

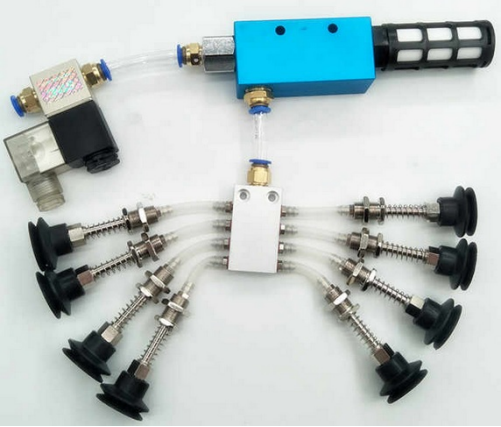
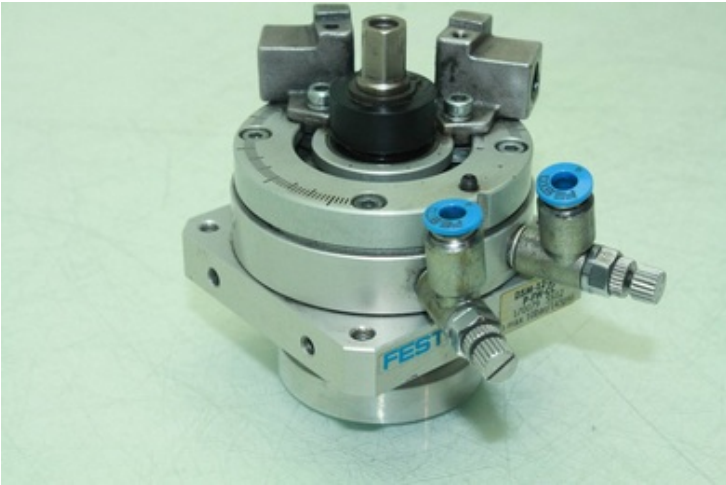
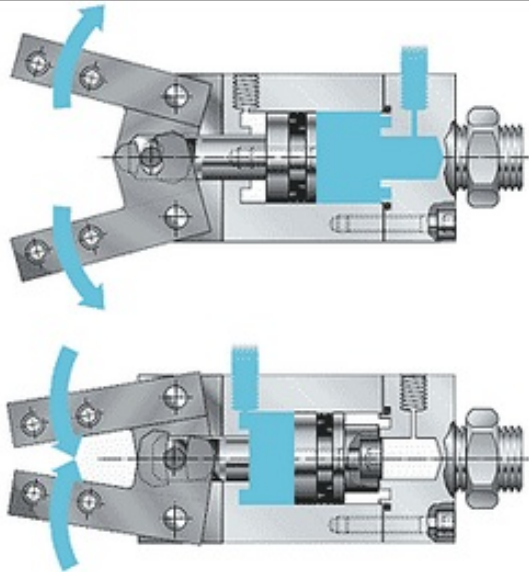
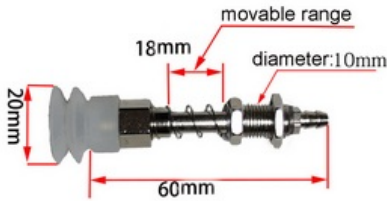
# APA YANG DIKENDALIKAN DI SISTEM PNEUMATIC?

Actuators can be further broken down into groups:

- Linear actuators
  - Single-acting cylinder
  - Double-acting cylinder
- Rotary actuators
  - Air motors
  - Rotary actuators



Fig. 2.13  
Actuators, linear and rotary



-----/ ROBOTIK --/ CAE  
 XI MEKA A ---/ 5gurij  
 XI MEKA B ---/ fk2al3c  
 XII MEKA A ---/ t2nhcnz --/ 6t7hfnw  
 XII MEKA B ---/ 4p6pejv --/ vfyfn5g

# UNTUK APA AKTUATORNYA?

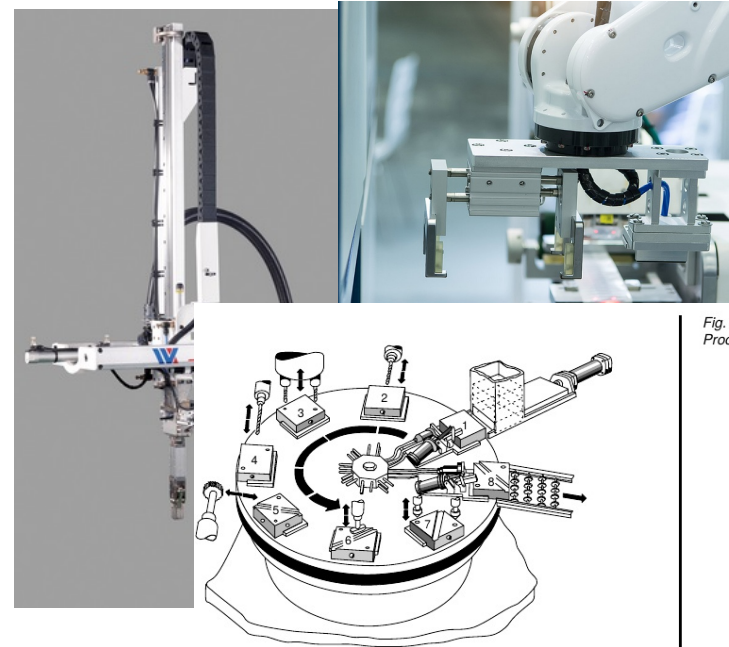


Fig. 1.2:  
Processing station

Fig. 1.2  
Points switch for two  
conveyor belts

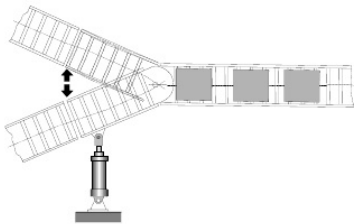


Fig. 1.3  
Pneumatic cutter



Fig. 5.2:  
Positional sketch of the  
lifting device

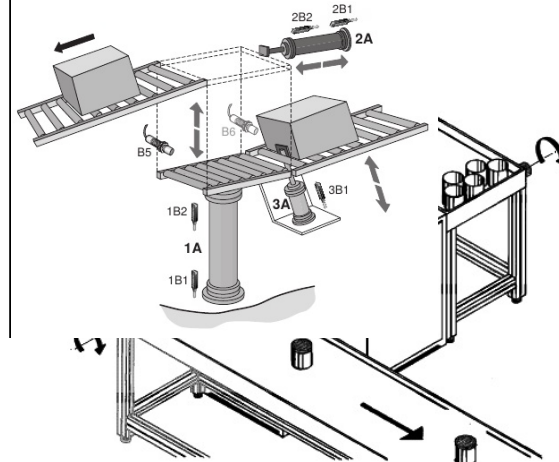


Fig. 1.3:  
Assembly device for  
mounting lids on cans

Pneumatic

Electropneumatic

# BAGIAN BAGIAN DARI PNEUMATIC

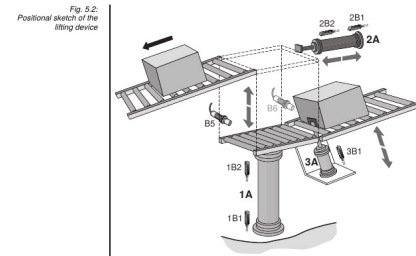
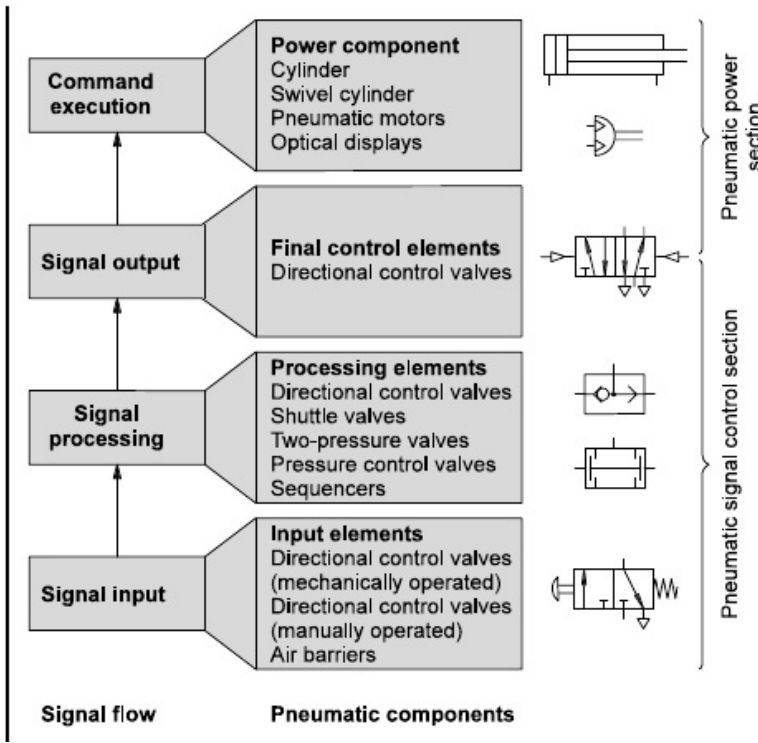
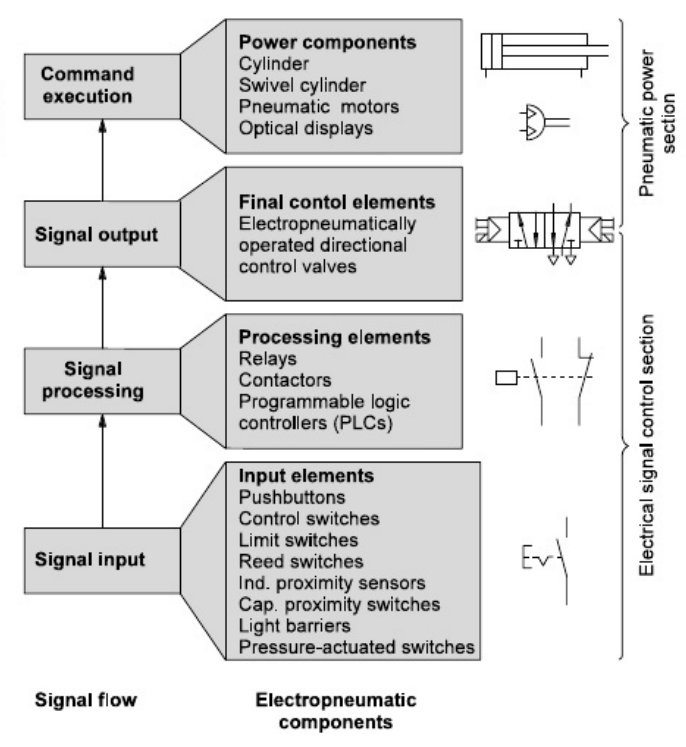


Fig. 1.7: Signal flow and components of a pneumatic control system



Pneumatic

Fig. 1.8: Signal flow and components of an electropneumatic control system



Electropneumatic

# BAGIAN BAGIAN DARI PNEUMATIC

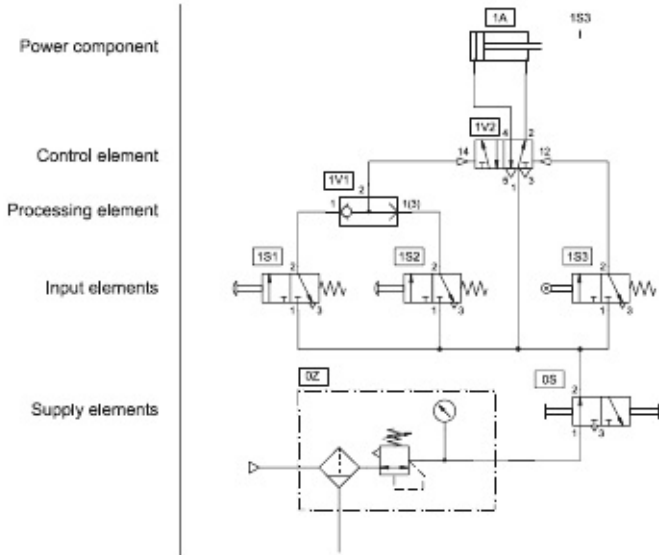


Fig. 4.3  
Circuit diagram

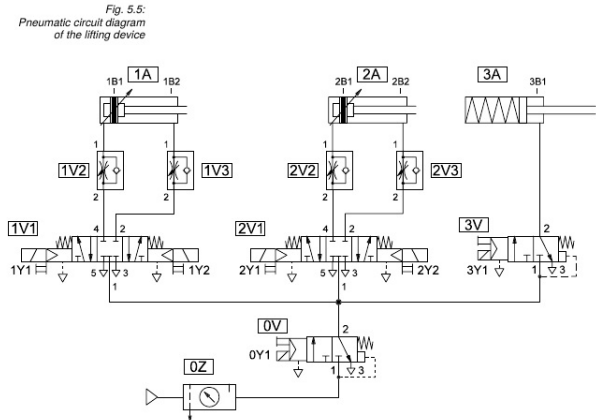


Fig. 5.5:  
Pneumatic circuit diagram of the lifting device

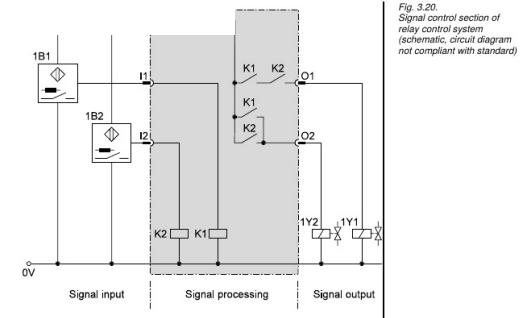


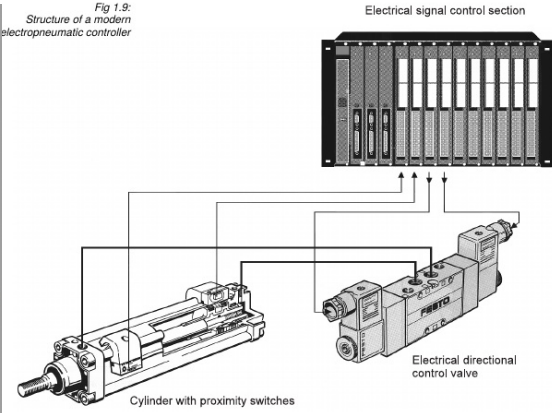
Fig. 3.20  
Signal control section of relay control system (schematic circuit diagram not compliant with standard)



Pneumatic



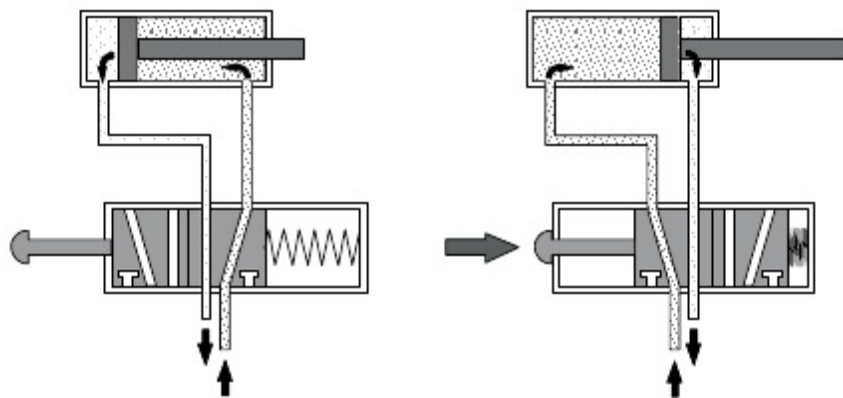
Fig. 1.9:  
Structure of a modern electropneumatic controller



Electropneumatic



# BAGAIMANA MENGENDALIKAN AKTUATORNYA?



Pneumatic

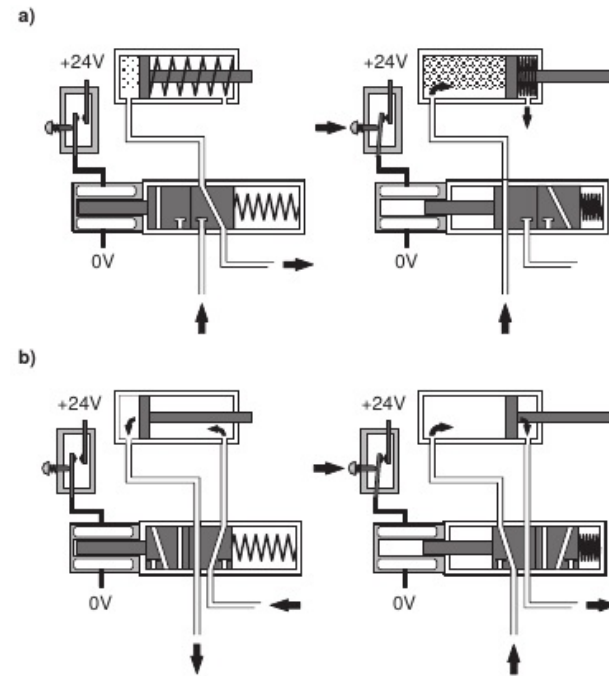
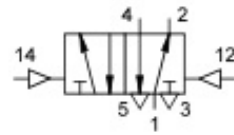
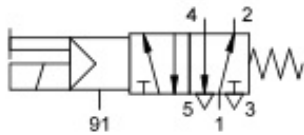
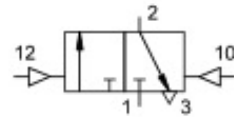
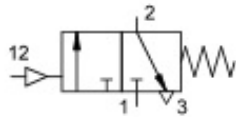


Fig. 4.1: Actuation of a pneumatic cylinder a) Single-acting b) Double-acting



Electropneumatic

# MENGENAL VALVE 1



Valve switching positions are represented as squares



The number of squares shows how many switching positions the valve has



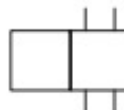
Lines indicate flow paths, arrows shows the direction of flow



Shut off positions are identified in the boxes by lines drawn at right angles



The connections (inlet and outlet ports) are shown by lines on the outside of the box

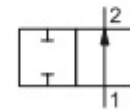


Working lines	ISO 5599-3	Lettering System	Port or Connection
	1	P	Pressure port
	2, 4	A, B	Working lines
	3, 5	R, S	Exhaust ports

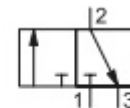
Pilot lines	ISO 5599-3	Lettering System	Port or Connection
	10	Z	Applied signal inhibits flow from port 1 to port 2
	12	Y, Z	Applied signal connects port 1 to port 2
	14	Z	Applied signal connects port 1 to port 4
	81, 91	Pz	Auxiliary pilot air

Number of ports  
Number of positions

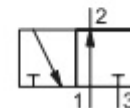
2/2 – Way directional control valve, normally open



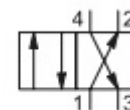
3/2 – Way directional control valve, normally closed



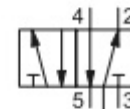
3/2 – Way directional control valve, normally open



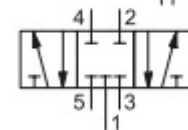
4/2 – Way directional control valve  
Flow from 1 → 2 and from 4 → 3



5/2 – Way directional control valve  
Flow from 1 → 2 and von 4 → 5

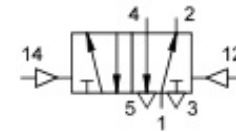
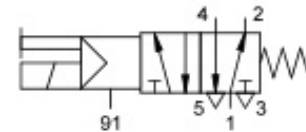
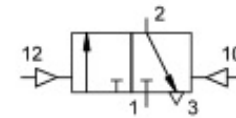
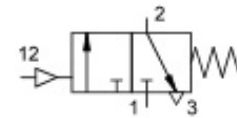


5/3 – Way directional control valve  
Mid position closed



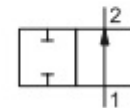
# MENGENAL VALVE 2

<b>Manual</b>	General	
	Pushbutton	
	Lever Operated	
	Detend lever operated	
	Foot pedal	
<b>Mechanical</b>	Plunger	
	Roller operated	
	Idle return, roller	
	Spring return	
	Spring centred	
<b>Pneumatic</b>	Direct pneumatic actuation	
	Indirect pneumatic actuation (piloted)	
<b>Electrical</b>	Single solenoid operation	
	Double solenoid operation	
<b>Combined</b>	Double solenoid and pilot operation with manual override	

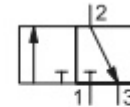


Number of ports  
 Number of positions

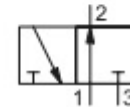
2/2 – Way directional control valve, normally open



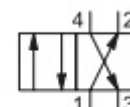
3/2 – Way directional control valve, normally closed



3/2 – Way directional control valve, normally open



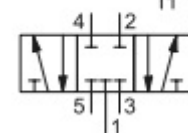
4/2 – Way directional control valve  
Flow from 1 → 2 and from 4 → 3



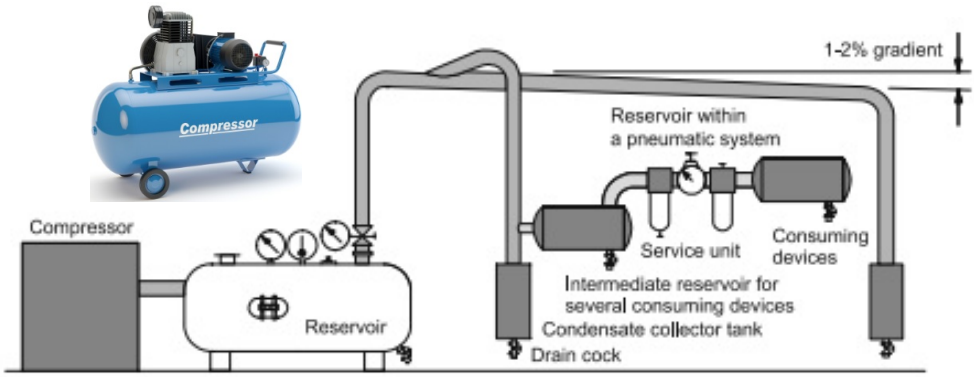
5/2 – Way directional control valve  
Flow from 1 → 2 and von 4 → 5



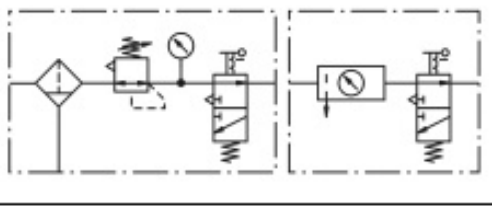
5/3 – Way directional control valve  
Mid position closed



# SUPLY ELEMENT



Service unit with on-off valve



Manifold

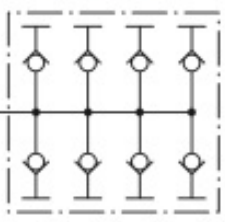
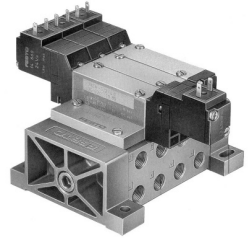


Fig. 4.12. Mounting of electrically actuated directional control valves on a valve manifold block (Prest)



Pneumatic

Electropneumatic

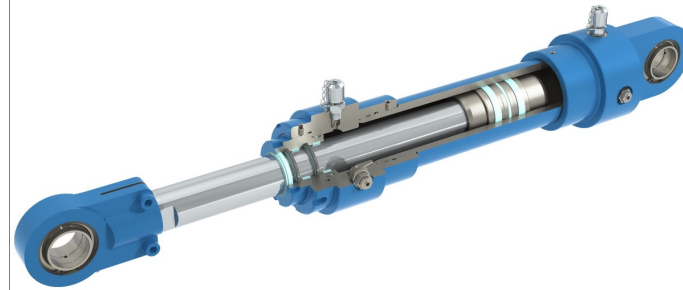


# POWER COMPONENTEN

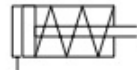
Actuators can be further broken down into groups:

- Linear actuators
  - Single-acting cylinder
  - Double-acting cylinder
- Rotary actuators
  - Air motors
  - Rotary actuators

Fig. 2.13  
Actuators, linear and rotary



Single-acting cylinder



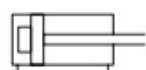
Double-acting cylinder



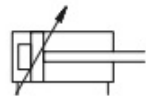
Double-acting cylinder with double ended piston rod



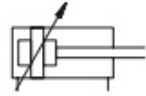
Double-acting cylinder with non-adjustable cushioning in one direction



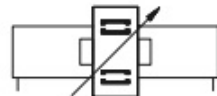
Double-acting cylinder with single adjustable cushioning



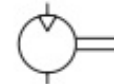
Double-acting cylinder with adjustable cushioning at both ends



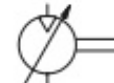
Linear drive with magnetic coupling



Air motor, rotation in one direction fixed capacity



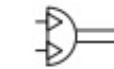
Air motor, rotation in one direction variable capacity



Air motor, rotation in both directions variable capacity

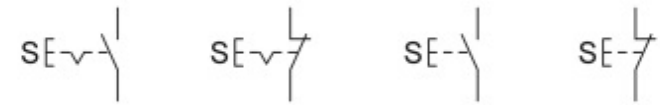
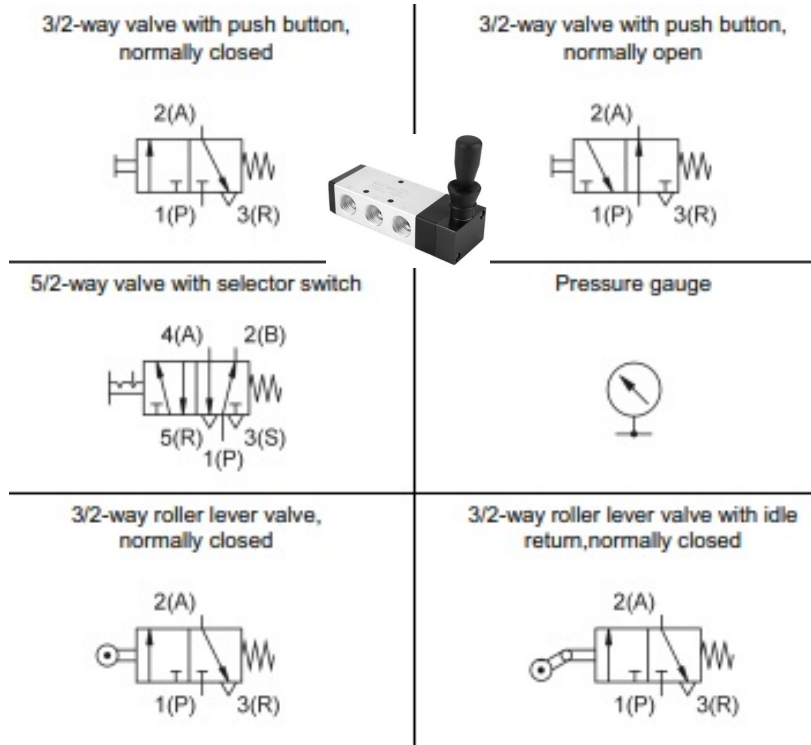


Rotary actuator



ctropneumatic  
Pneumatic

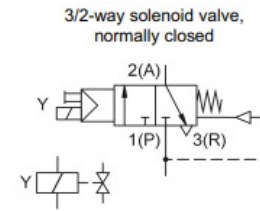
# INPUT ELEMENT 1



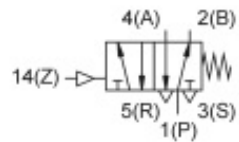
Pneumatic

Electropneumatic

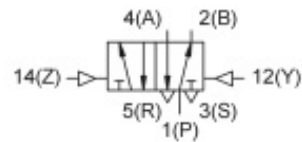
# FINAL CONTROL ELEMENT



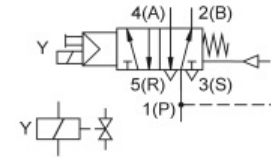
5/2-way pilot valve



5/2-way double pilot valve



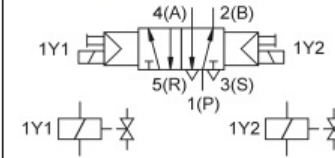
5/2-way solenoid valve



Indicator and distributor plate, electrical



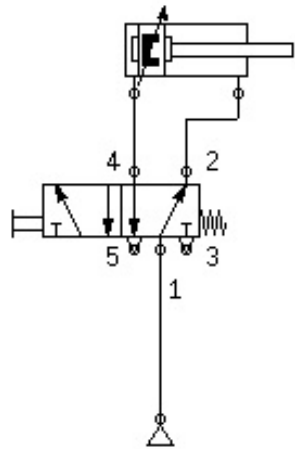
5/2-way double solenoid valve



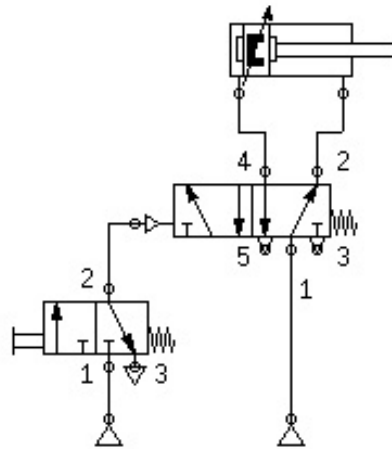
Pneumatic

Electropneumatic

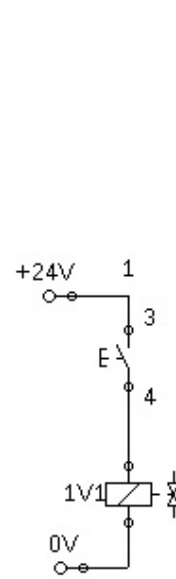
# KENDALI SECARA LANGSUNG DAN TIDAK LANGSUNG



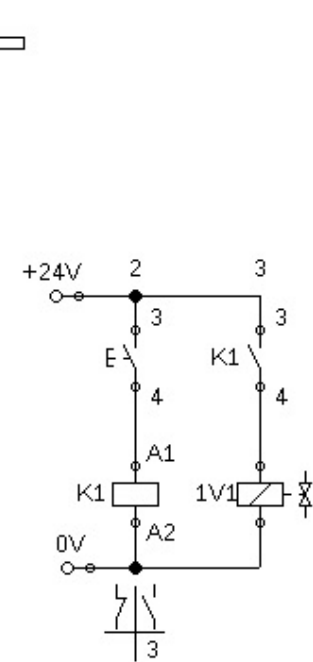
Langsung



Tidak Langsung



Langsung



Tidak Langsung

Pneumatic

Electropneumatic

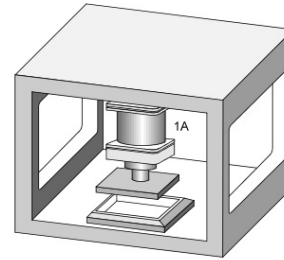
# Mendesain Rangkaian Dengan FluidSim

## 5.6 Exercise 2: Indirect control of a double-acting cylinder

**The Problem** A double-acting cylinder is to advance when a push button is operated. Upon release of the push button the cylinder is to retract. The cylinder is 250 mm diameter and consumes a large volume of air.

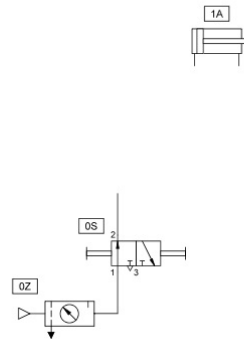
**Exercise** Draw the circuit diagram for the problem. Designate the valves and indicate the numbering system for the connections.

Fig. 5.7  
Positional sketch



What happens to the cylinder, if the push button is pressed for a very short period and is then immediately released? Describe the operation of the circuit.

Fig. 5.8  
Circuit diagram



Pneumatic

Electropneumatic