 DC push button valve from a remote

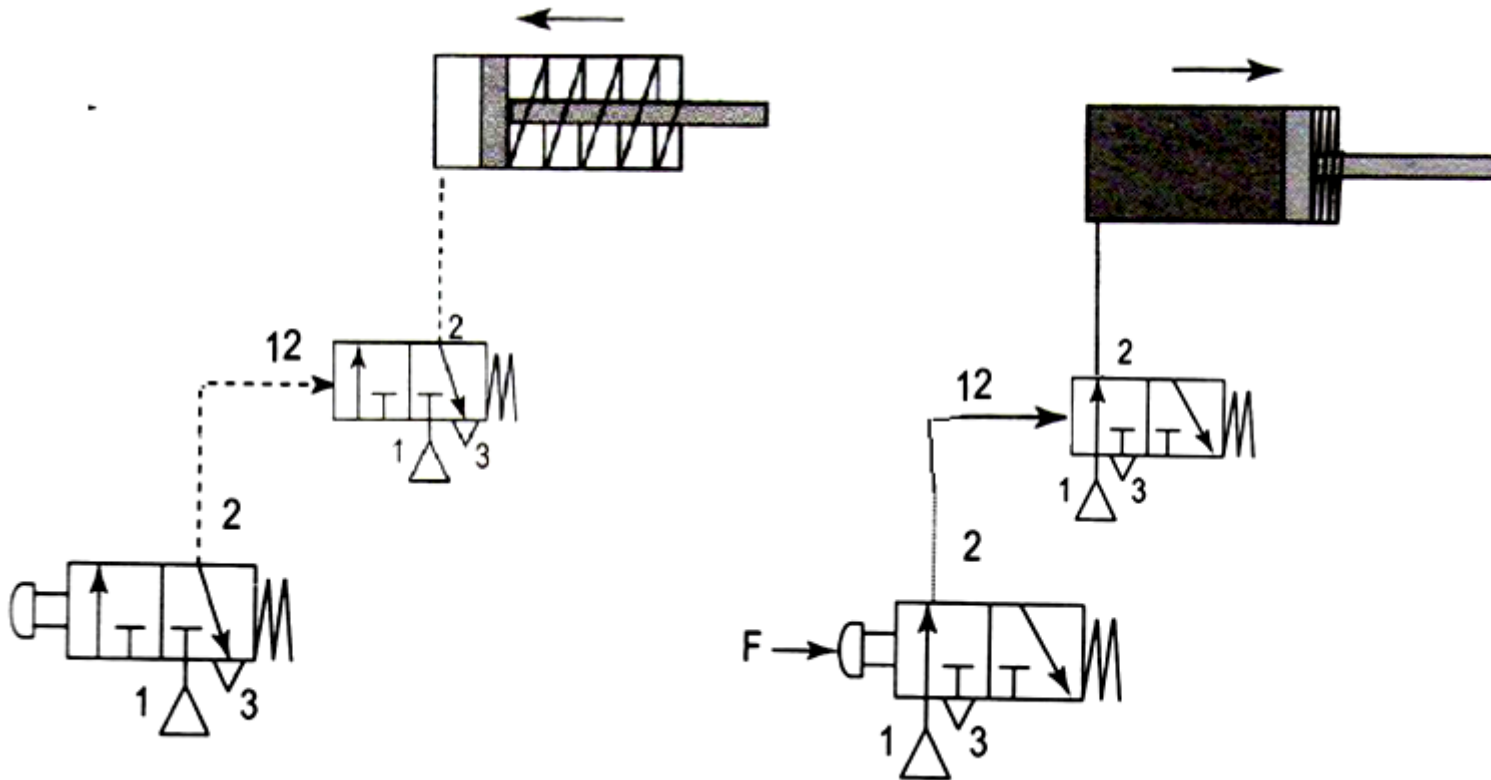
position, the cylinder is extended and when the push button is

released, the cylinder is to retract. Develop a pneumatic circuit to

implement the above assignment

# Indirect control of a single Acting Cylinder

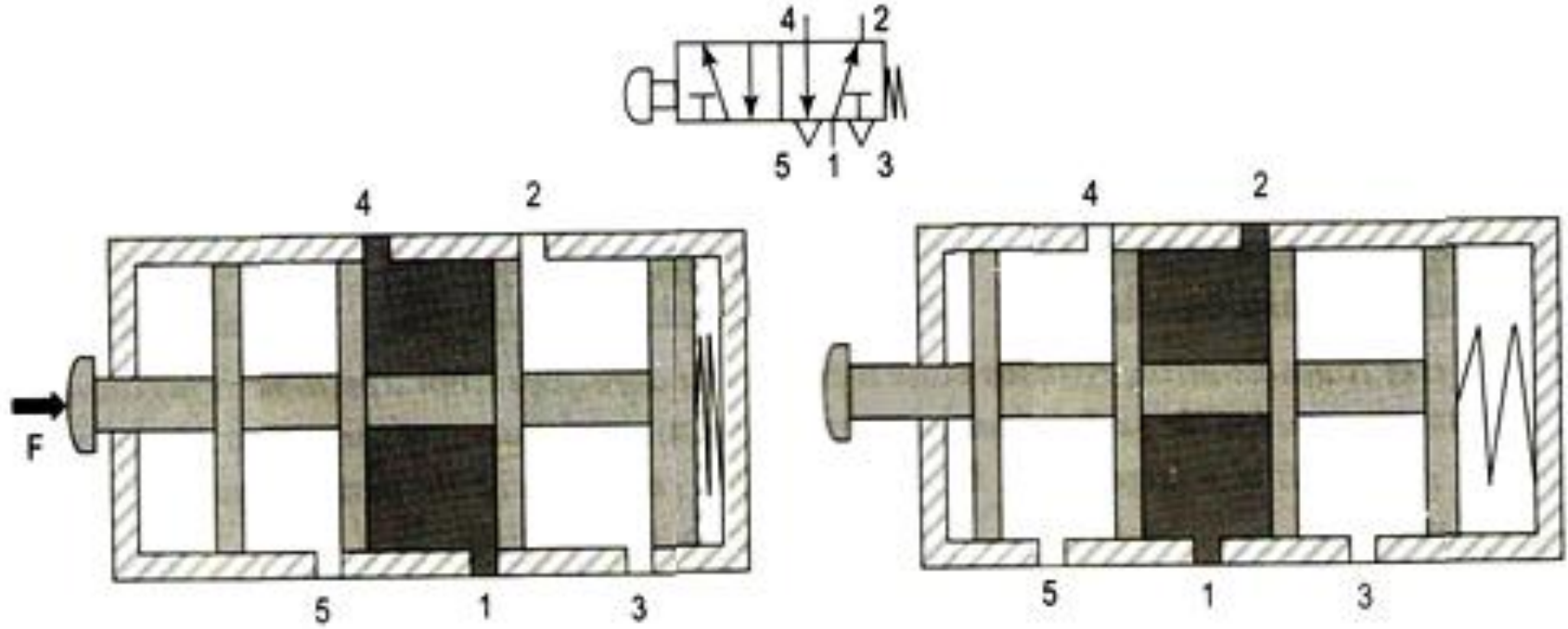
A SAC with large piston diameter is used to clamp a work piece. Upon operation of a 3/2 DC push button valve from a remote position, the cylinder is extended and when the push button is released, the cylinder is to retract. Develop a pneumatic circuit to implement the above assignment



Initial position

Actuated position





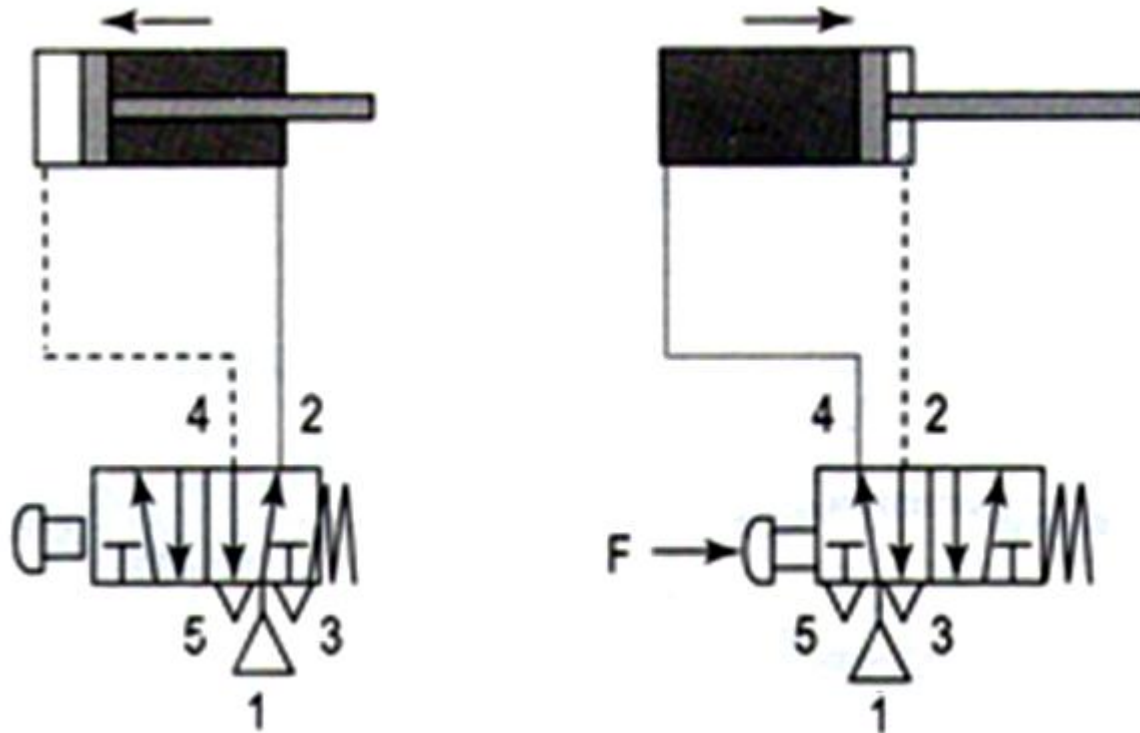
5/2 DC valve (Manually actuated)- spool type

## Direct control of a Double Acting Cylinder

A DAC of small piston diameter is used to clamp a work piece when the push button is pressed. As long as the push button is pressed, the cylinder is to remain in clamped position. If the push button is released, the cylinder is to retract. Develop a pneumatic circuit to implement the above requirement.

# Direct control of a Double Acting Cylinder

A DAC of small piston diameter is used to clamp a work piece when the push button is pressed. As long as the push button is pressed, the cylinder is to remain in clamped position. If the push button is released, the cylinder is to retract. Develop a pneumatic circuit to implement the above requirement.

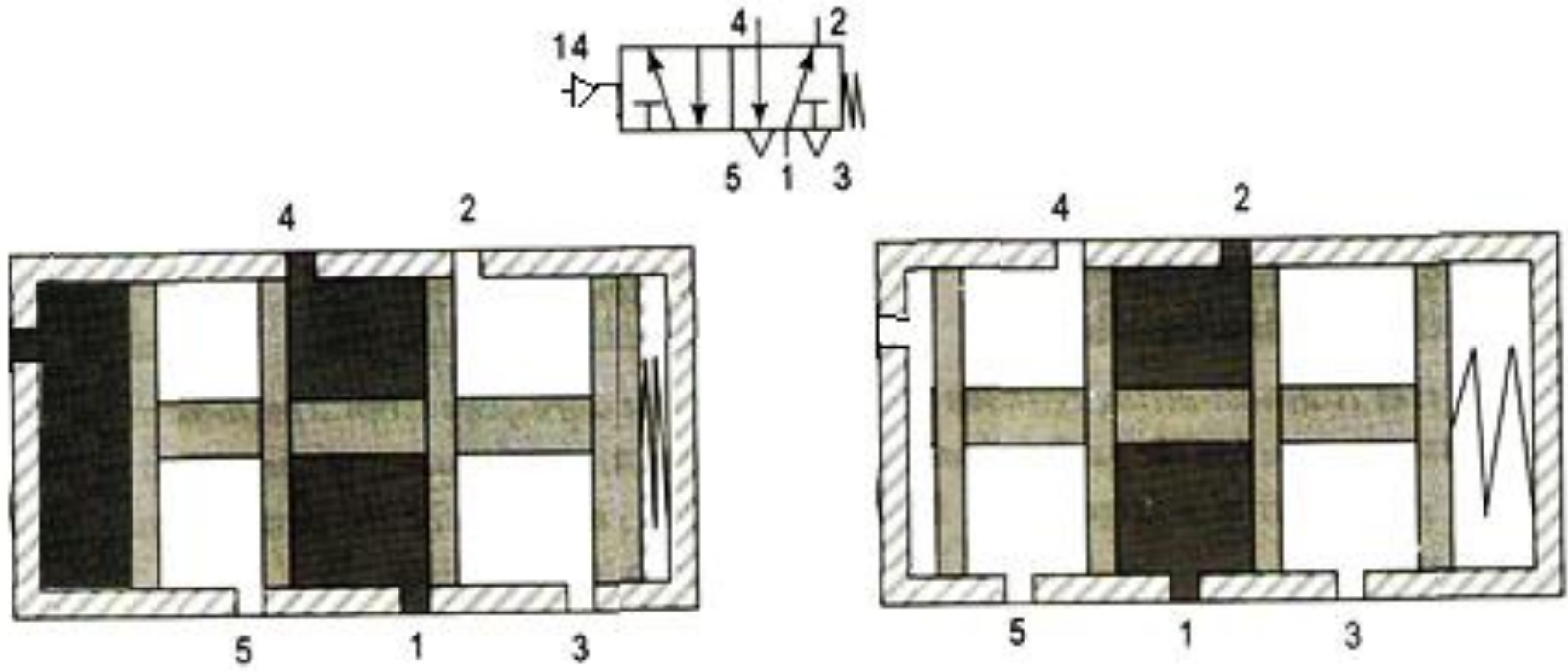


(a) Initial position

(b) Actuated position

Two positions of the circuit for direct control of DAC

PNEUMATIC AND HYDRAULIC SYSTEM



(a) Actuated position

(b) Normal position

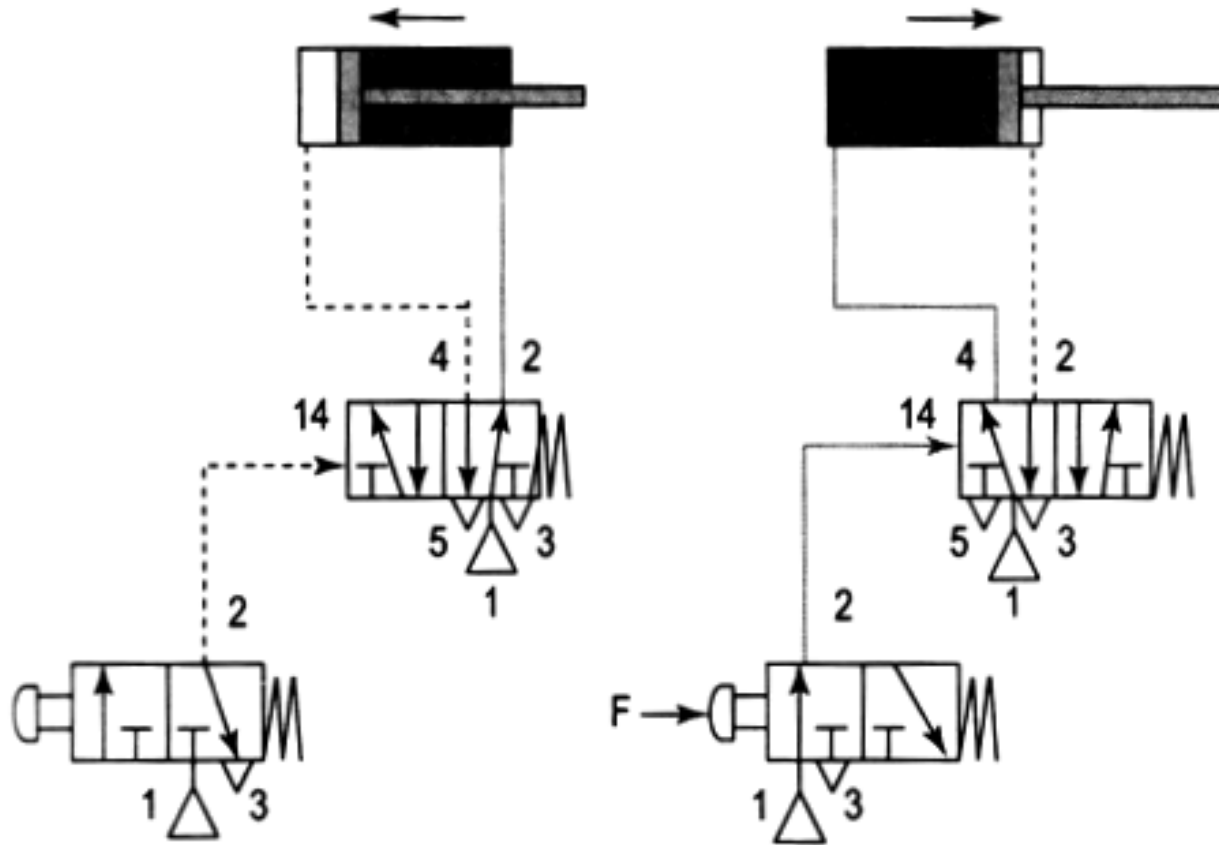
5/2 DC valve (Pneumatic actuated)- spool type

# Indirect control of a double Acting Cylinder

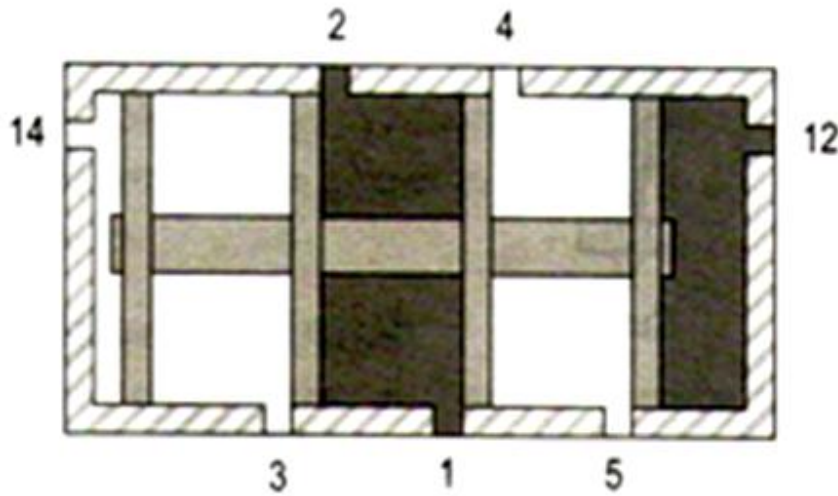
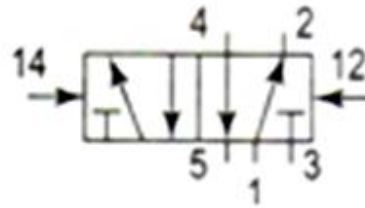
A DAC with large piston diameter is used to clamp a work piece when a push button valve from a remote position, the cylinder is extended and when the push button is released, the cylinder is to retract. Develop a pneumatic circuit to implement the above assignment

# Indirect control of a double Acting Cylinder

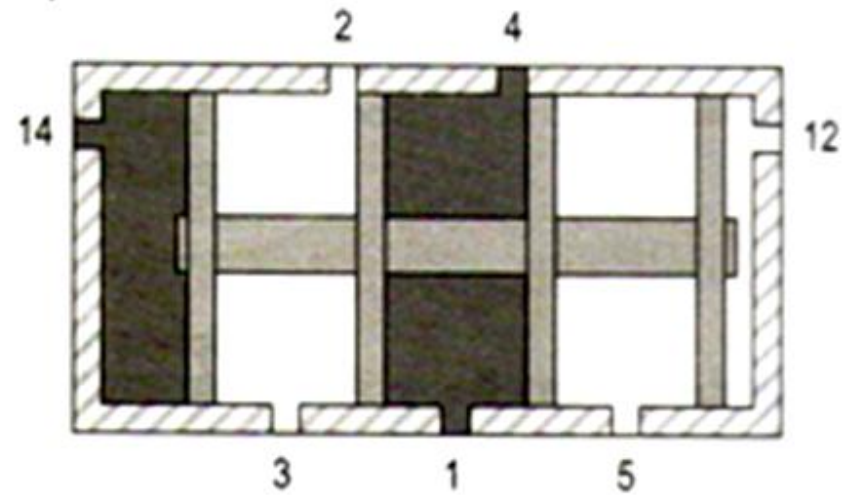
A DAC with large piston diameter is used to clamp a work piece when a push button valve from a remote position, the cylinder is extended and when the push button is released, the cylinder is to retract. Develop a pneumatic circuit to implement the above assignment



# Pilot valve



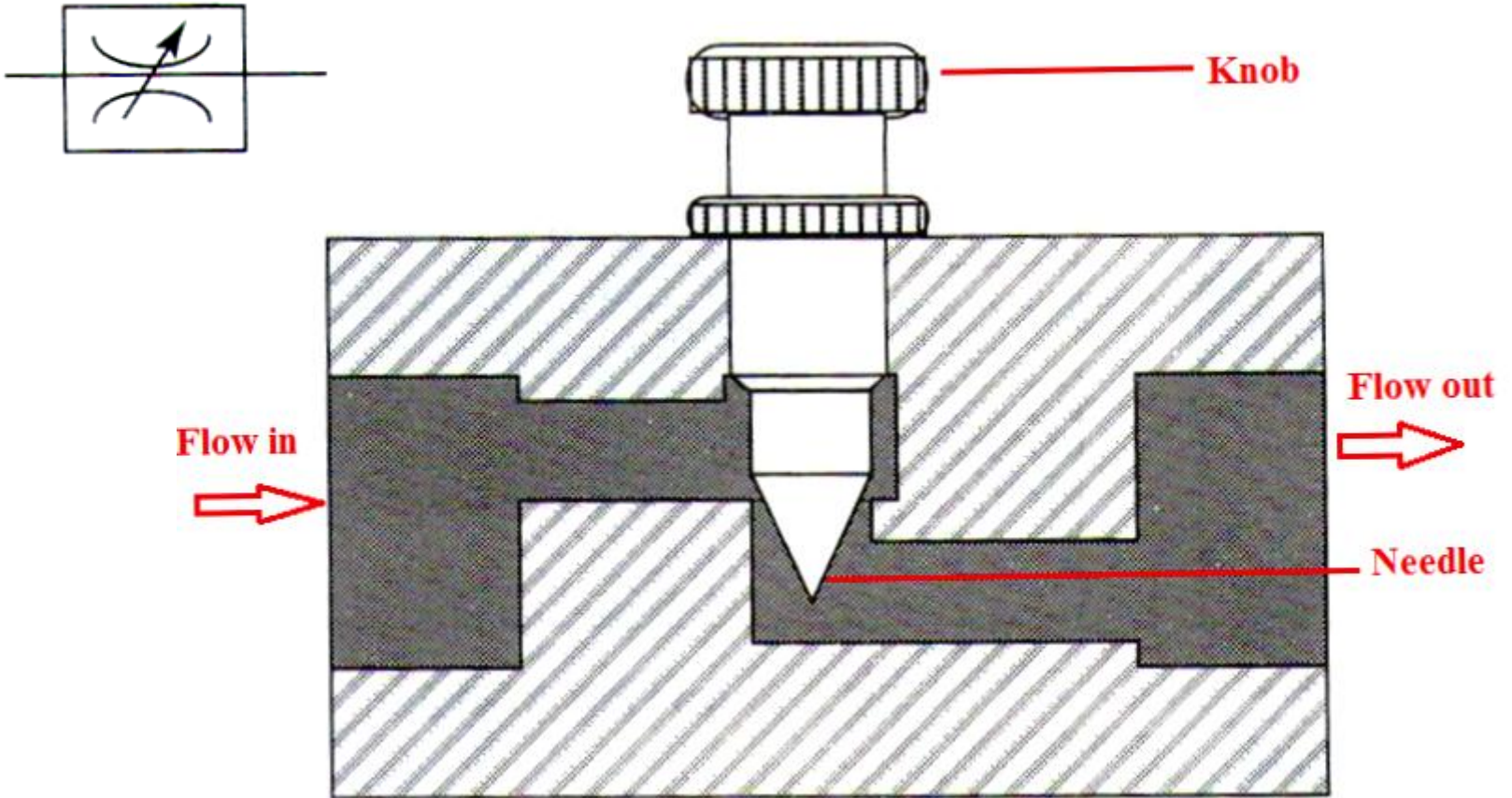
(a) Signal applied to port 12



(b) Signal applied to port 14

5/2-DC double-pilot valve.

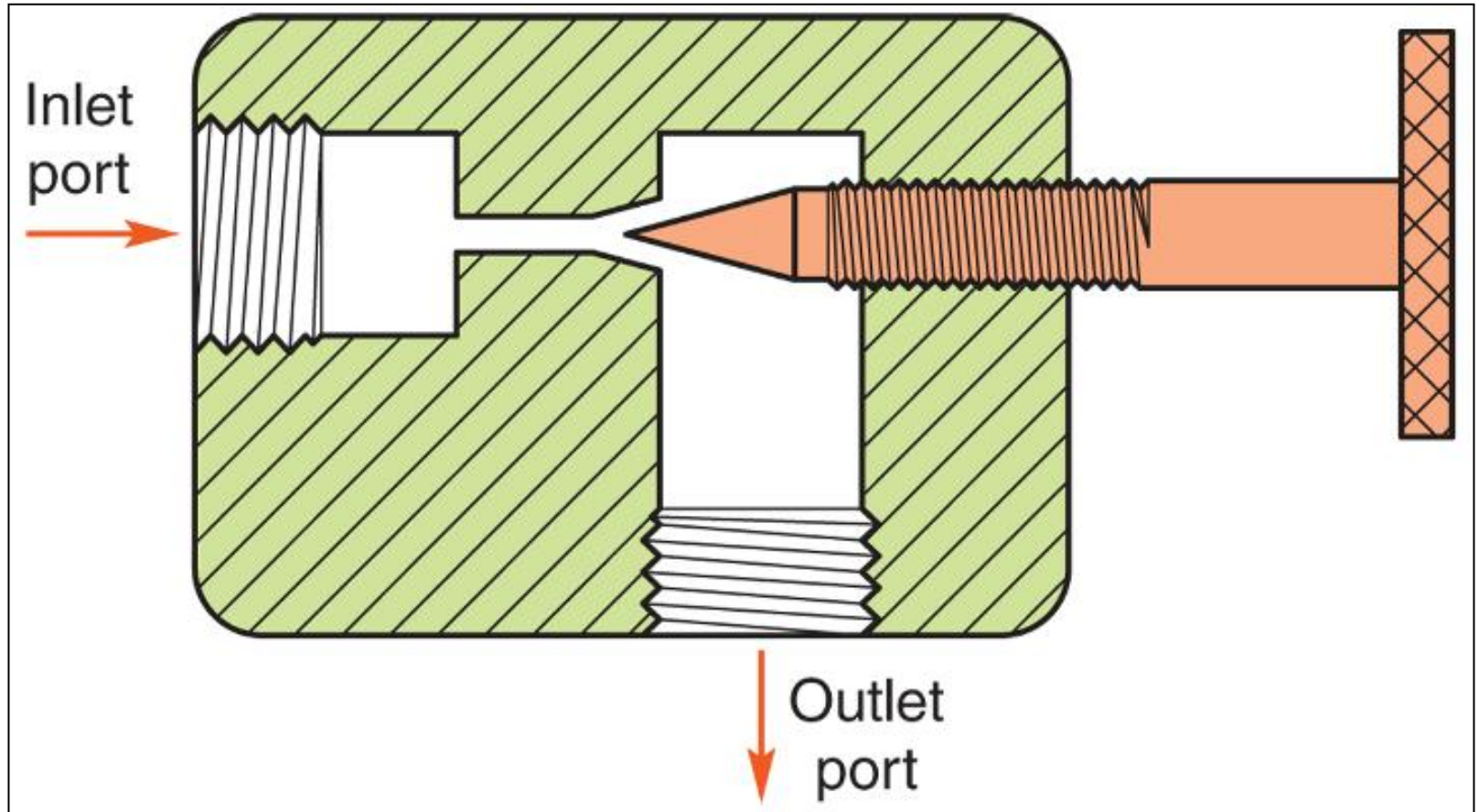
# THROTTLE VALVE



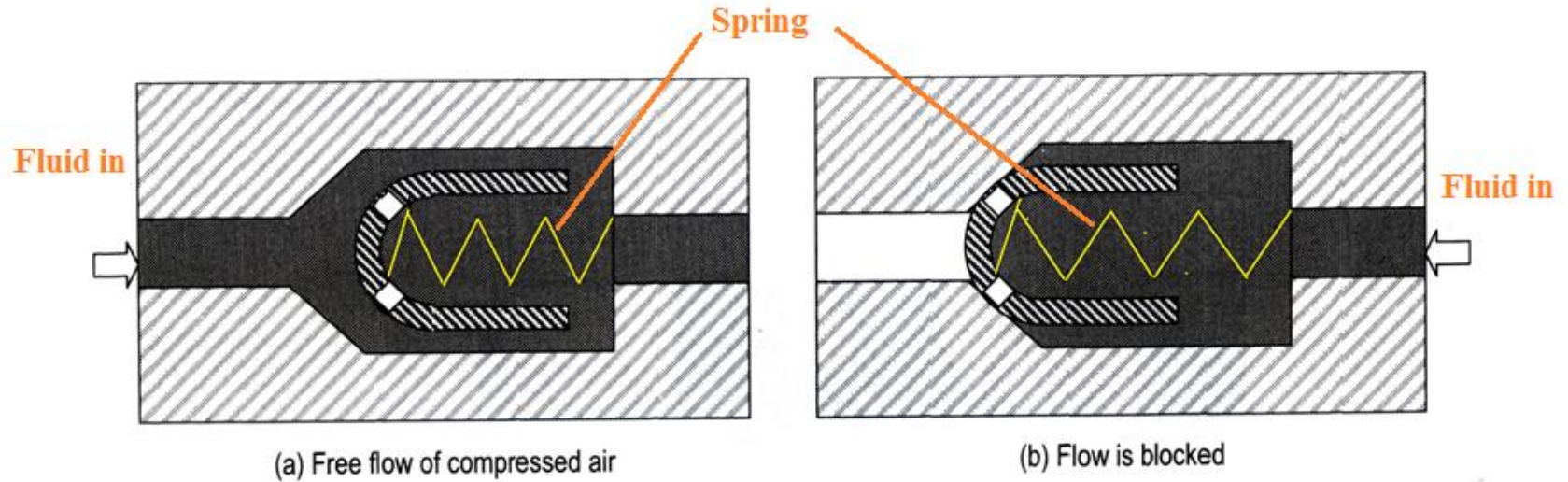
- It consists of orifice whose cross-section can be controlled by externally adjustable needle.
- Also called as restriction valve or needle valve.



# THROTTLE VALVE



# CHECK VALVE

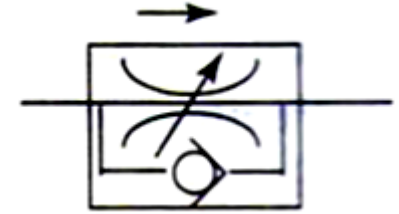


- Permits air flow in one direction
- Stops in opposite direction
- Flow has to overcome spring pressure.
- Poppet is pushed on to its seat and block flow.
- Poppet is pushed off its seat and allow flow.

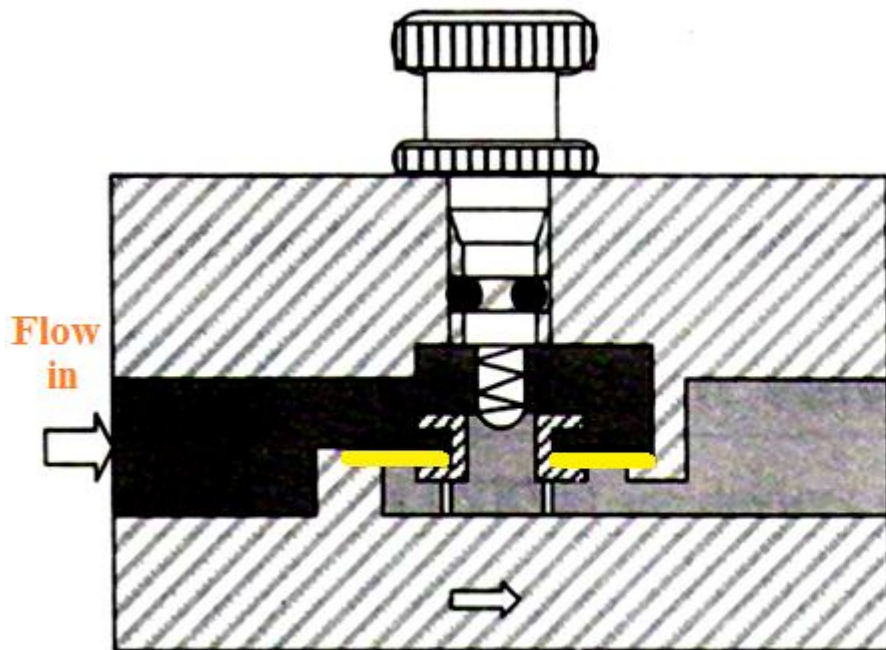
# One way flow control valve

- Also called as throttle-relief valve or throttle check valve.
- Combination of throttle valve and check valve.
- Check valve blocks the flow of air in one direction forcing the air to flow through the controlled cross-section
- Hence throttled in that direction.
- In opposite direction, the air flows freely through the opened valve.

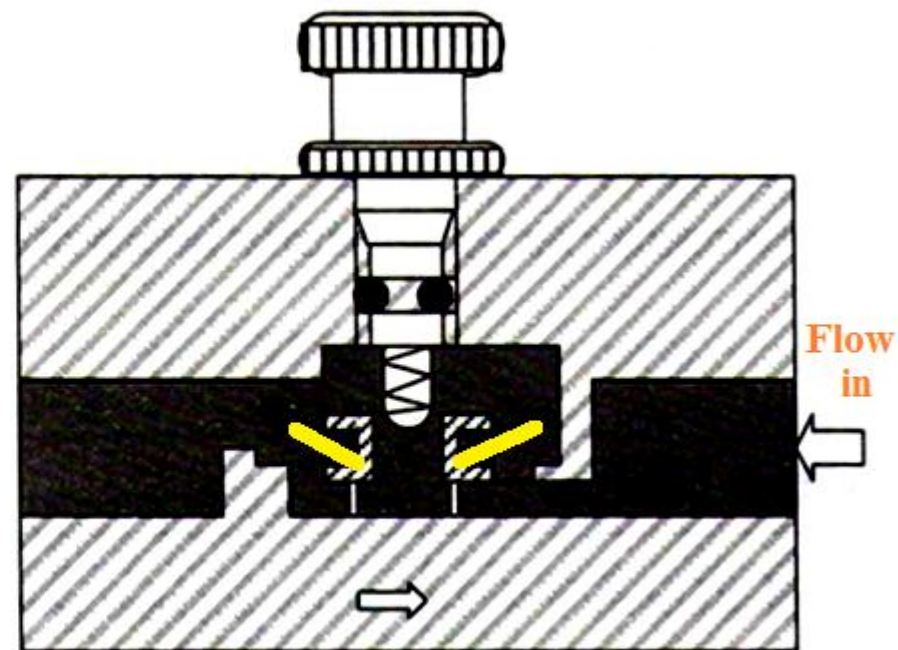
# One way flow control valve



- Parallel arrangement of throttle and check valve.
- Check valve blocks flow in one direction.
- Flow is passed through restricted opening in that direction.
- In opposite direction air flows freely.



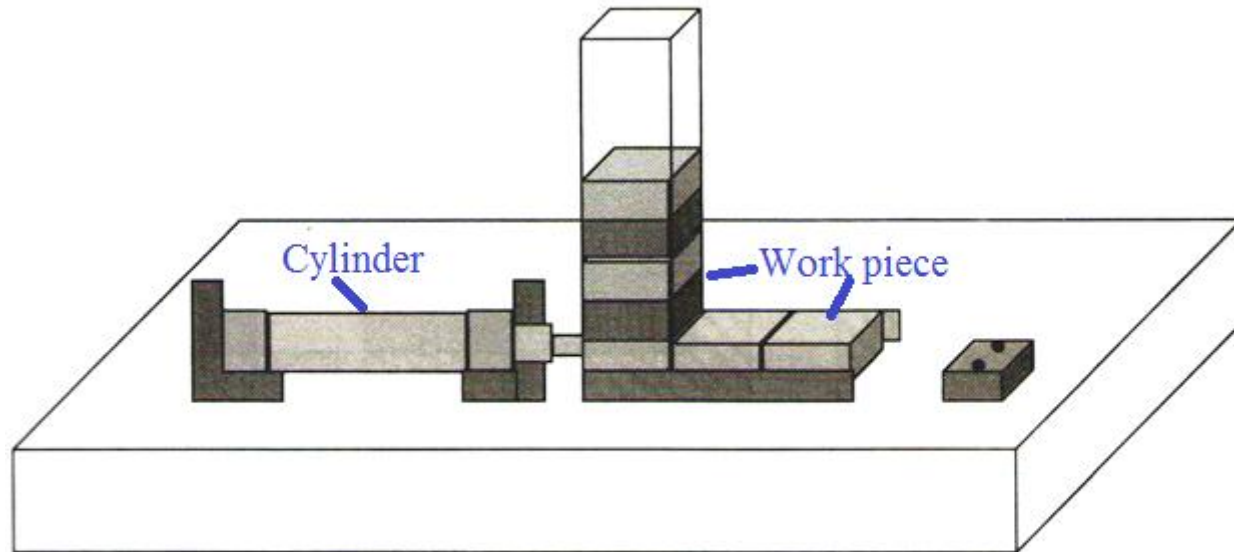
(a) Flow through throttle valve



(b) Flow through check valve

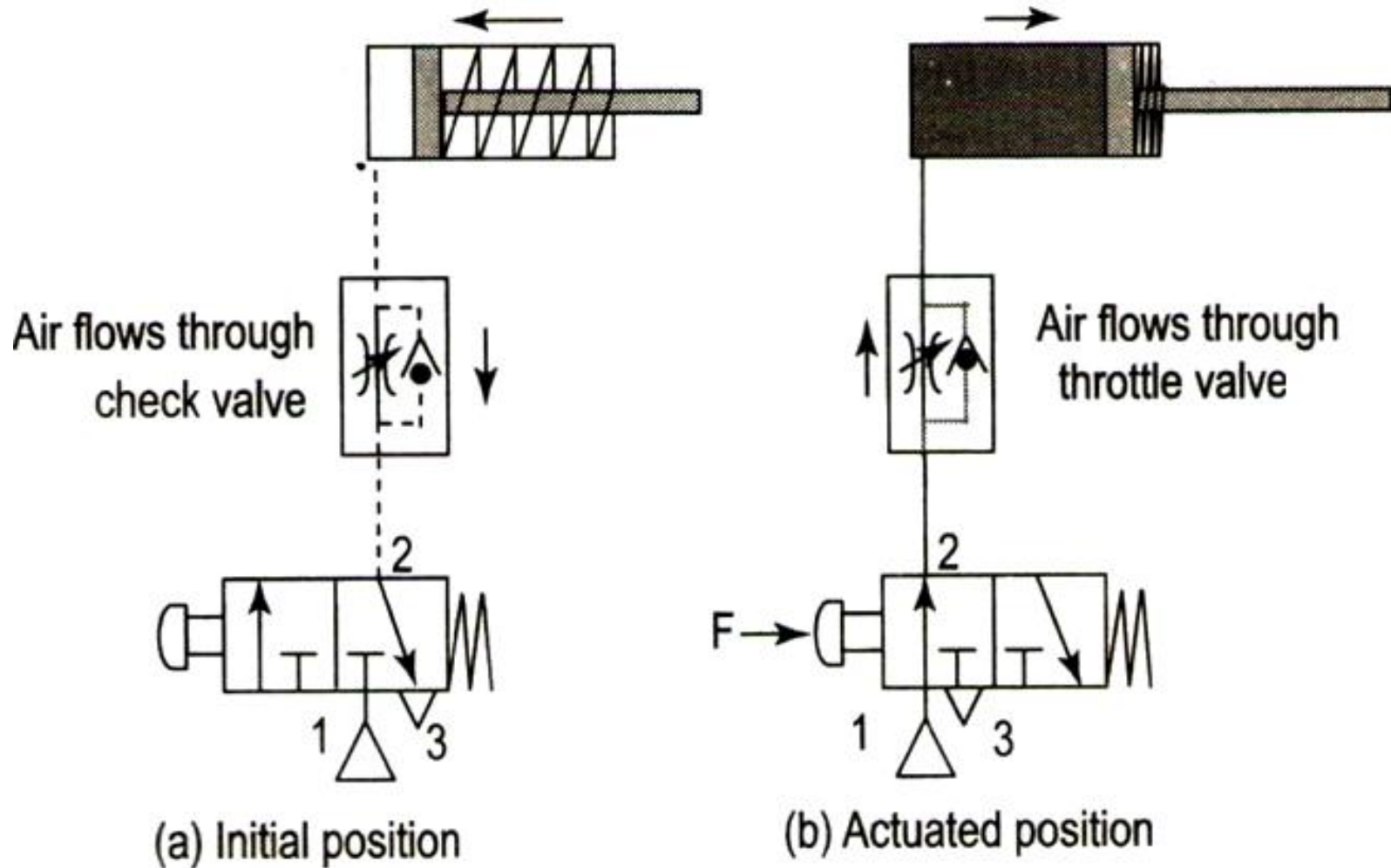
## Speed control of SAC

A SAC is to push and clamp light weight work pieces in magazine when a push button is pressed. The forward motion of the piston must be slow. The piston should move with normal speed when push button is released. Develop a pneumatic circuit.



Schematic arrangement for the clamping of work-pieces

# One way flow control valve



Two positions of the circuit for the speed control of SAC

# LOGIC CONTROL

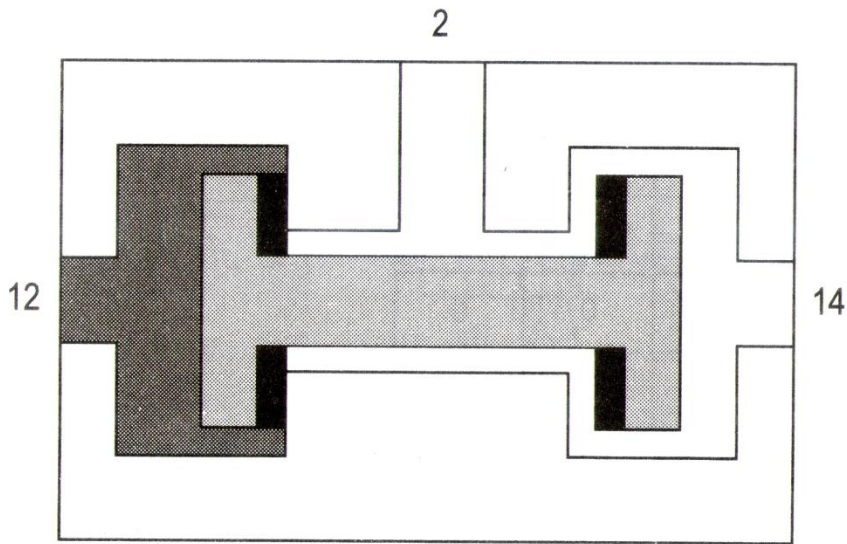
X	Y	A
0	0	0
0	1	1
1	0	1
1	1	1

(a) OR logic

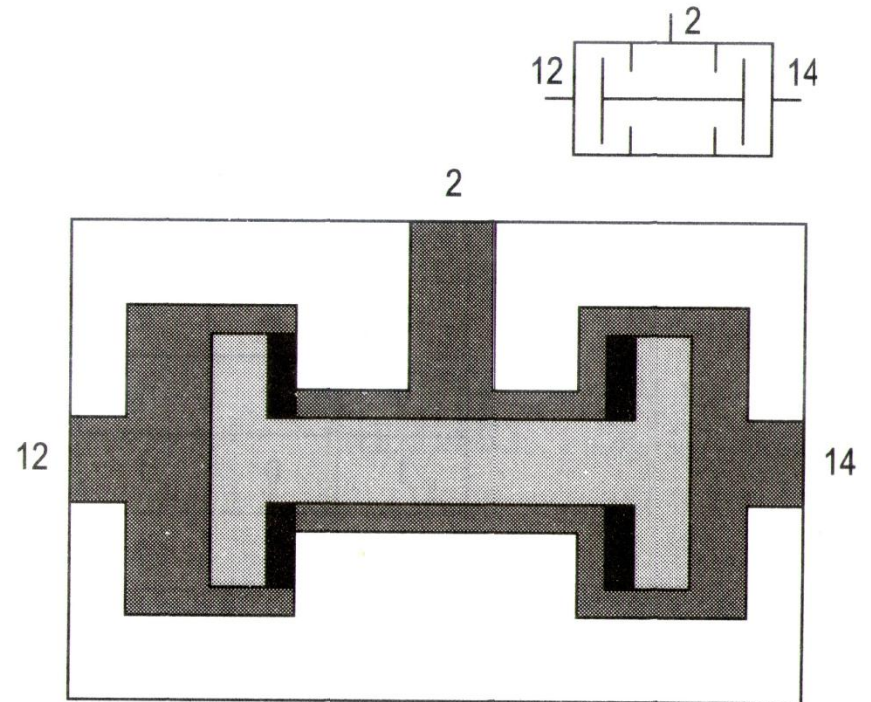
X	Y	A
0	0	0
0	1	0
1	0	0
1	1	1

(b) AND logic

# AND Logic



(a) Signal at 12

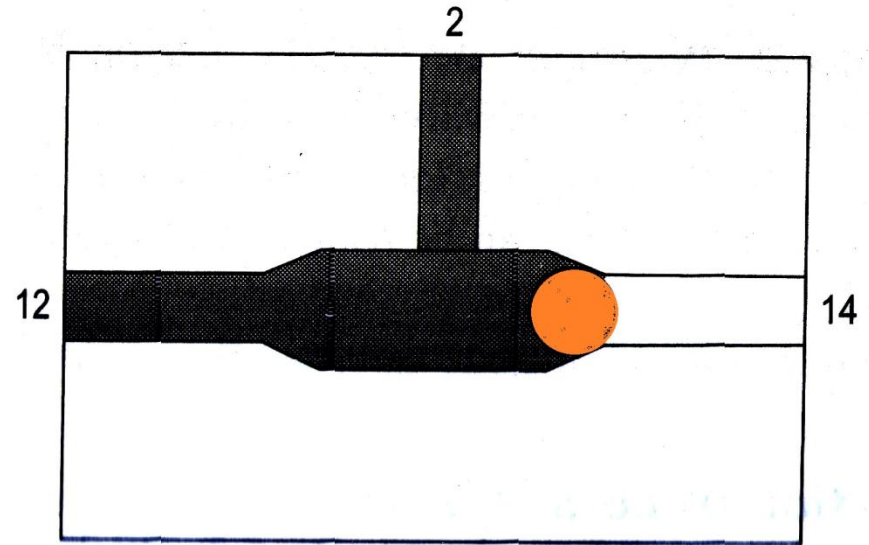
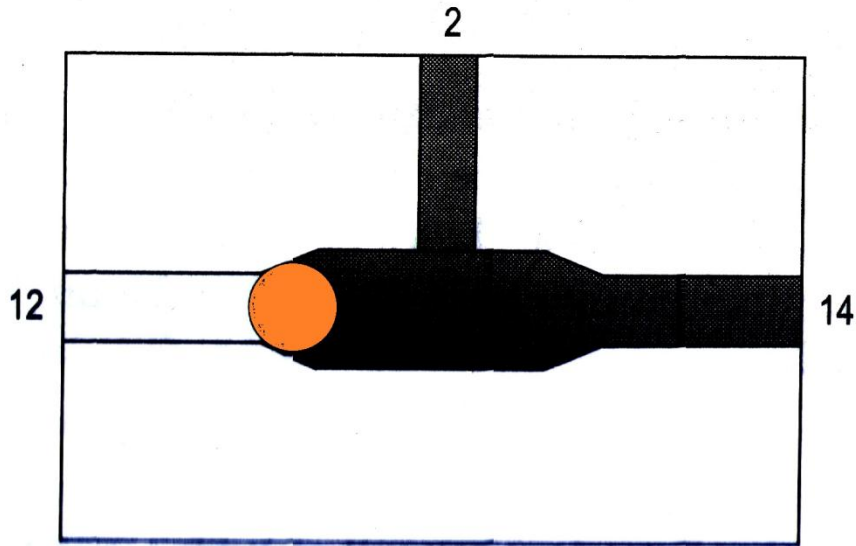
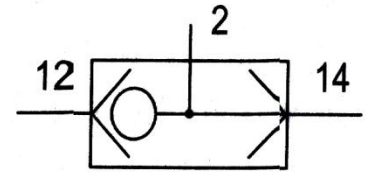


(b) Signals at 12 and 14

Two-pressure valve.

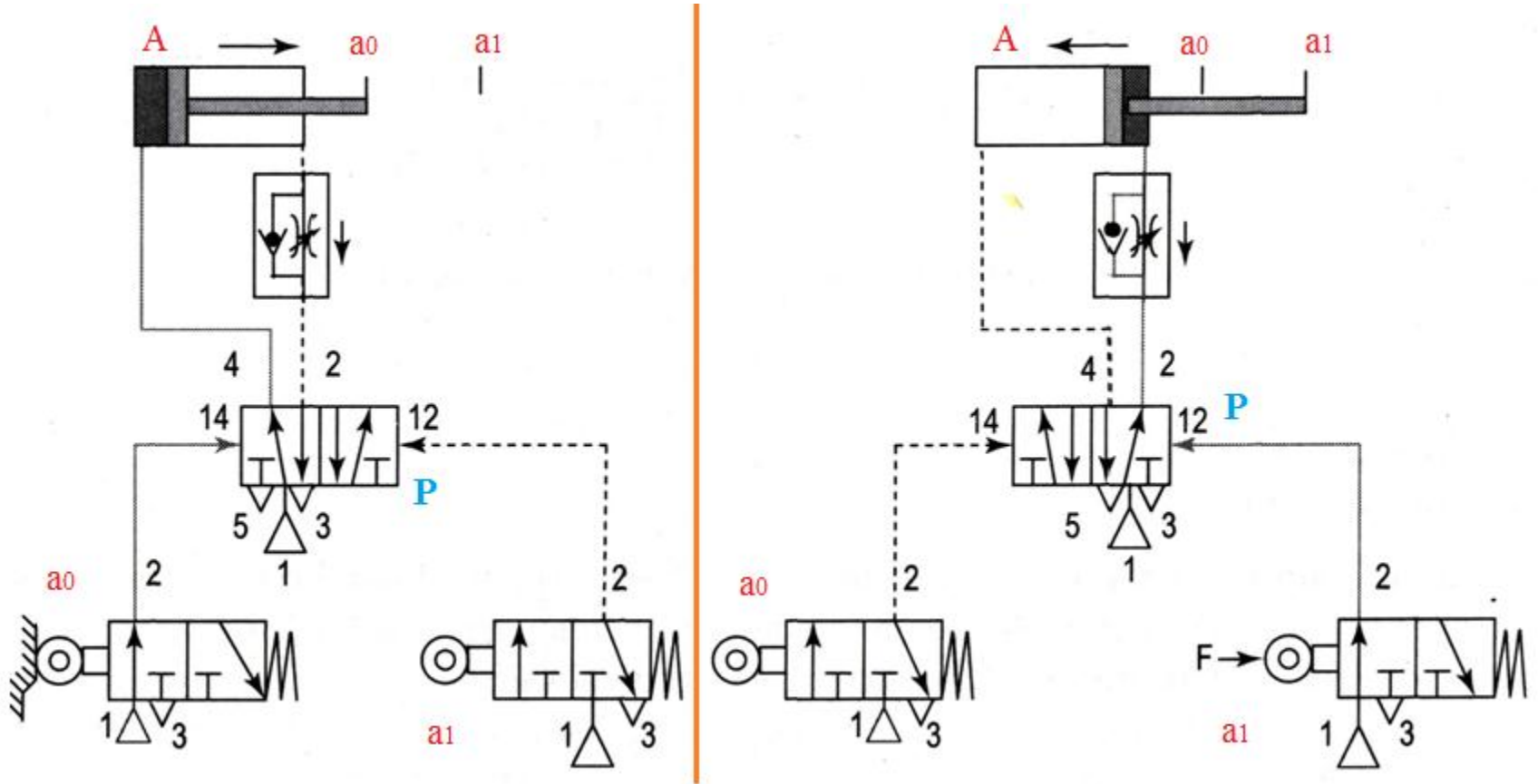


# OR Logic



# Cyclic operation of a cylinder

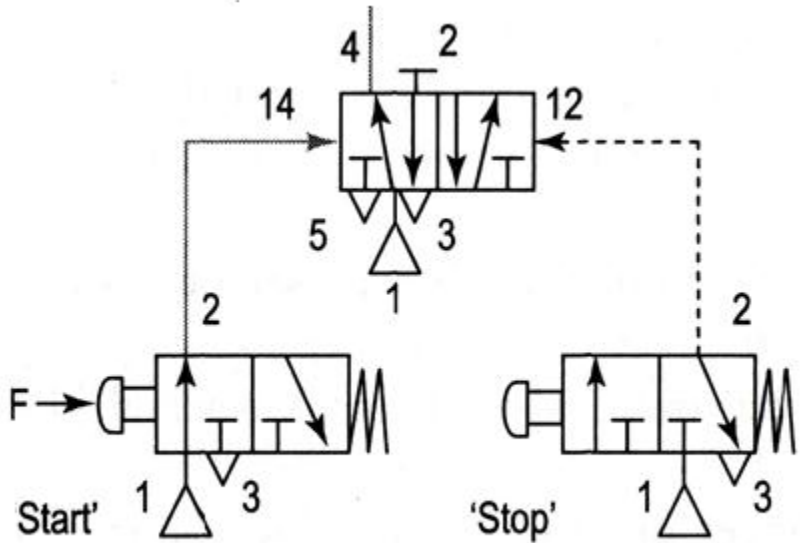
PNEUMATIC AND HYDRAULIC SYSTEM



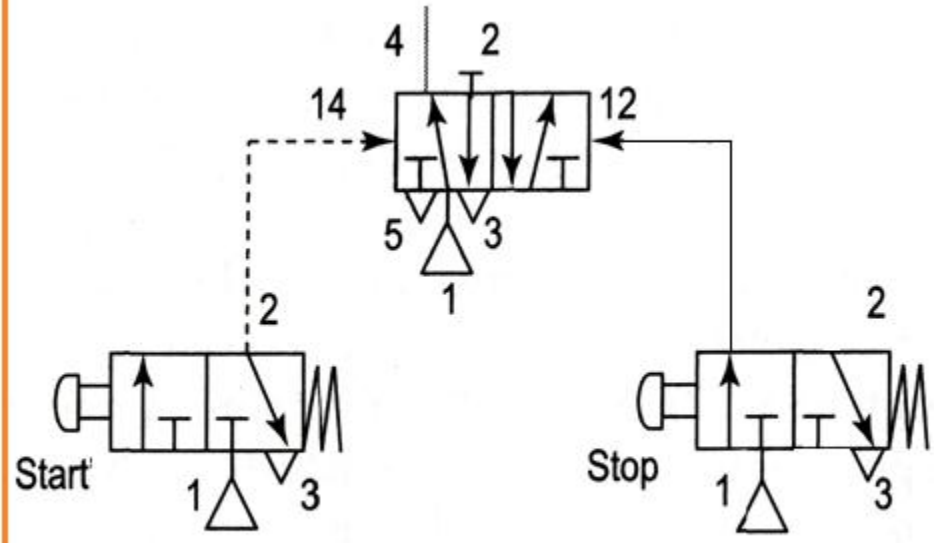
Position when cylinder begins to extend

Position when cylinder begins to retract

# Start and stop control



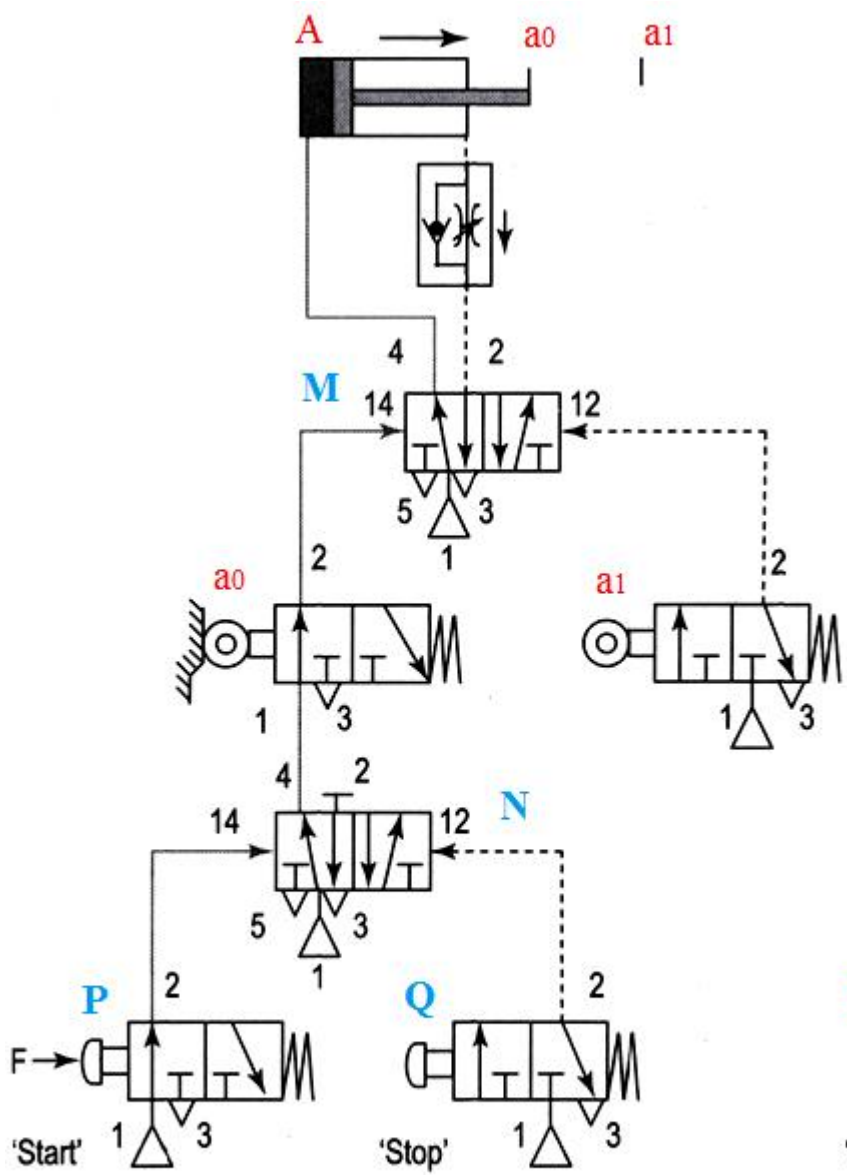
(a) Signal from 'Start' push-button



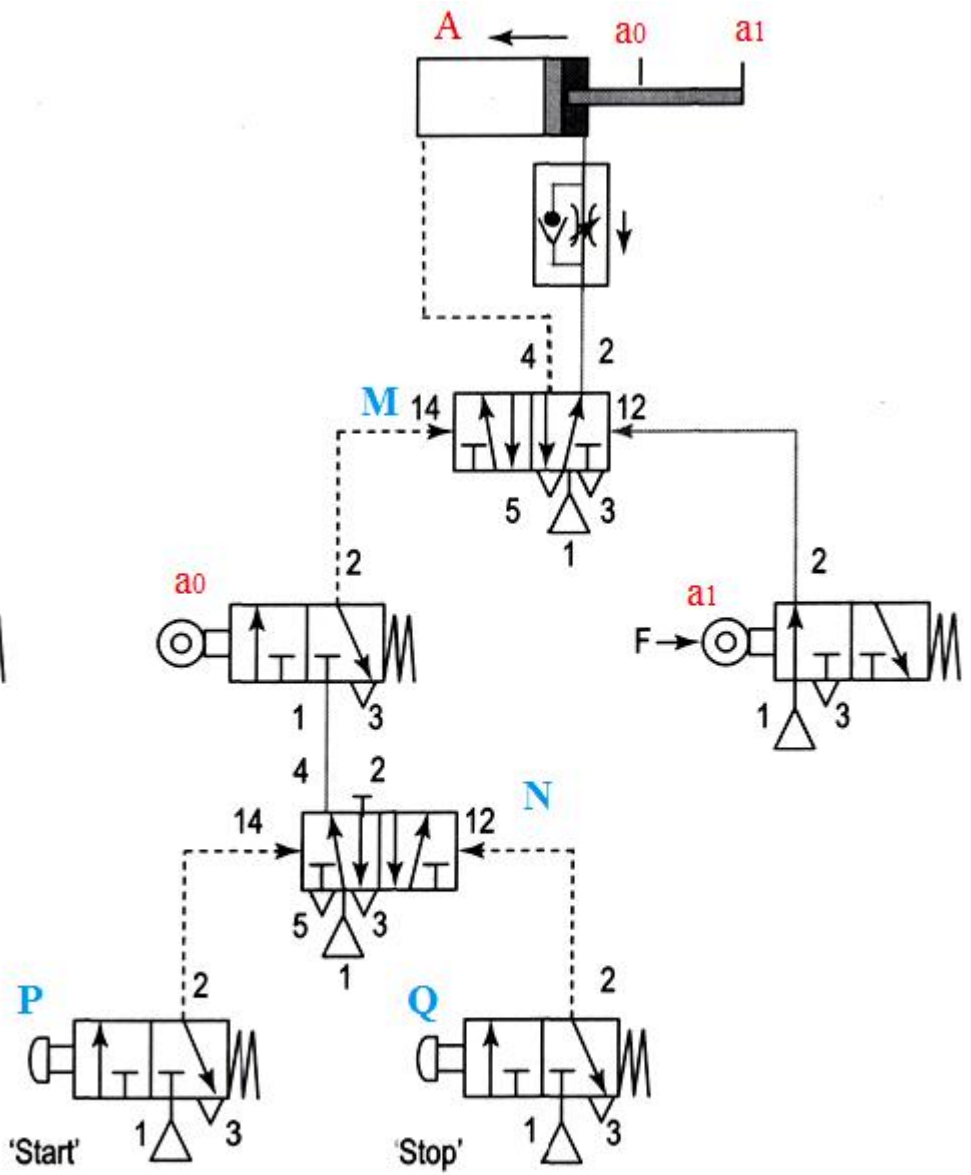
(b) Signal from 'Stop' push-button

A double acting cylinder is to carry out an oscillatory motion after the start signal is pressed. Develop a pneumatic circuit to implement the task.

PNEUMATIC AND HYDRAULIC SYSTEM



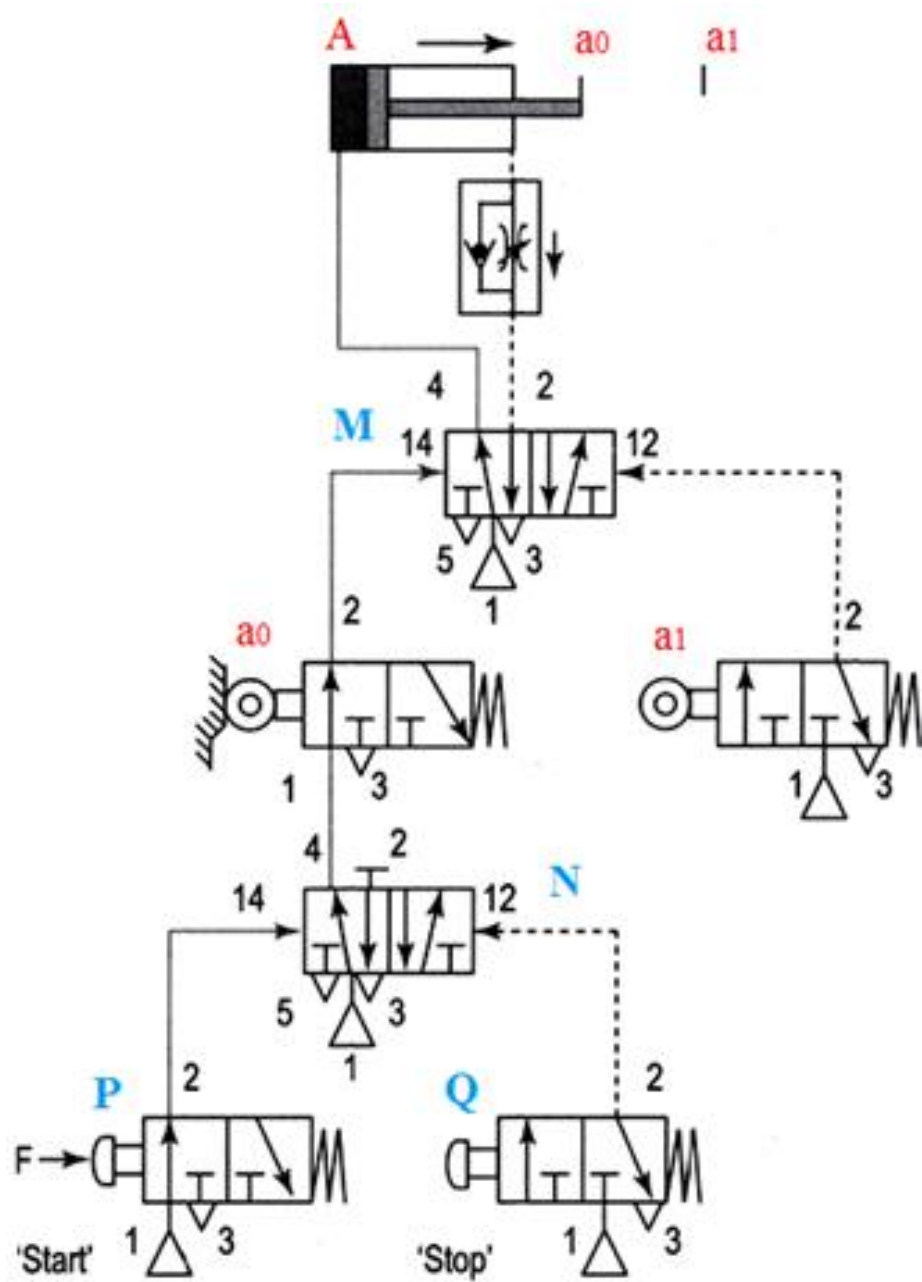
(a) Signal from 'Start' push-button



(b) Signal from sensor a1

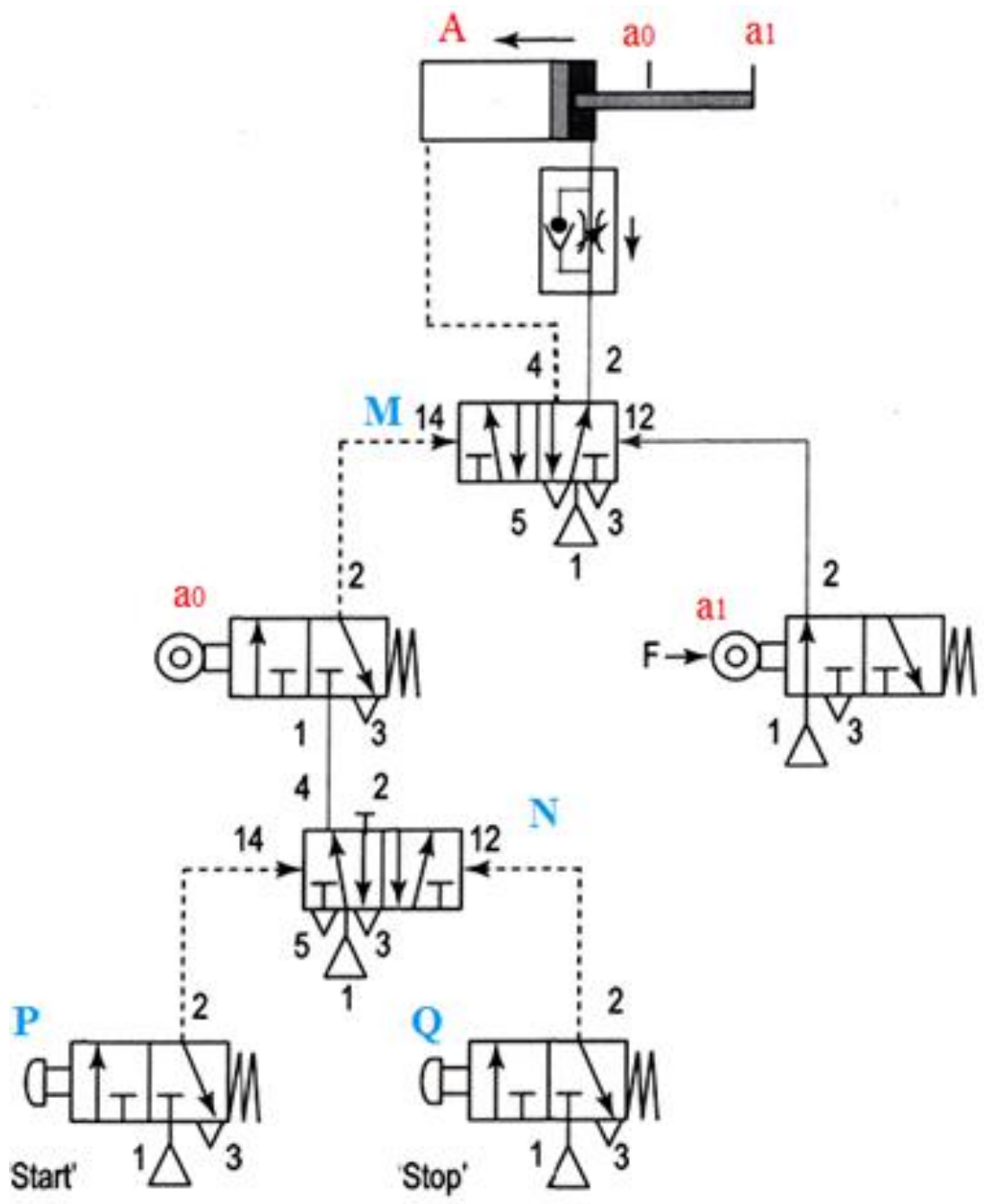
Two critical positions of the circuit for the to and fro motion of a double-acting cylinder

PNEUMATIC AND HYDRAULIC SYSTEM



(a) Signal from 'Start' push-button

PNEUMATIC AND HYDRAULIC SYSTEM



(b) Signal from sensor a1