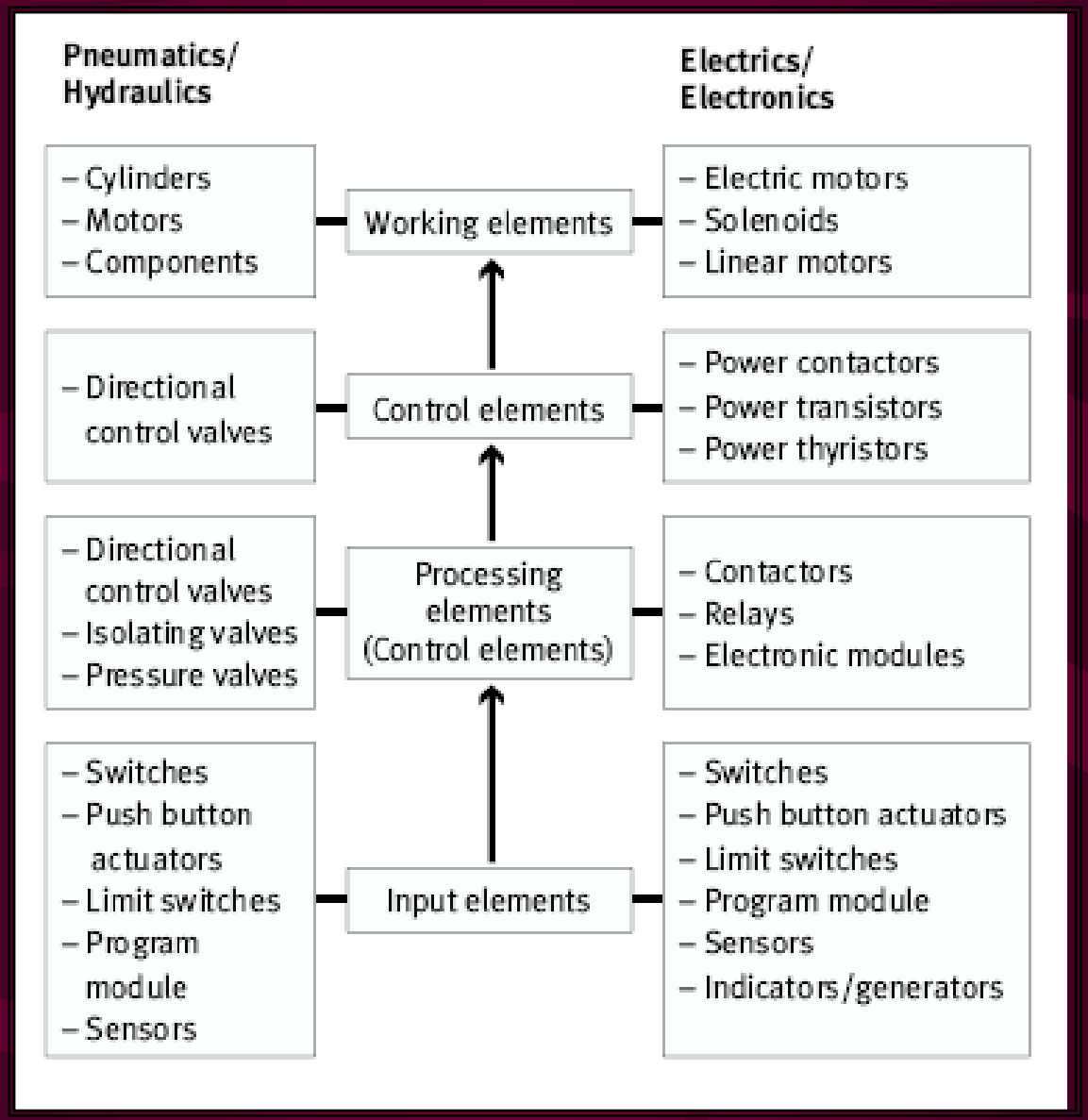
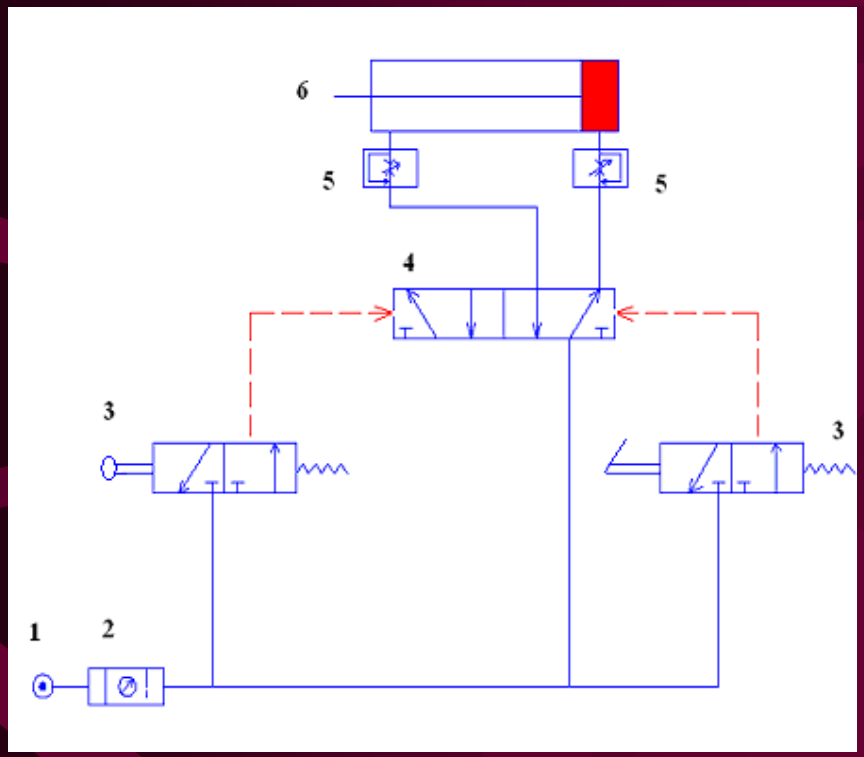
Pneumatic Control Circuit

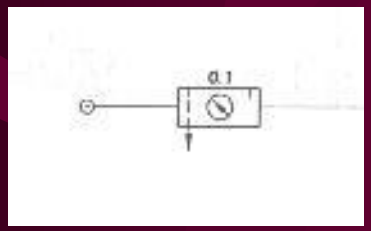
Element of control chain



Pneumatic circuit

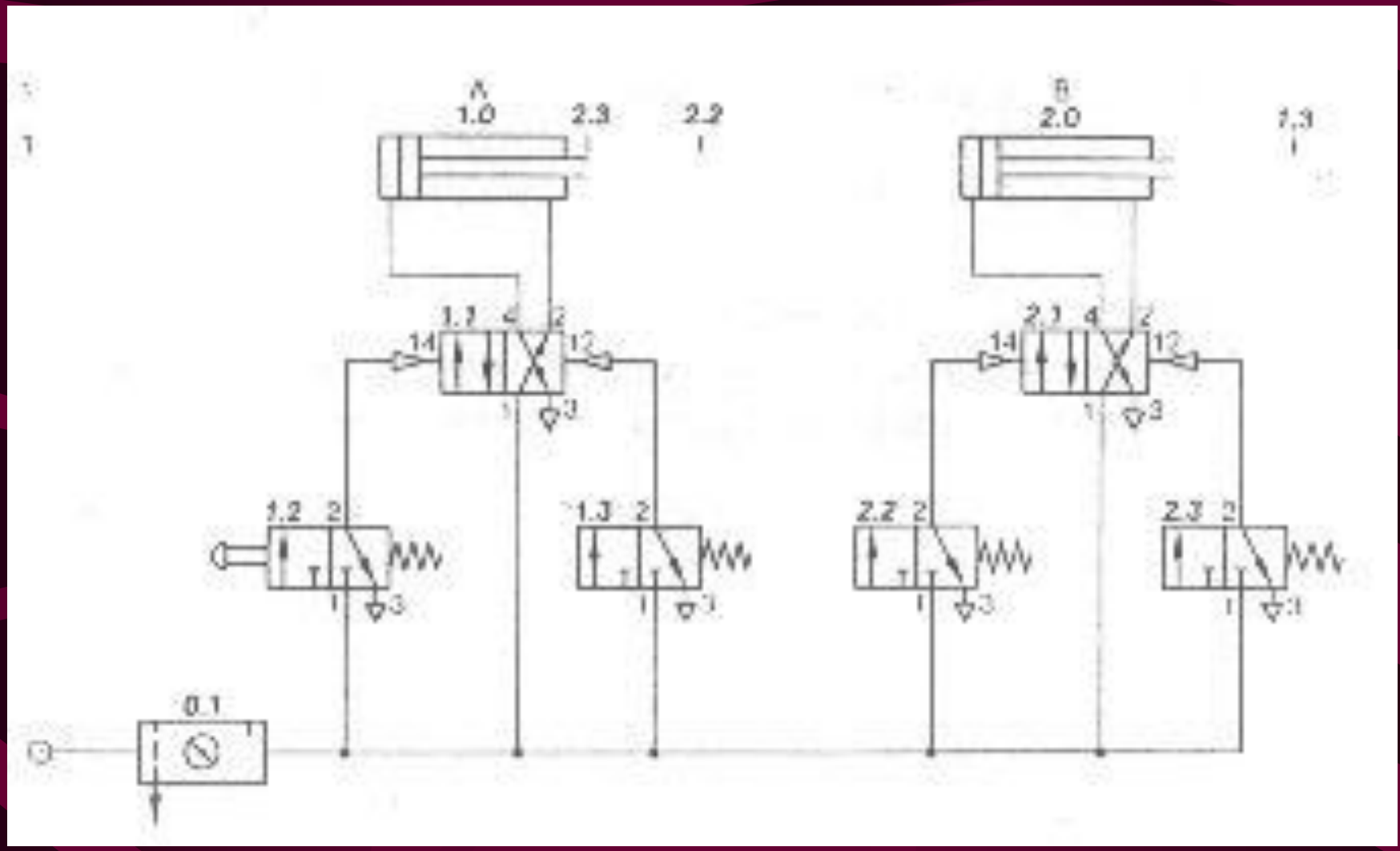
Controlling one double acting cylinder.

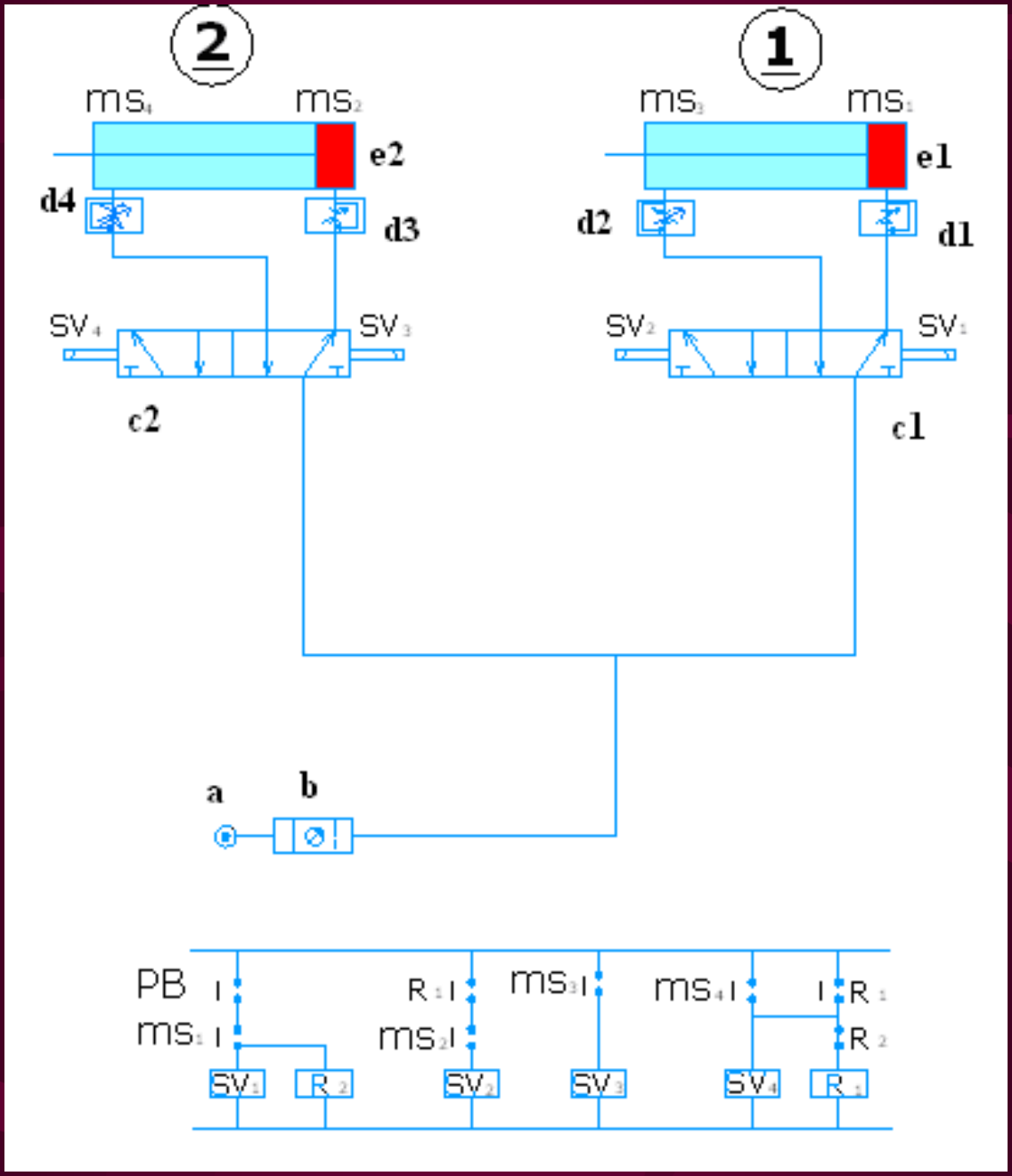




- List of the component:
  - 1 Air supply.
  - 2 Service unit.
  - 3 Valve(with roller in left and with lever in right).
  - 4 Directional Control Valve, 3/2 ways.
  - One way flow control valve.
  - Double acting cylinder.

http://www.mekanizmalar.com/valf5.shtml


A
1.0
2.3
2.2
B
2.0
1.3
1.1
2.1
14
12
1.2
1.3
2.2
2.3
0.1

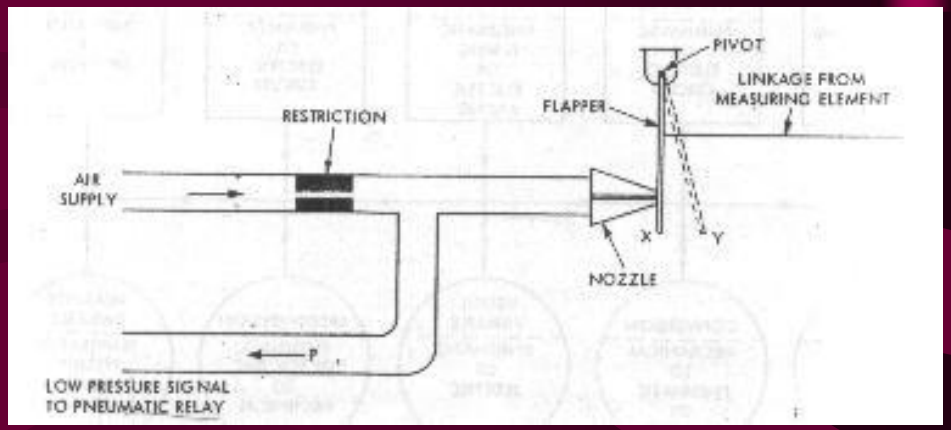

2
1
e2
e1
d4
d3
d2
d1
c2
c1
a
b
PB
R 1
R 2

Pneumatic controller

- The basic pneumatic control mechanism is the **flapper-nozzle unit**.
- Using with amplifying relay and feedback bellow for rapid control mechanism.
- Convert a small motion(position) or force into an equivalent(proportional) pneumatic signal.
- Control pressure is;
  - 20 to 100 kPa (3 to 15 psi)
  - 0 % signal pressure is equivalent to 20 kPa and 100 % signal is equivalent to 100 kPa.

The Flapper-Nozzle unit

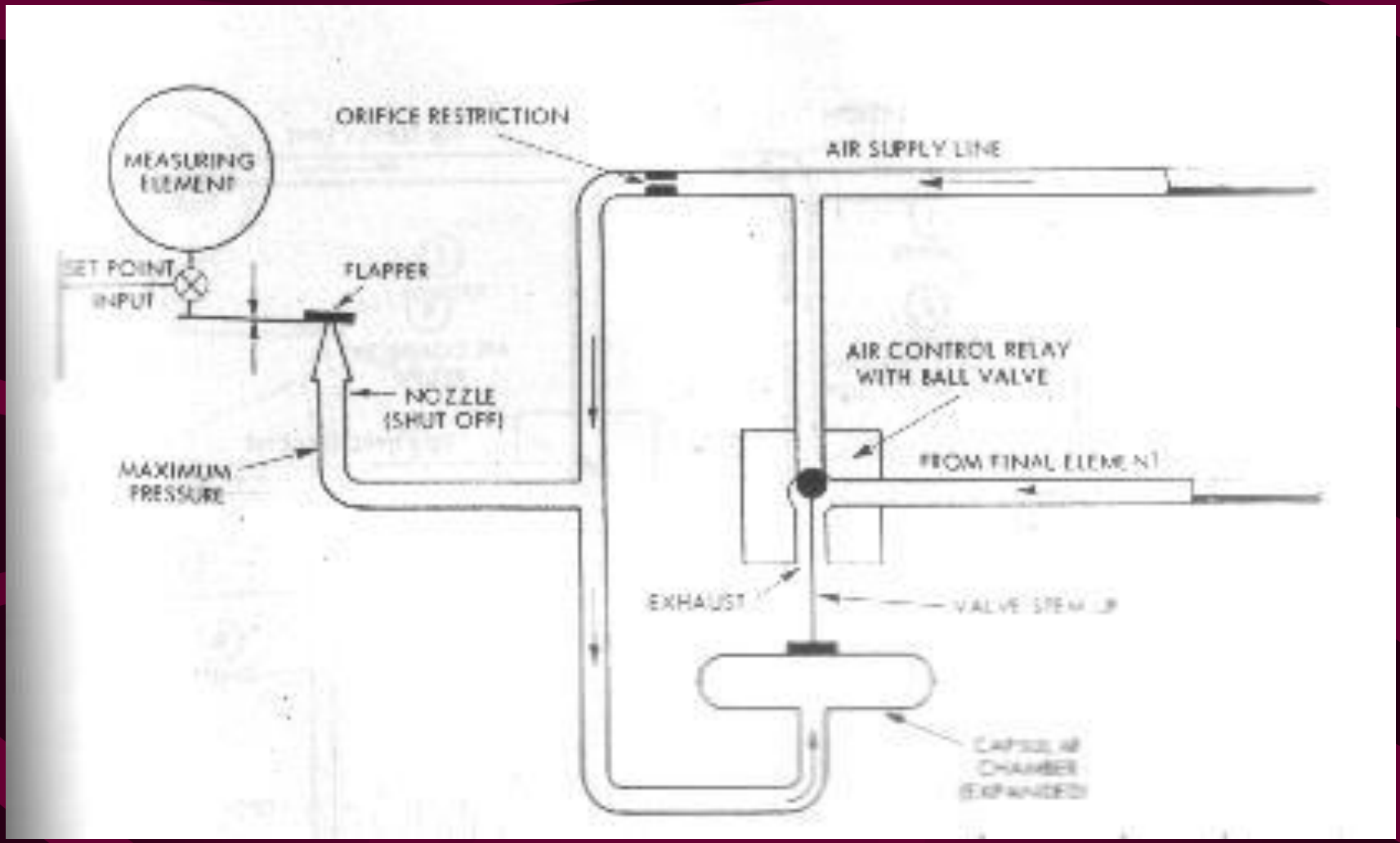
- Working principle:
  - Input air(regulated at 20 psi or 138kPa) is fed to the nozzle through a reducing tube(restriction).
  - The pressure of the nozzle drop when the flapper is moved away from the nozzle.
  - The pressure will constantly build up when the flapper is moved closer to the nozzle.

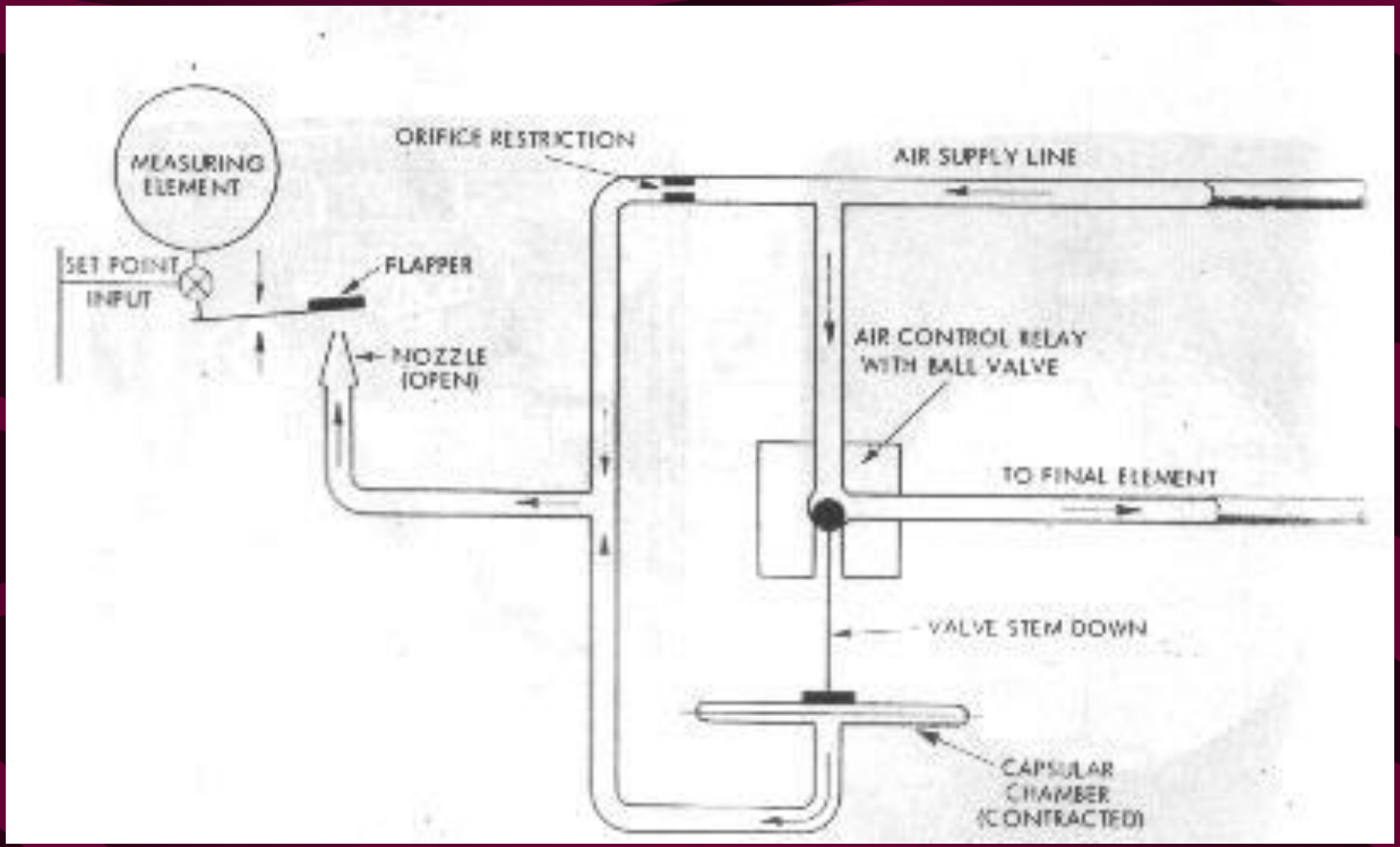


- The flapper movement is very small and rapidly, produce a proportional pneumatic signal.

- The limitation of the simple flapper-nozzle:
  - Output pressure is slow because of the constriction when directly used to operate a control valve. Causing the sluggish action on the system.
  - The flapper must big and strong enough to overcome the blast of air leaving the nozzle.
  - Because of the flapper moving rapidly the system is susceptible to vibration and instability.

- The limitation can be reduce by adding:
  - Relay or amplifier.
  - Feedback system (repositions the flapper or nozzle.)


ORIFICE RESTRICTION
AIR SUPPLY LINE
MEASURING ELEMENT
SET POINT INPUT
FLAPPER
NOZZLE (SHUT OFF)
MAXIMUM PRESSURE
AIR CONTROL RELAY WITH BALL VALVE
FROM FINAL ELEMENT
EXHAUST
VALVE STEM


MEASURING ELEMENT
ORIFICE RESTRICTION
AIR SUPPLY LINE
SET POINT INPUT
FLAPPER
NOZZLE (OPEN)
AIR CONTROL RELAY WITH BALL VALVE
TO FINAL ELEMENT
VALVE STEM DOWN
CAPSULAR CHAMBER (CONTRACTED)