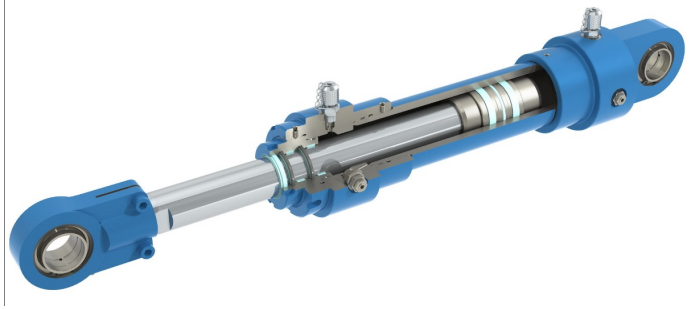
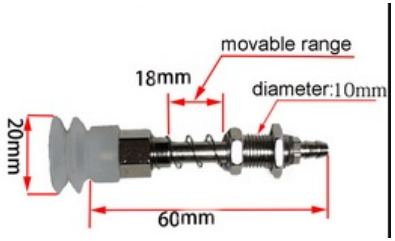
APA YANG DIKENDALIKAN DI SISTEM PNEUMATIC?

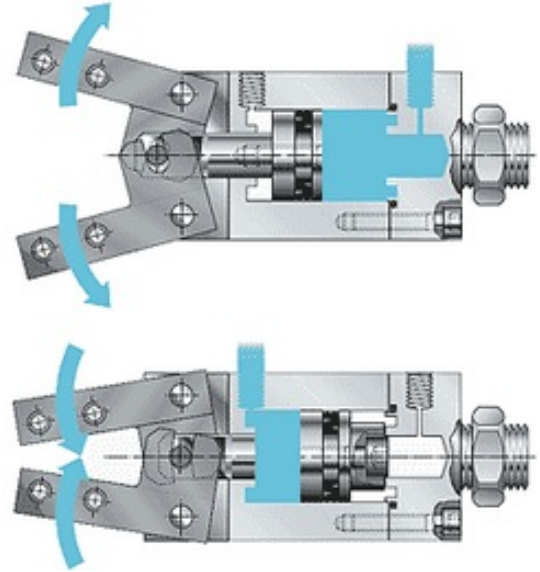
Actuators can be further broken down into groups:

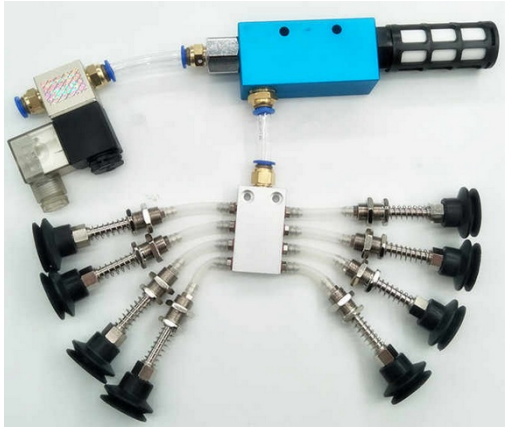
- Linear actuators
  - Single-acting cylinder
  - Double-acting cylinder
- Rotary actuators
  - Air motors
  - Rotary actuators

Fig. 2.13
Actuators, linear and rotary









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

UNTUK APA AKTUATORNYA?

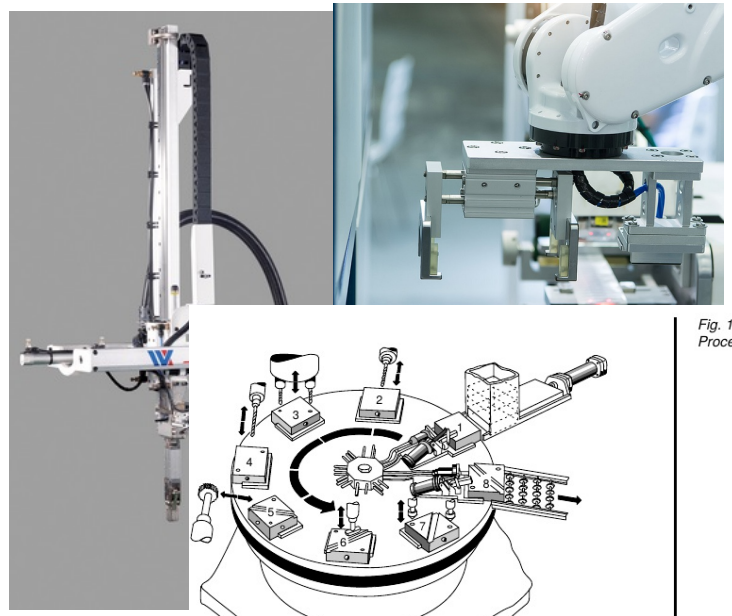


Fig. 1.2:
Processing station

Fig. 1.2
Points switch for two conveyor belts

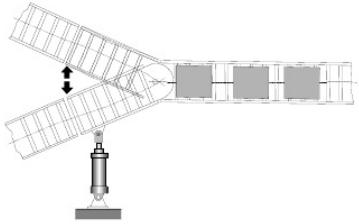


Fig. 1.3
Pneumatic cutter

Fig. 5.2:
Positional sketch of the lifting device

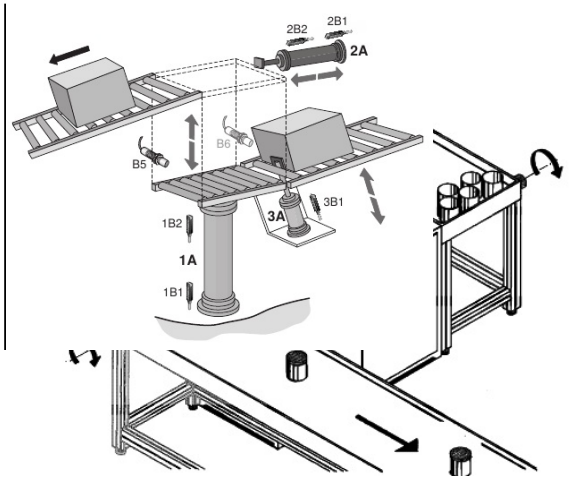


Fig. 1.3:
Assembly device for mounting lids on cans

Pneumatic

Electropneumatic

BAGIAN BAGIAN DARI PNEUMATIC

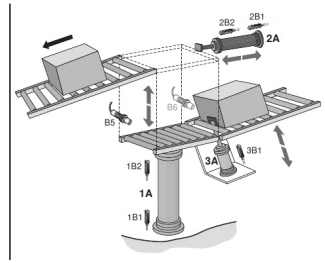
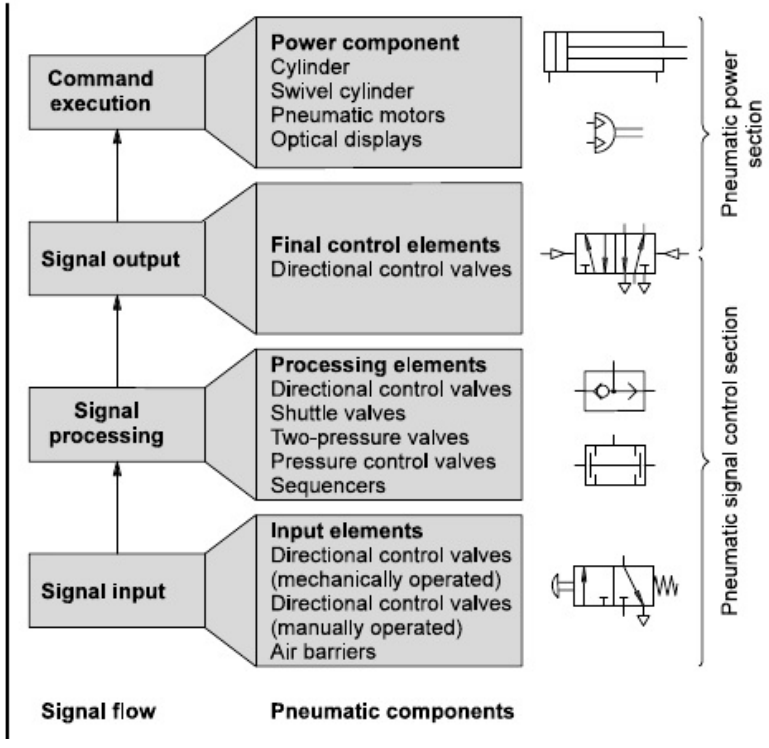


Fig. 5.2: Positional sketch of the lifting device

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



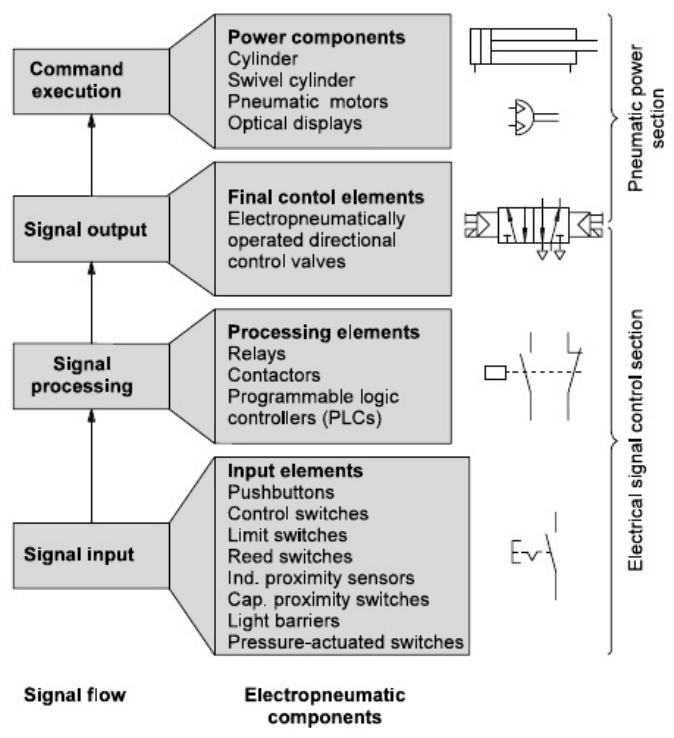


Fig. 1.8: Signal flow and components of an electropneumatic control system

Pneumatic

Electropneumatic

BAGIAN BAGIAN DARI PNEUMATIC

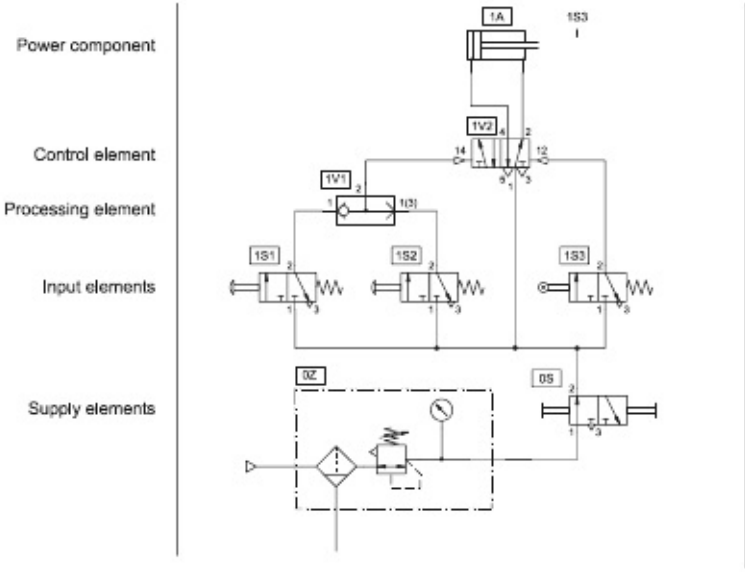


Fig. 4.3
Circuit diagram

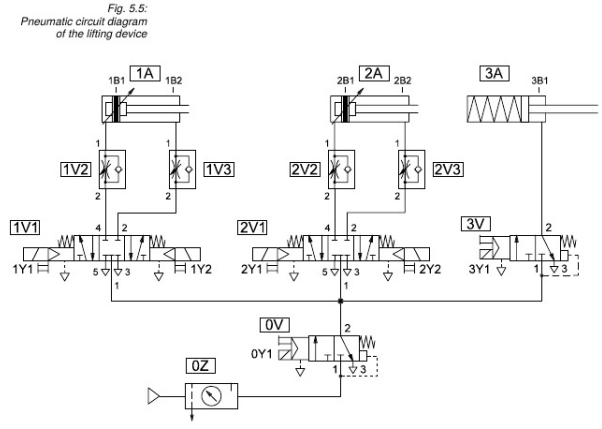


Fig. 5.5:
Pneumatic circuit diagram of the lifting device

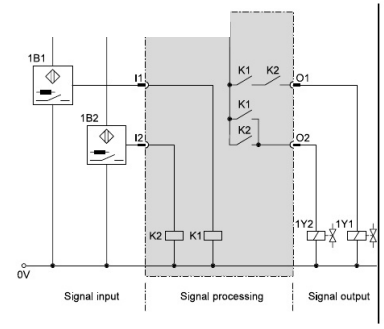
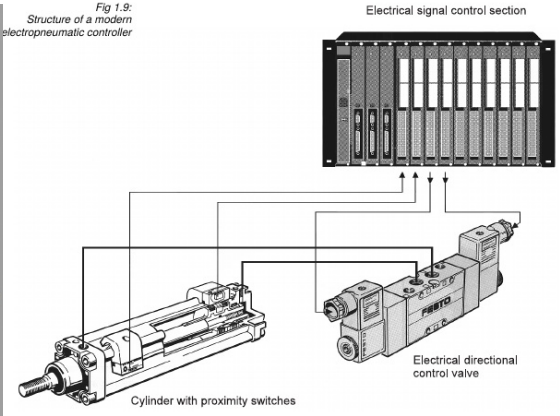


Fig. 3.20.
Signal control section of relay control system (schematic, circuit diagram not compliant with standard)

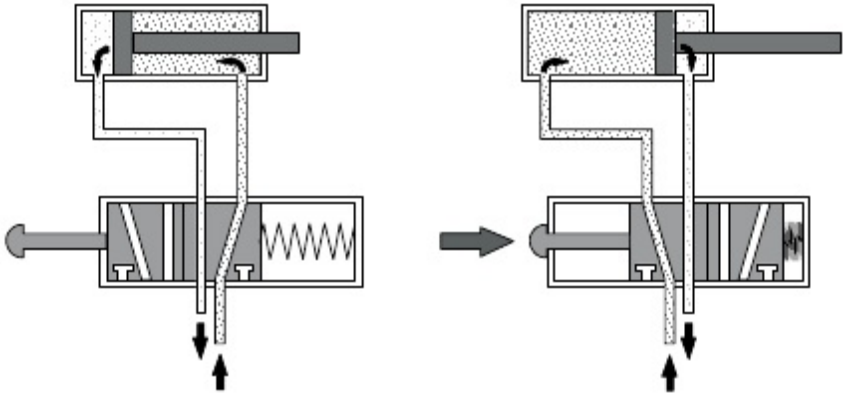
Fig 1.9:
Structure of a modern electropneumatic controller



Pneumatic

Electropneumatic

BAGAIMANA MENGENDALIKAN AKTUATORNYA?



Pneumatic

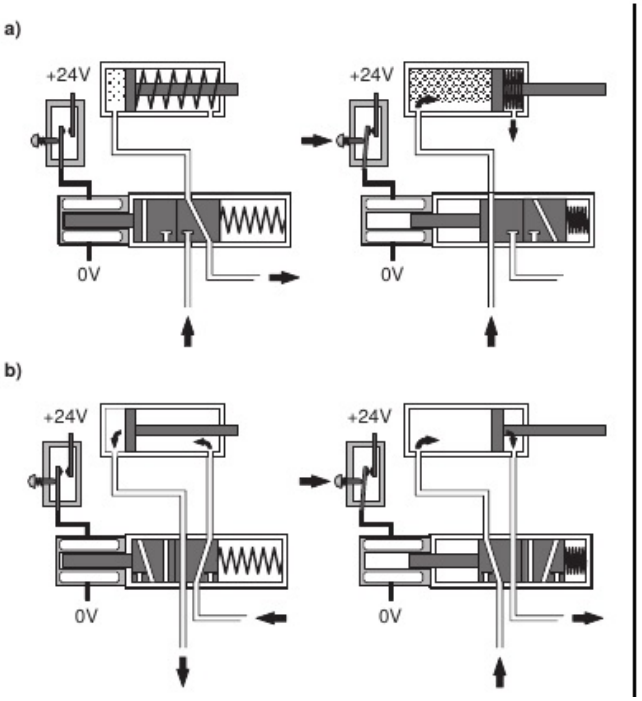
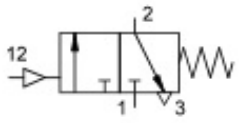
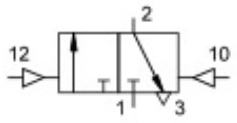


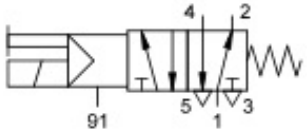
Fig. 4.1: Actuation of a pneumatic cylinder a) Single-acting b) Double-acting

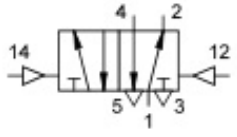
Electropneumatic

MENGENAL VALVE 1









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

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

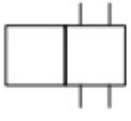
Valve switching positions
are represented as squares

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

Lines indicate flow paths,
arrows shows the direction of flow

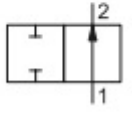
Shut off positions are identified in the boxes
by lines drawn at right angles

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

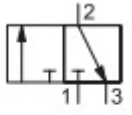


Number of ports
Number of positions

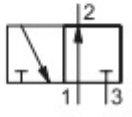
2/2 – Way directional control valve, normally open



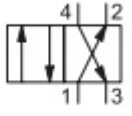
3/2 – Way directional control valve, normally closed



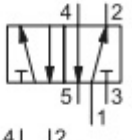
3/2 – Way directional control valve, normally open



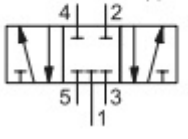
4/2 – Way directional control valve
Flow from 1 → 2 and from 4 → 3



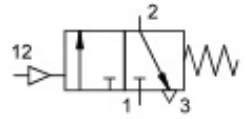
5/2 – Way directional control valve
Flow from 1 → 2 and von 4 → 5

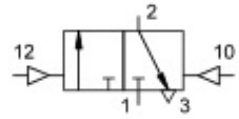


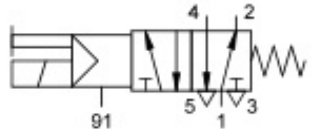
5/3 – Way directional control valve
Mid position closed

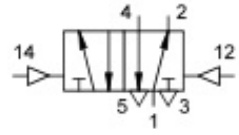


MENGENAL VALVE 2





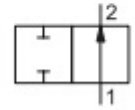




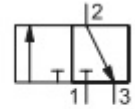
Manual	General	
	Pushbutton	
	Lever Operated	
	Detend lever operated	
	Foot pedal	
Mechanical	Plunger	
	Roller operated	
	Idle return, roller	
	Spring return	
	Spring centred	
Pneumatic	Direct pneumatic actuation	
	Indirect pneumatic actuation (piloted)	
Electrical	Single solenoid operation	
	Double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

Number of ports
Number of positions

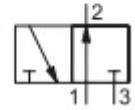
2/2 – Way directional control valve, normally open



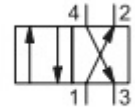
3/2 – Way directional control valve, normally closed



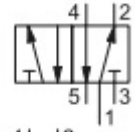
3/2 – Way directional control valve, normally open



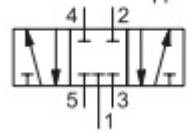
4/2 – Way directional control valve
Flow from 1 → 2 and from 4 → 3



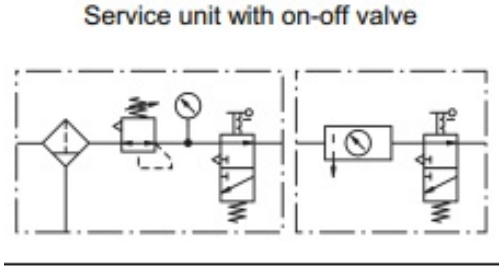
5/2 – Way directional control valve
Flow from 1 → 2 and von 4 → 5

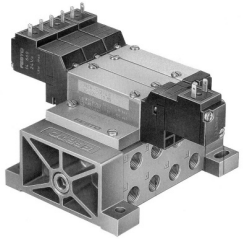


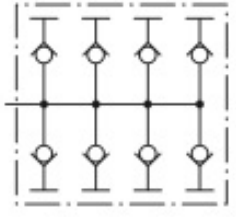
5/3 – Way directional control valve
Mid position closed



SUPLAY ELEMENT







Pneumatic

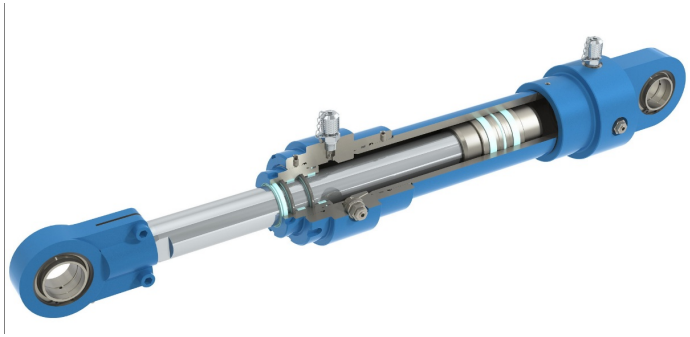
Electropneumatic

POWER COMPONEN

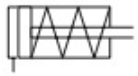
Actuators can be further broken down into groups:

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

Fig. 2.13
Actuators, linear and rotary



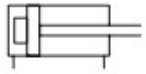
Single-acting cylinder



Double-acting cylinder

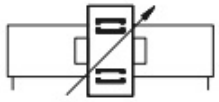
Double-acting cylinder
with double ended piston rod

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



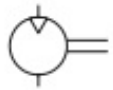
Double-acting cylinder
with single adjustable cushioning

Double-acting cylinder
with adjustable cushioning
at both ends

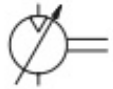


Linear drive with
magnetic coupling

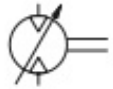
Air motor, rotation in one direction
fixed capacity



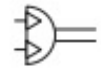
Air motor, rotation in one direction
variable capacity



Air motor, rotation in both directions
variable capacity



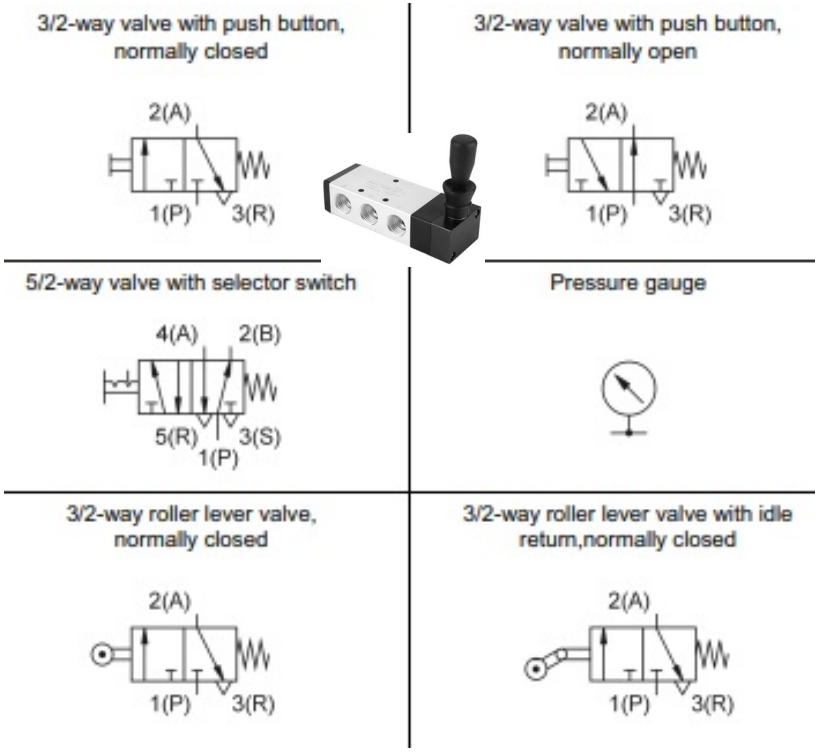
Rotary actuator



ctropneumatic

Pneumatic

INPUT ELEMENT 1

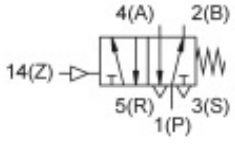


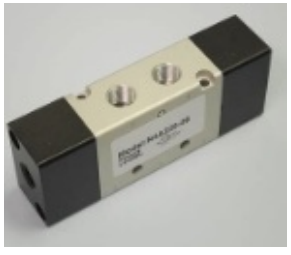
Pneumatic

Electropneumatic

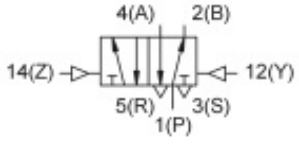
FINAL CONTROL ELEMENT

5/2-way pilot valve

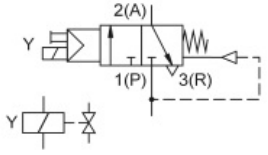




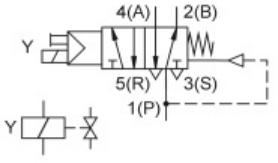
5/2-way double pilot valve



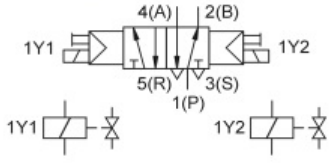
3/2-way solenoid valve, normally closed



5/2-way solenoid valve



5/2-way double solenoid valve

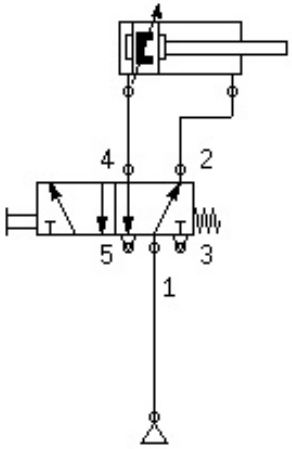


Indicator and distributor plate, electrical

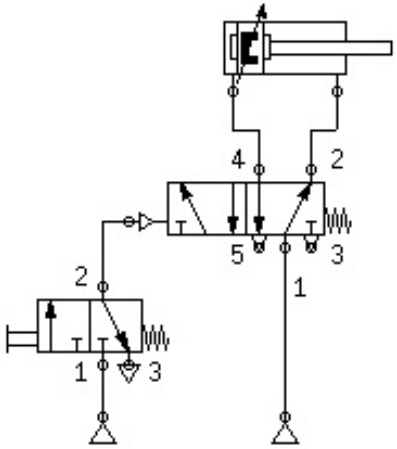
Pneumatic

Electropneumatic

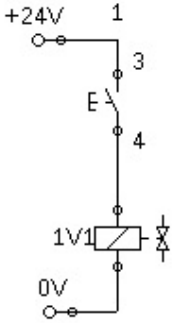
KENDALI SECARA LANGSUNG DAN TIDAK LANGSUNG



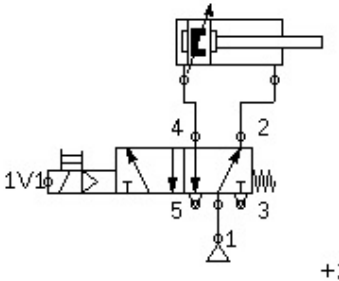
Langsung

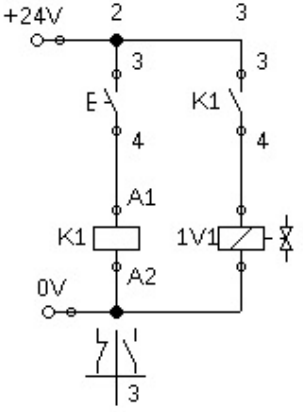


Tidak Langsung



Langsung





Tidak Langsung

Pneumatic

Electropneumatic

Mendesain Rangkaian Dengan FluidSim

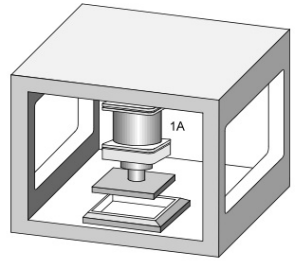
5.6 Exercise 2: Indirect control of a double-acting cylinder

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



Question 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.

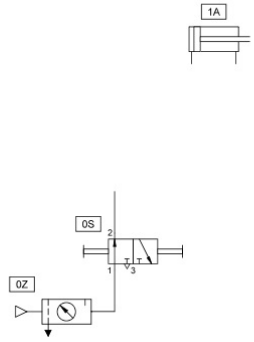
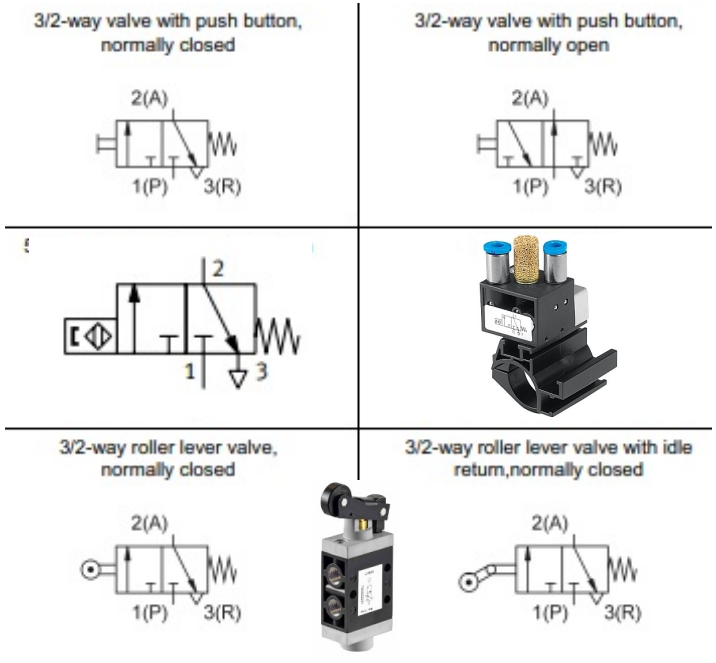


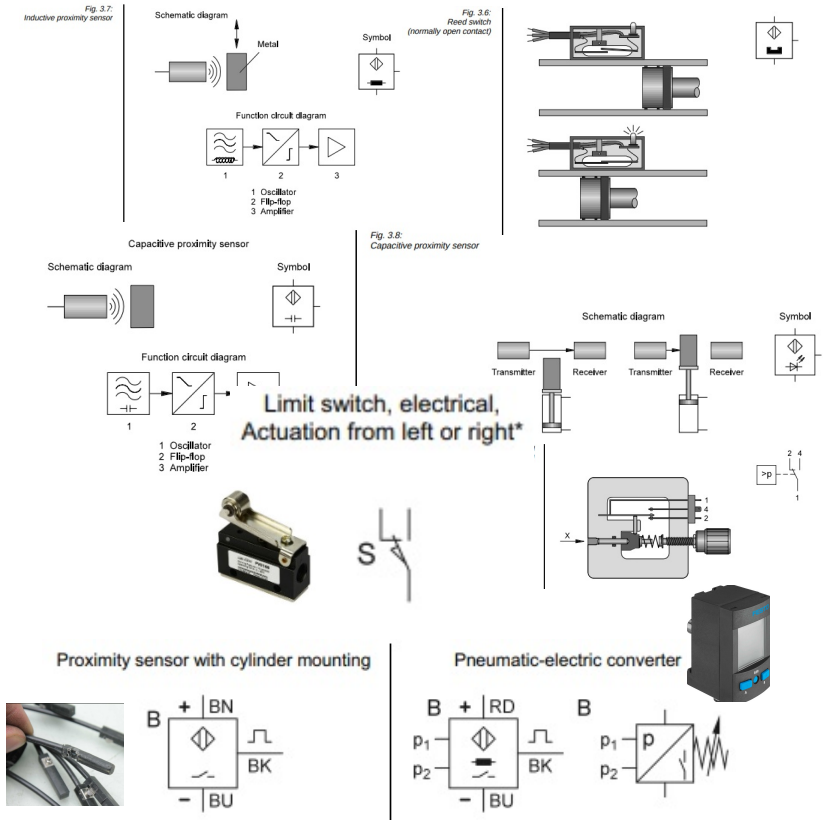
Fig. 5.8 Circuit diagram

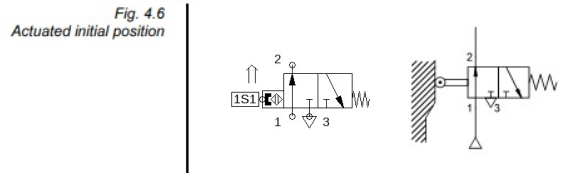
Pneumatic

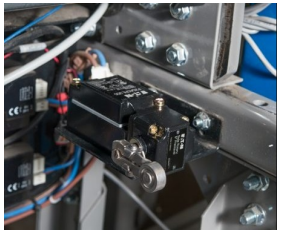
Electropneumatic

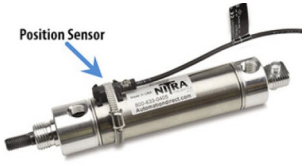
INPUT ELEMENT 2

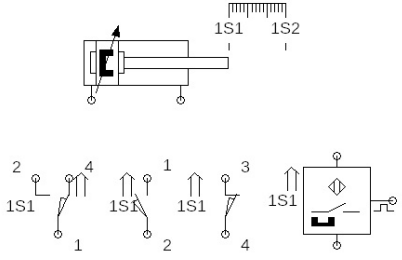










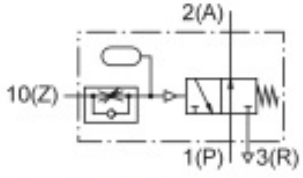


Pneumatic

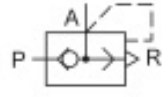
Electropneumatic

PROCESSING ELEMENT

Time delay valve normally closed

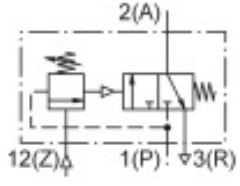


Quick exhaust valve

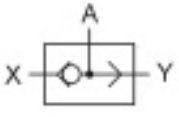


One-way flow control valve

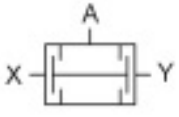
Pressure sequence valve



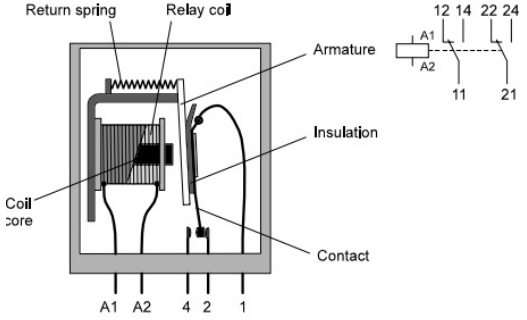
Shuttle valve

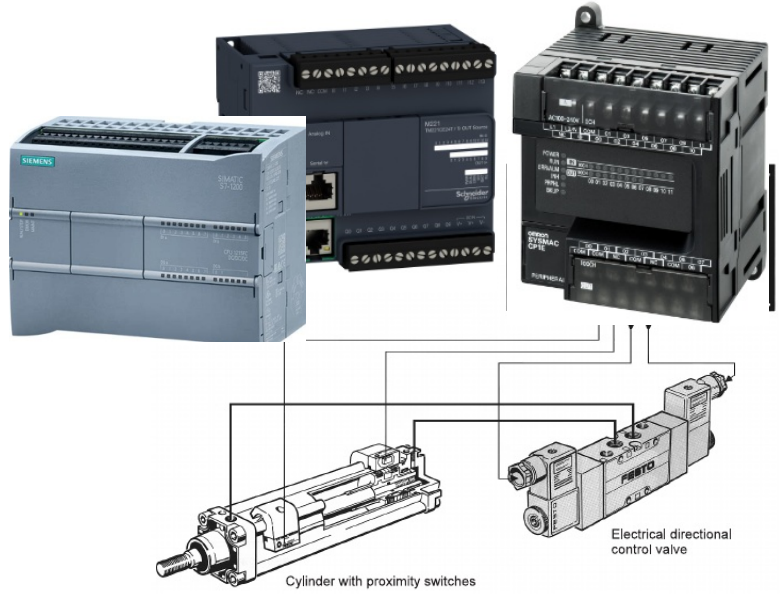


Dual-pressure valve



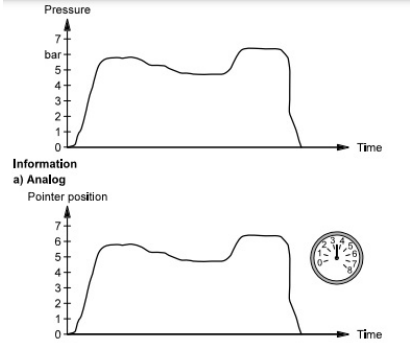
Pneumatic

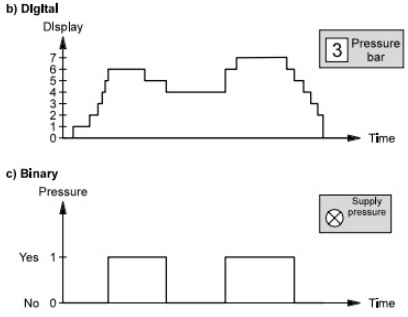


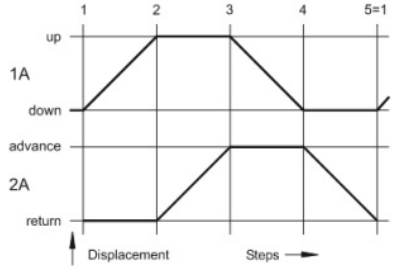


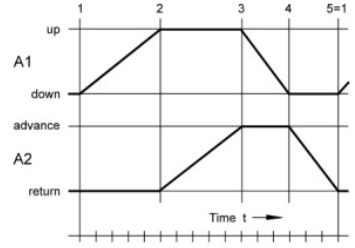
Electropneumatic

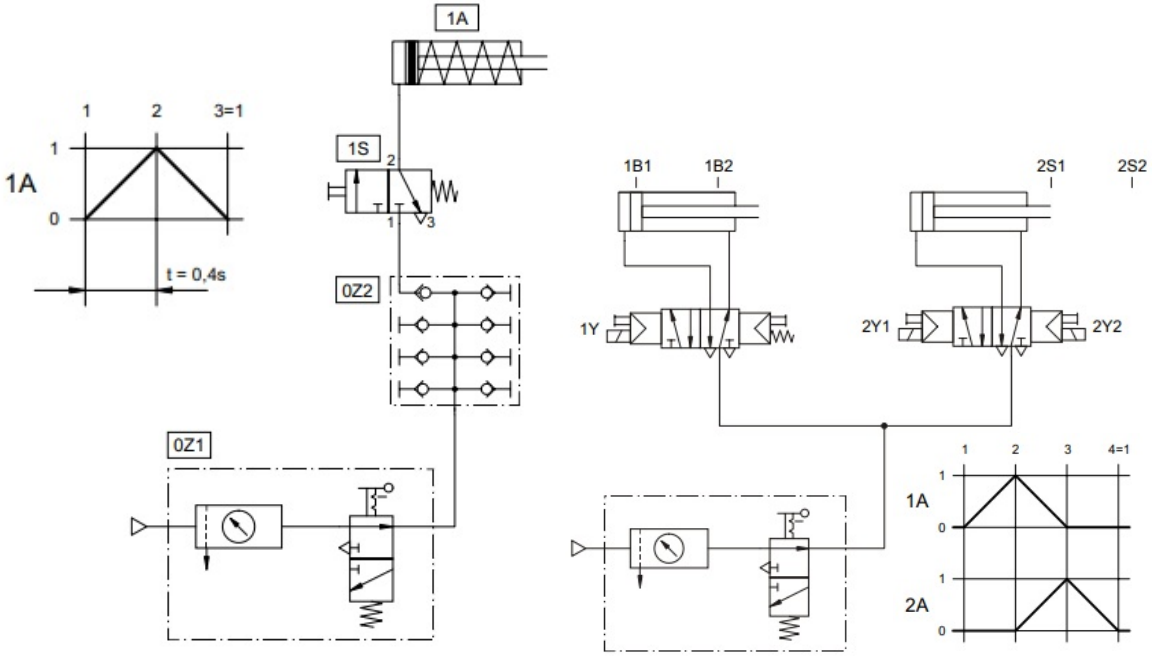
Grafik Pergerakan Pneumatic











PEMBERIAN LABEL KOMPONEN

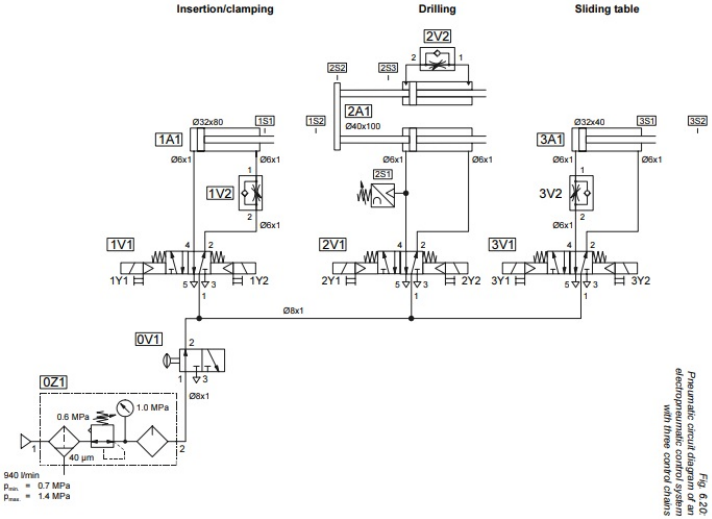
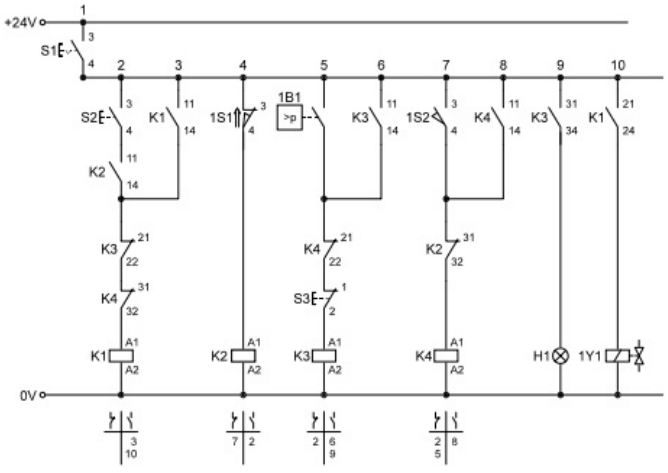


Fig. 6.20: Pneumatic circuit diagram of an electropneumatic control system with three control chains

Fig. 6.28: Electrical circuit diagram of an electropneumatic control system



S1 = Main switch
S2 = Start switch
S3 = Acknowledgement switch
1S1/1S2 = Limit switch
1B1 = Pressure switch

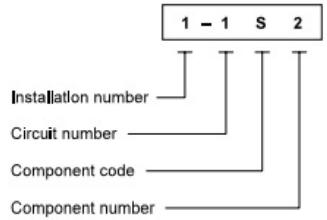


Fig. 6.21: Identification code for components in pneumatic circuit diagrams

Table 6.3: Identification codes for components in a pneumatic circuit diagram

Components	*Identification*
Compressors	P
Power components	A
Drive motors	M
Sensors	S
Valves	V
Valve coils	Y*
Other components	Z**

* national supplement in German standard
** or any other letter not included in the list

Table 6.4: Designation of components in an electrical circuit diagram (DIN 40719, Part 2)

Component type	*Identification*
Limit switch	S
Manually operated pushbutton, input elements	S
Reed switch	B
Electronic proximity switch	B
Pressure switch	B
Indicator	H
Relay	K
Contactor	K
Solenoid coil of a valve	Y