جامعة
بني سويف
التكنولوجية

BST

BANI SWIEF
TECHNOLOGICAL
UNIVERSITY

Basics of hydraulics

Autotronics Program

Section2

COMPONENTS OF HYDRAULIC SYSTEM:-

-Power sources units:

Tank or reservoir

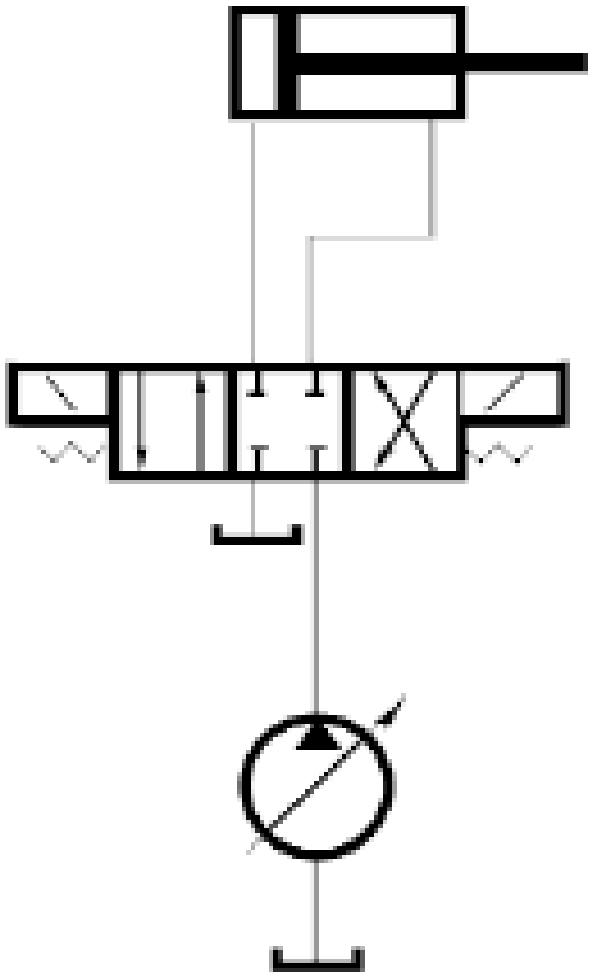
Pumps

- Power control units:

- Valves:
  - *Directional Control Valves*
  - *Flow Control Valves*
  - *Pressure Control Valves*

-Drive units:

Actuators

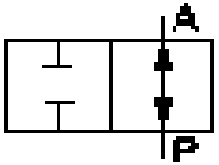


Hydraulics Symbols

2/2-way valve

(2 ports and

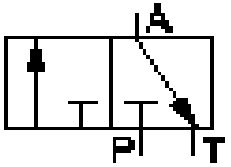
2 switching position)



3/2-way valve

(3 ports and

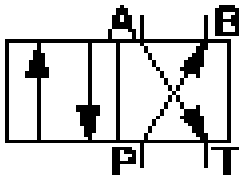
2 switching position)



4/2-way valve

(4 ports and

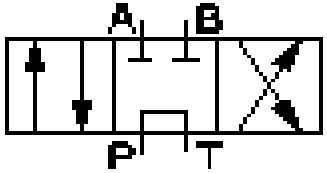
2 switching position)



4/3-way valve

(4 ports and

3 switching position)



Port designations

P: pressure port

T: return port

A, B: power port

Fig : Directional control valves

Methods of actuation:

The switching position of a directional control valve can be changed by various actuation methods. The symbol for the valve is elaborated by the addition of the symbol indicating the actuation method. In the case of some of the actuation methods shown, such as push button, pedal, lever with detent, a spring is always necessary for resetting. Resetting may also be achieved by switching the valve a second time, e.g. in the case of a valve with hand lever and detent setting.

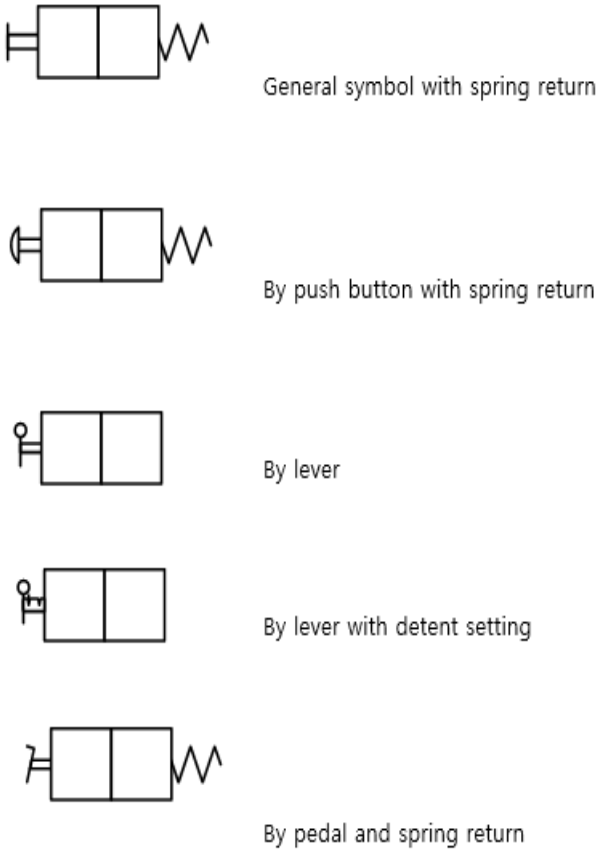


Fig : Manual actuation

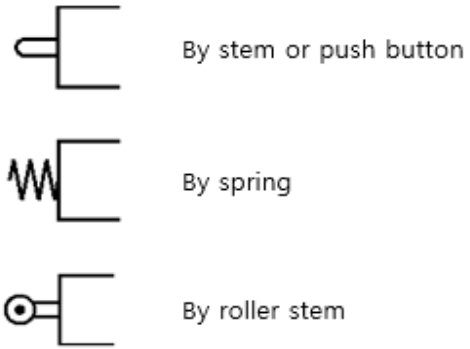


Fig : Mechanical actuation

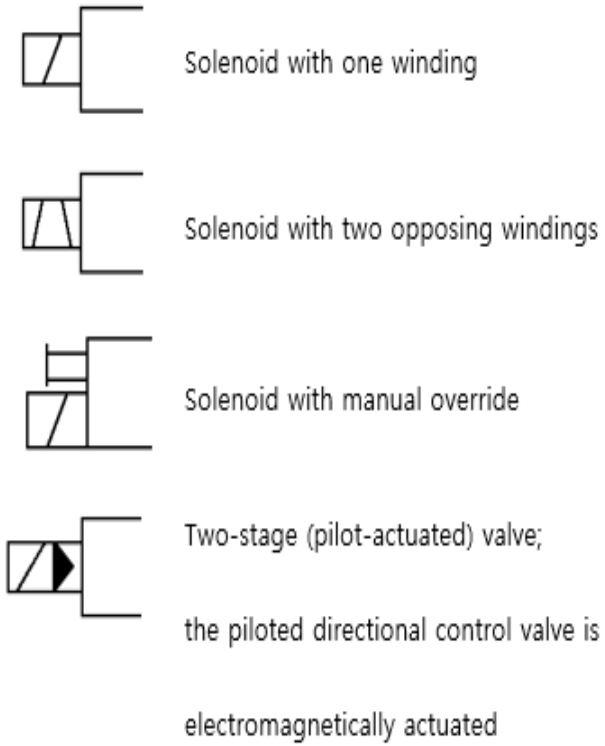


Fig : Electrical actuation

Directional Control Valves:

Directional control valves are components which change, open or close flow paths in hydraulic systems. They are used to control the direction of motion of power components and the manner in which these stop.

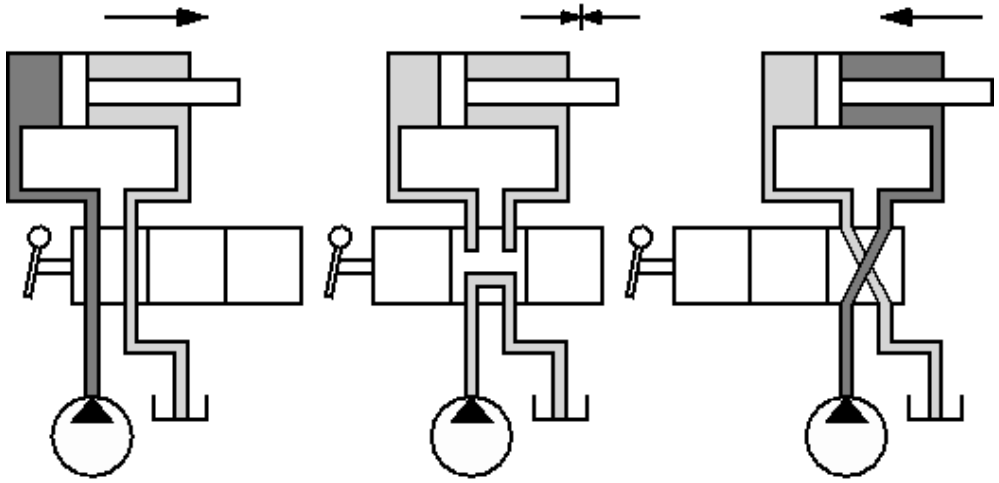


Fig: function of directional control valve

Look at:
https://www.youtube.com/watch?v=jsMJbJQkGTs&t=5s

2/2-way valve

The 2/2-way valve has a working port (A) and a pressure port (P) .It controls the delivery by closing or opening the passage.

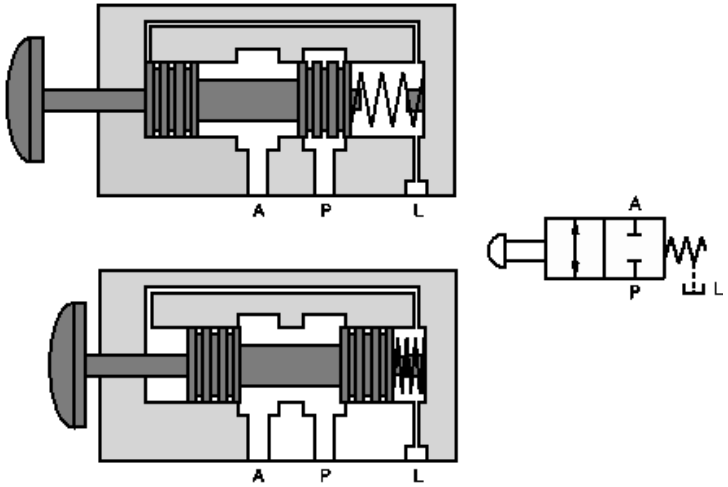


Fig: 2/2-way valve

- Normal position: P to A closed;
- Actuated position: Flow from P to A

Look at:
https://www.youtube.com/watch?v=leCy8Gb2k6U&t=5s

3/2-way valves

The 3/2-way valve has a working port (A), a pressure port (P) and a tank connection (T). It controls the flow rate via the following switching positions:

- Normal position: P is closed and A to T is open;
- Actuated position: Outlet T is closed, flow from P to A.

3/2-way valve can be normally open, i.e. there may be a flow from P to A.

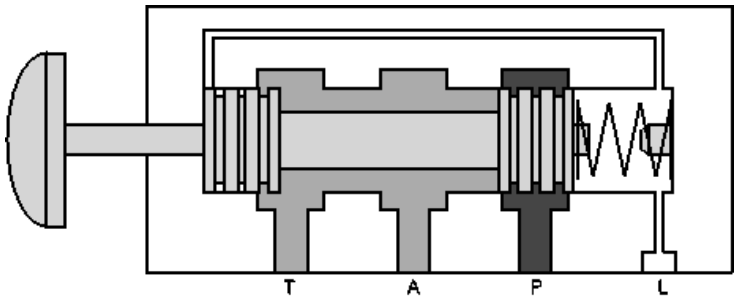


Fig: Sectional view of 3/2-way valve

4/2-way valves

The 4/2-way valve has two working ports (A, B), a pressure port (P) and a tank connection (T).

For 4/2-way valve with 3 control pistons:

- Normal position: flow from P to B and from A to T;
- Actuated position: flow from P to A and from B to T.

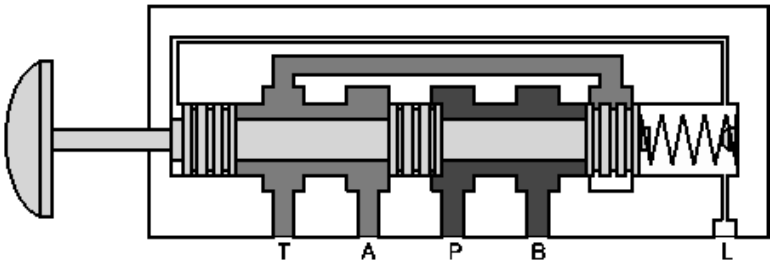


Fig: 4/2-way valve with 3 control pistons

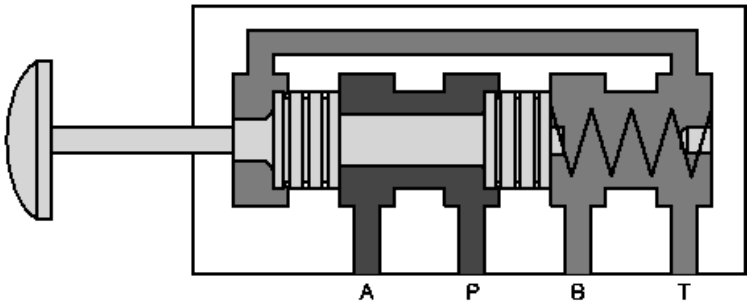
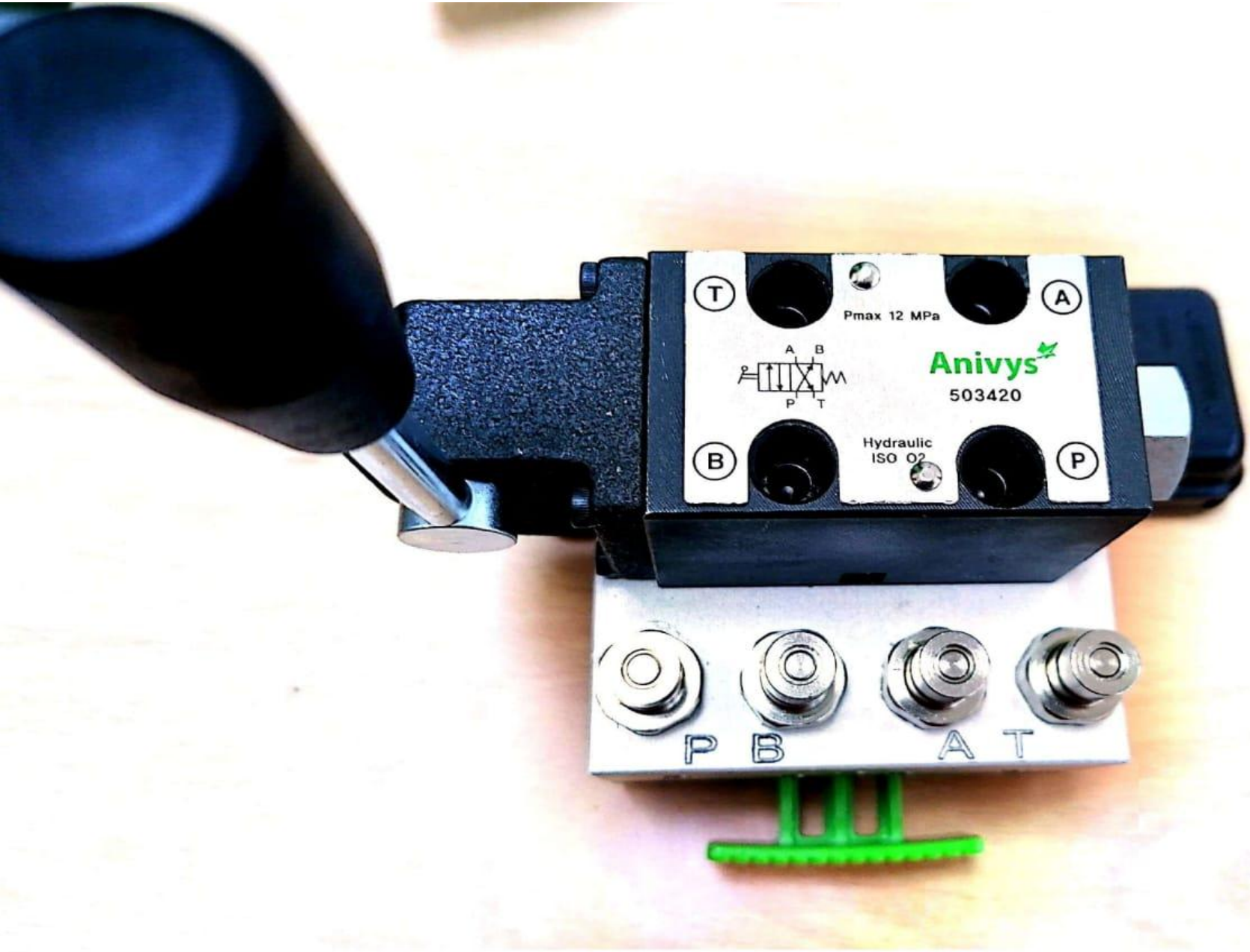


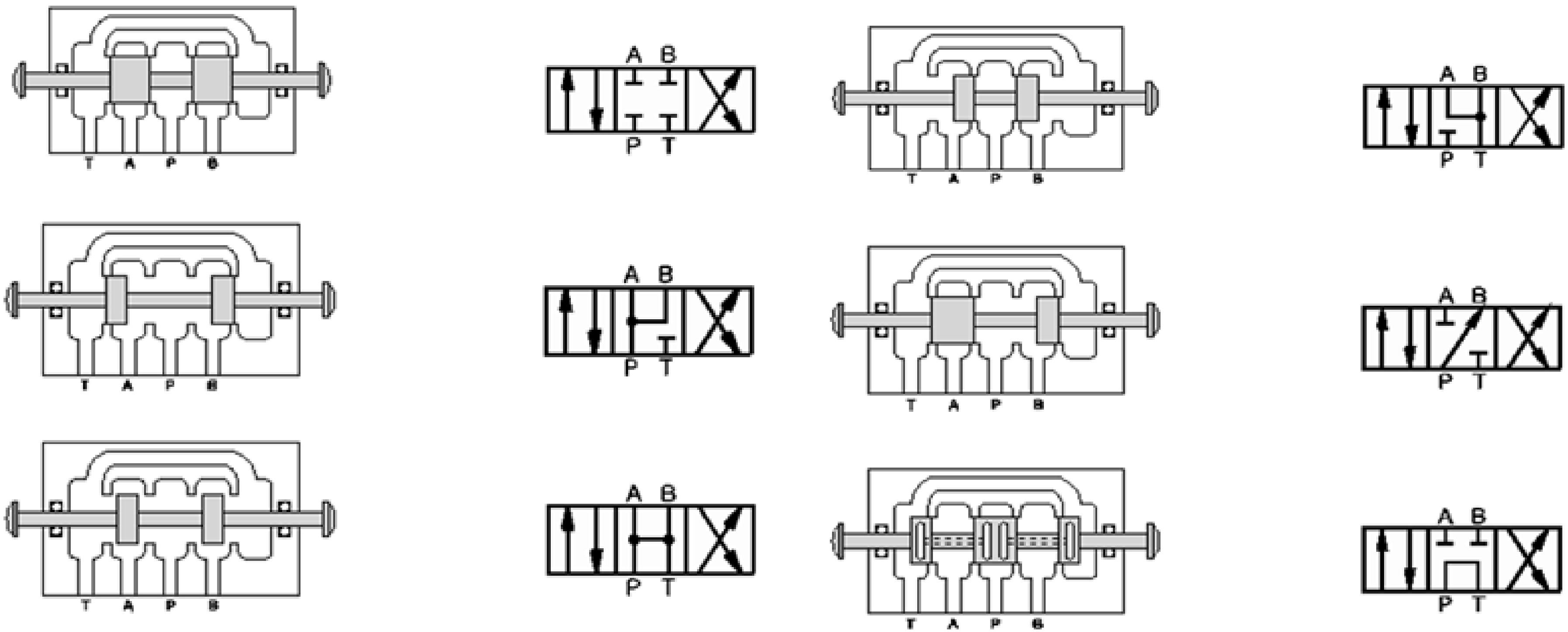
Fig: 4/2-way valve with 2 control pistons

4/2-way valves are also constructed with just two control pistons. These valves do not require any drain ports. It should be borne in mind that tank connection T and working ports A and B are routed via the end cap of the valve in this design.

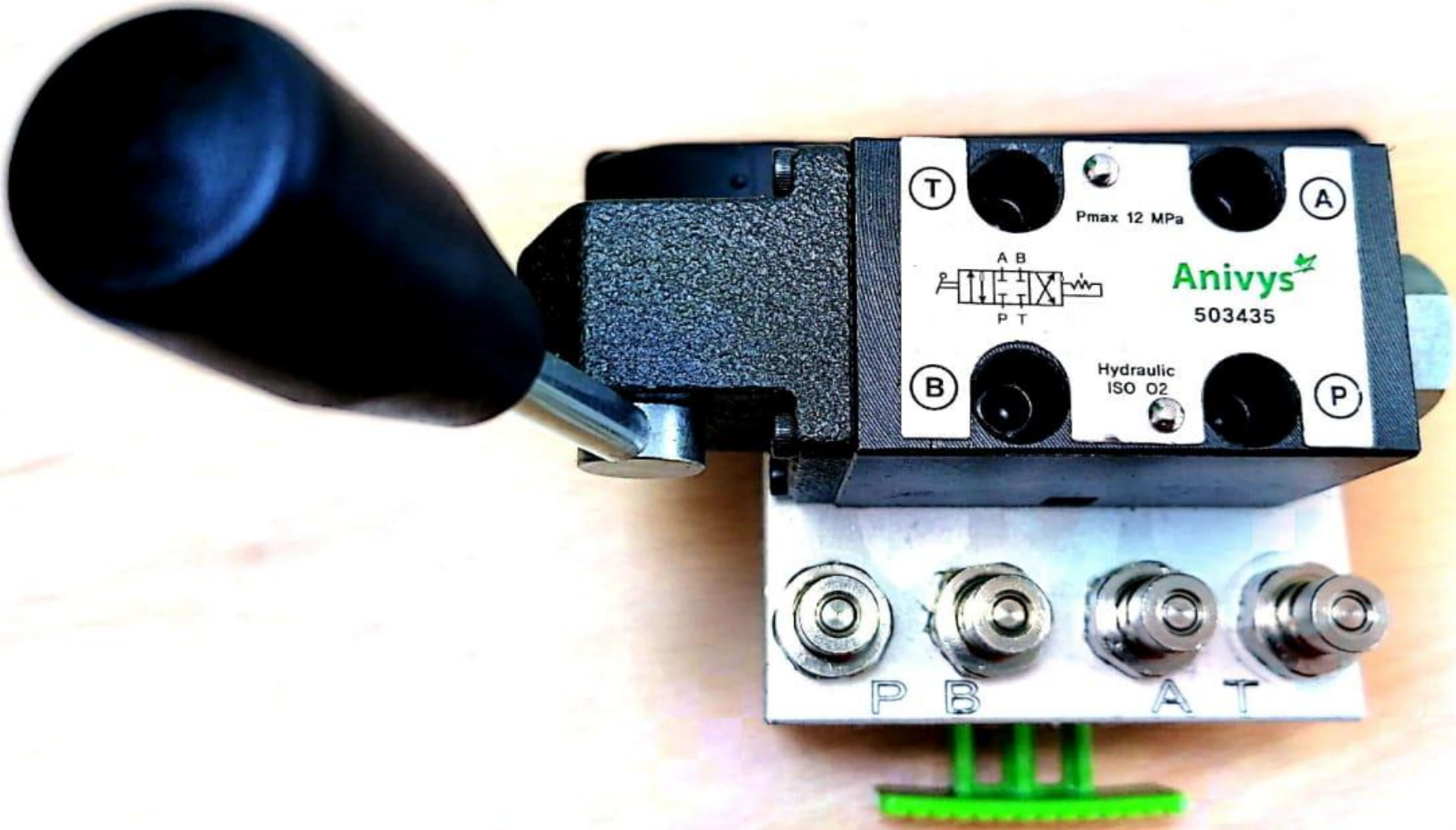
4/2-way valves



4/3-way valves



Look at:
https://www.youtube.com/watch?v=8EEw1xD4JhI&t=2s



Hydraulics Symbols

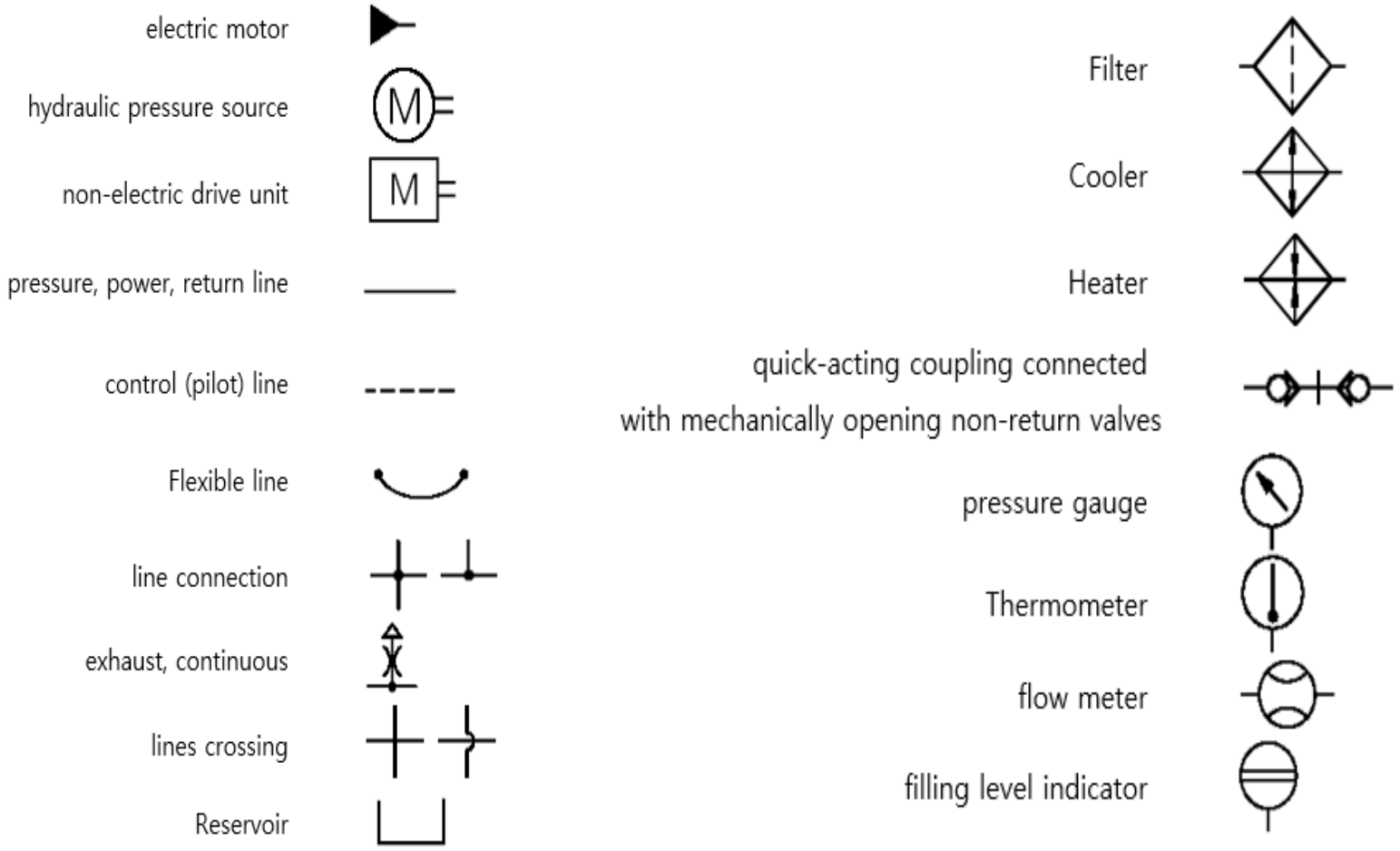


Fig : Symbols of hydraulic circuit

Thank you for your attention