

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

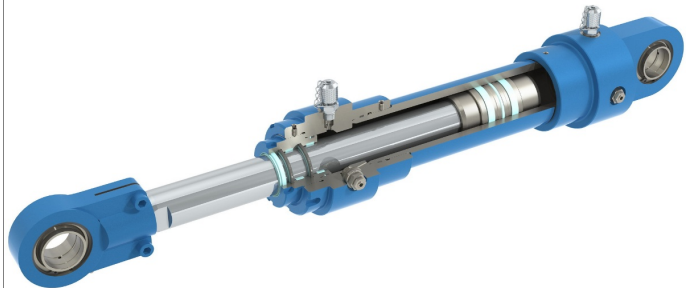
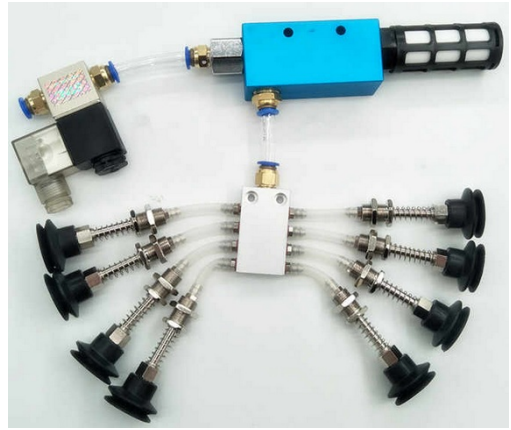
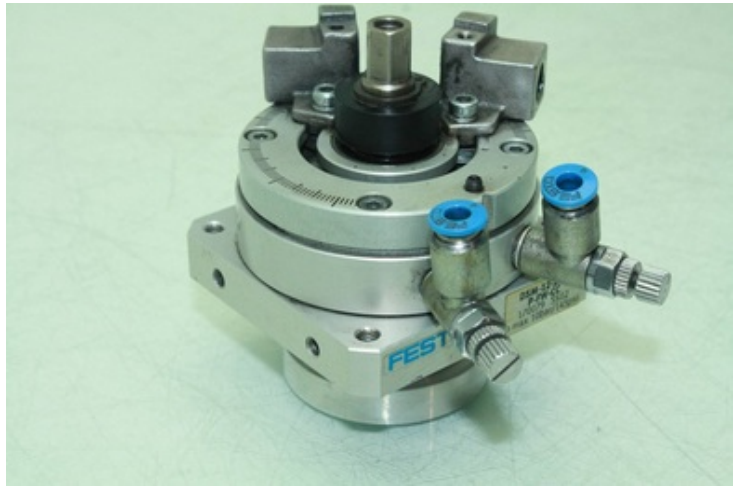
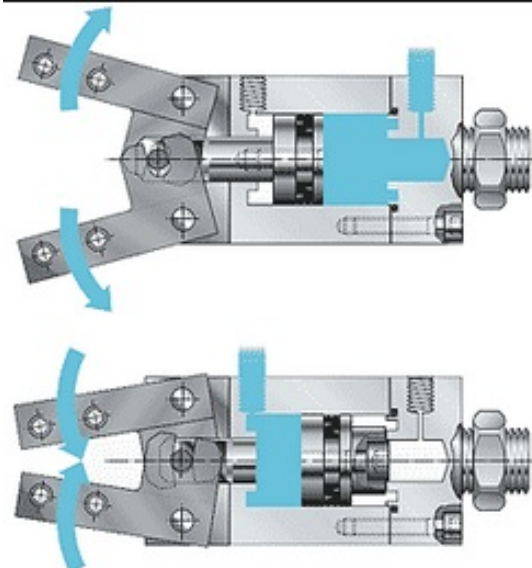
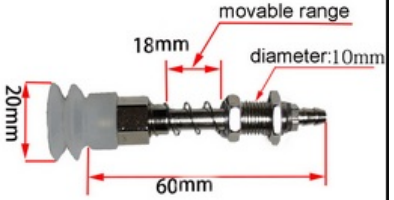


Fig. 2.13 Actuators, linear and rotary



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

UNTUK APA AKTUATORNYA?

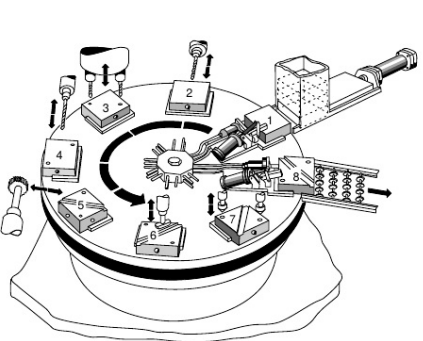


Fig. 1.2: Processing station

Fig. 1.2: Points switch for two conveyor belts

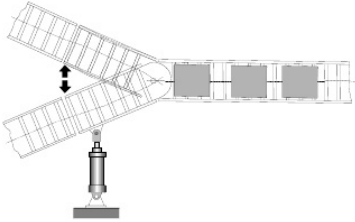


Fig. 5.2: Positional sketch of the lifting device

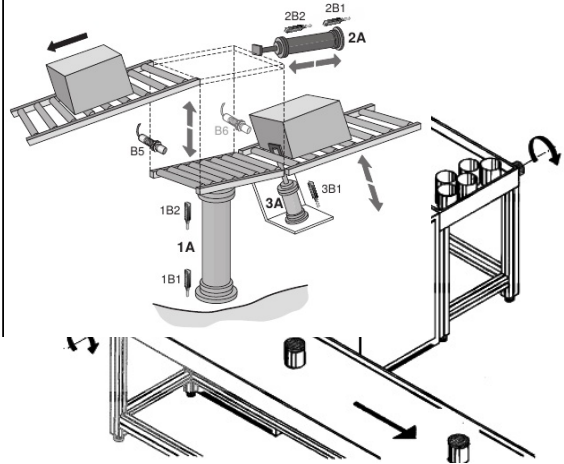
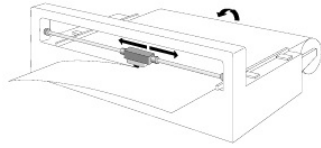


Fig. 1.3: Assembly device for mounting lids on cans

Fig. 1.3: Pneumatic cutter



Pneumatic

Electropneumatic

BAGIAN BAGIAN DARI PNEUMATIC

Fig. 5.2: Positional sketch of the lifting device

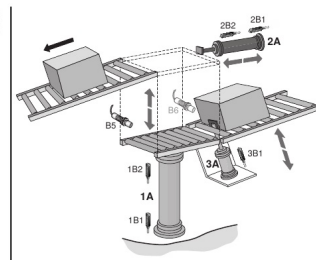
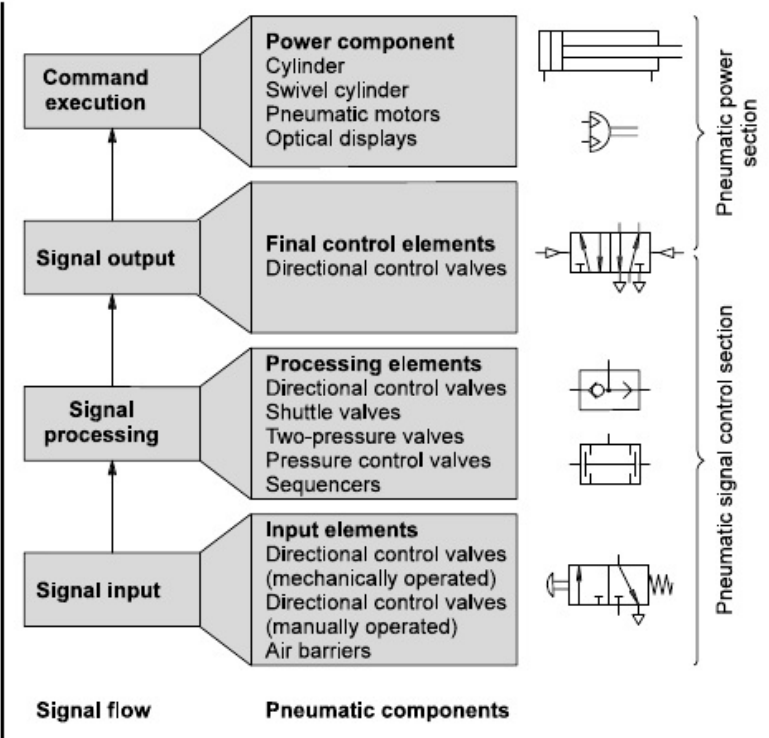
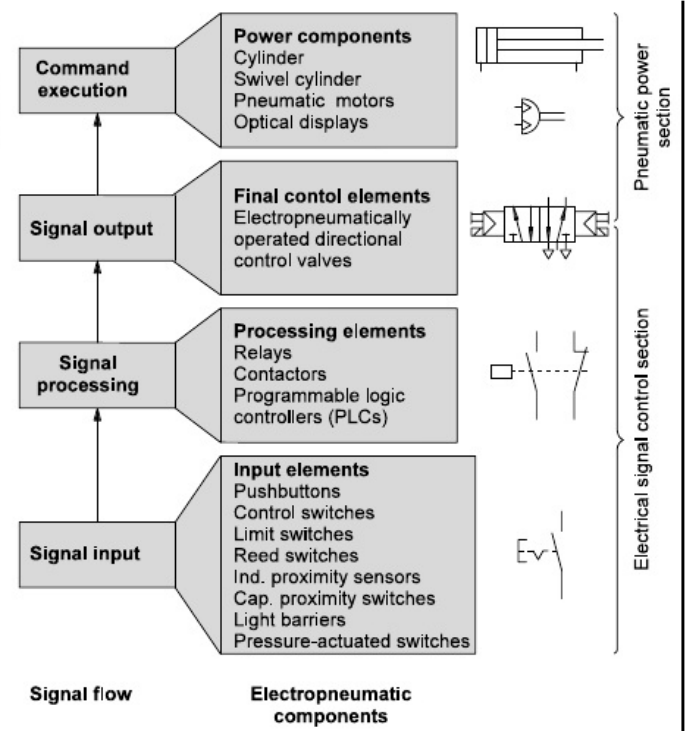


Fig. 1.7: Signal flow and components of a pneumatic control system



Pneumatic

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



Electropneumatic

BAGIAN BAGIAN DARI PNEUMATIC

Power component

Control element

Processing element

Input elements

Supply elements

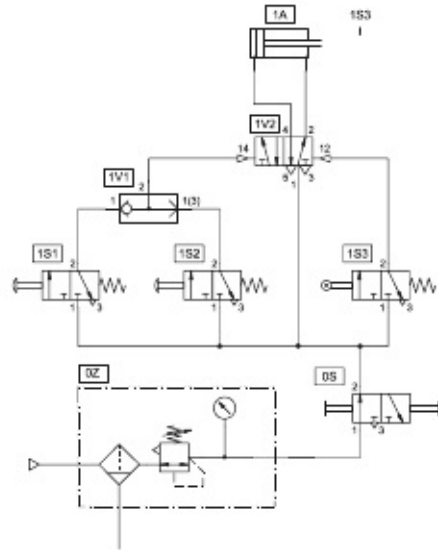


Fig. 4.3
Circuit diagram

Fig. 5.5:
Pneumatic circuit diagram
of the lifting device

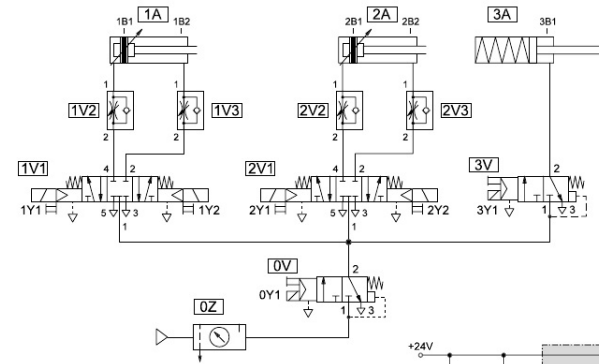
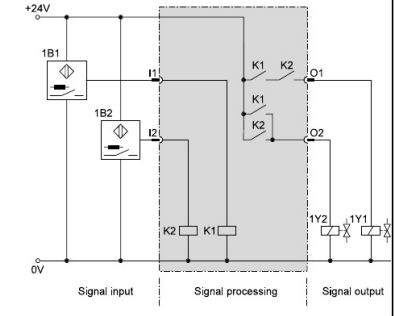


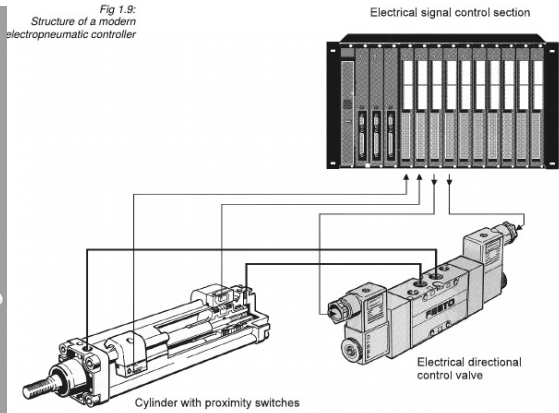
Fig. 3.20:
Signal control section of
relay control system
(schematic, circuit diagram
not compliant with standard)



Pneumatic

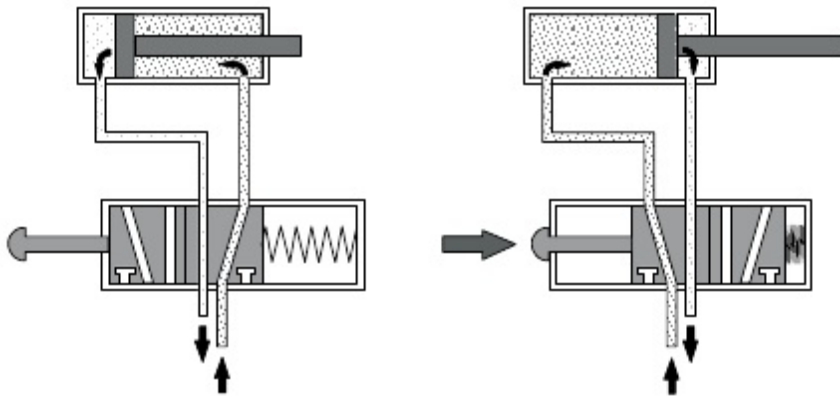


Fig 1.9:
Structure of a modern
electropneumatic controller



Electropneumatic

BAGAIMANA MENGENDALIKAN AKTUATORNYA?



Pneumatic

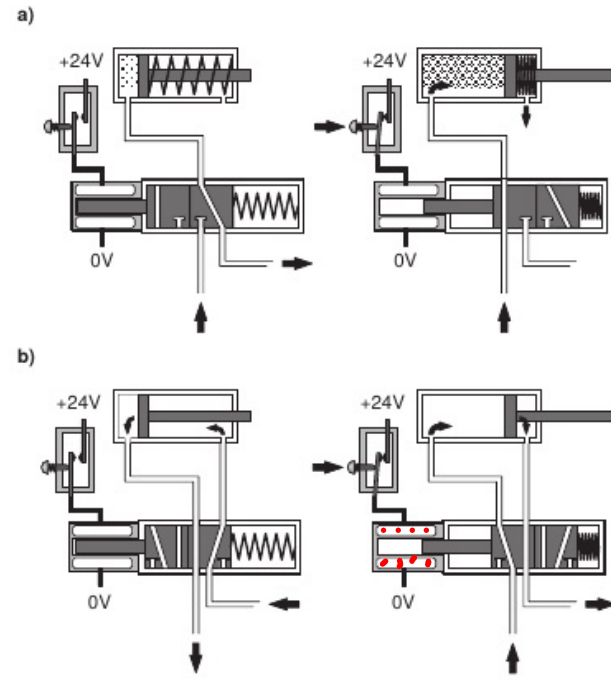
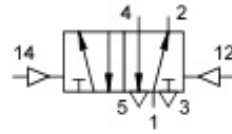
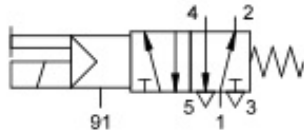
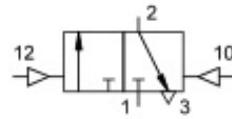
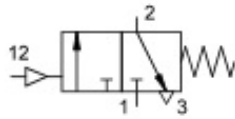


Fig. 4.1: Actuation of a pneumatic cylinder a) Single-acting b) Double-acting



Electropneumatic

MENGENAL VALVE 1



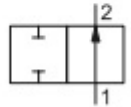
Working lines	ISO 5599-3	Lettering System	Port or Connection
	1	P	Pressure port
	2, 4	A, B	Working lines
	3, 5	R, S	Exhaust ports

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

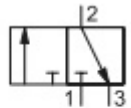
Number of ports

 Number of positions

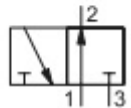
2/2 – Way directional control valve, normally open



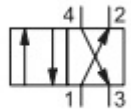
3/2 – Way directional control valve, normally closed



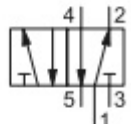
3/2 – Way directional control valve, normally open



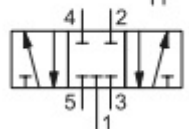
4/2 – Way directional control valve
Flow from 1 → 2 and from 4 → 3



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



5/3 – Way directional control valve
Mid position closed



Valve switching positions are represented as squares



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



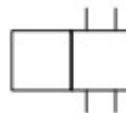
Lines indicate flow paths, arrows shows the direction of flow



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

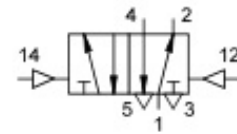
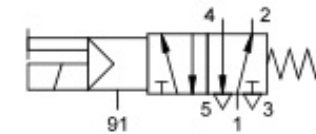
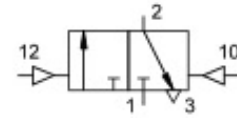
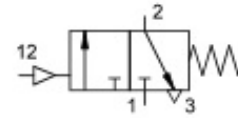


The connections (inlet and outlet ports) are shown by lines on the outside of the box



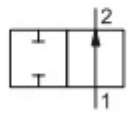
MENGENAL VALVE 2

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	

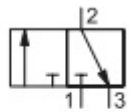


Number of ports
 Number of positions

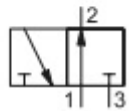
2/2 – Way directional control valve, normally open



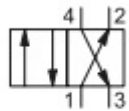
3/2 – Way directional control valve, normally closed



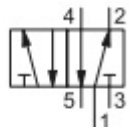
3/2 – Way directional control valve, normally open



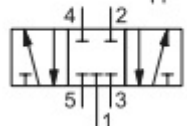
4/2 – Way directional control valve
Flow from 1 → 2 and from 4 → 3



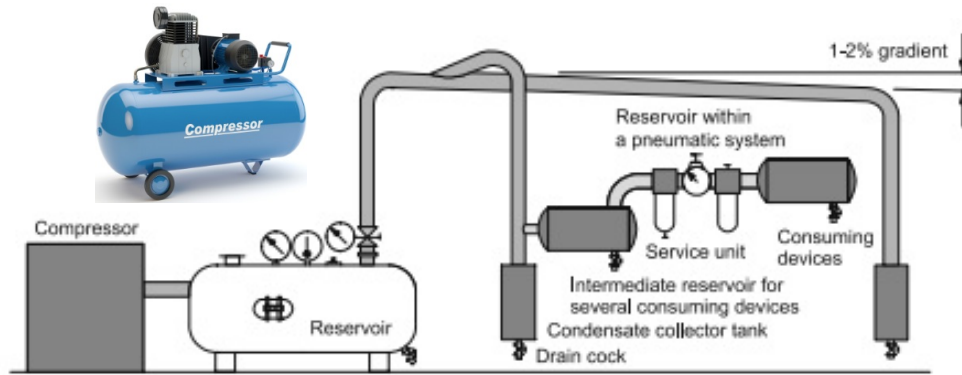
5/2 – Way directional control valve
Flow from 1 → 2 and von 4 → 3



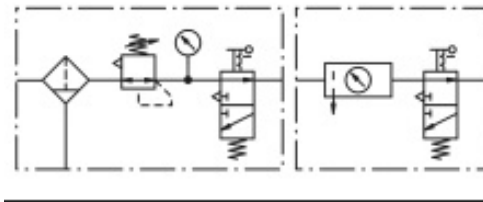
5/3 – Way directional control valve
Mid position closed



SUPLAY ELEMENT



Service unit with on-off valve



Manifold

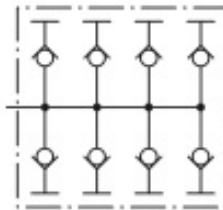
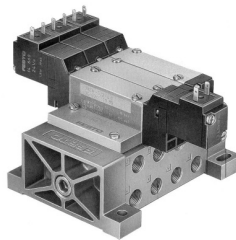


Fig. 4.12:
Mounting of
electrically actuated
directional control valves
on a valve manifold block
(Festo)



Pneumatic

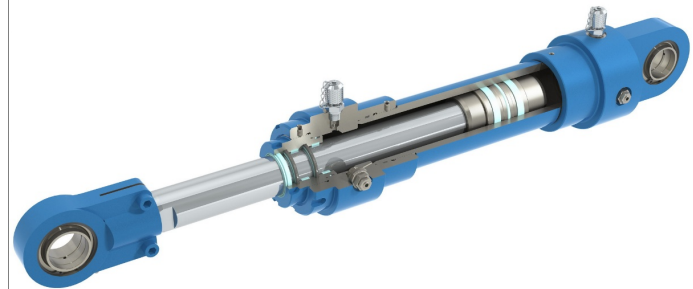
Electropneumatic

POWER COMPONENTEN

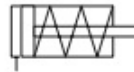
Actuators can be further broken down into groups:

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

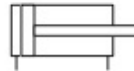
Fig. 2.13
Actuators, linear and rotary



Single-acting cylinder



Double-acting cylinder



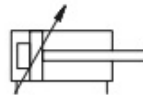
Double-acting cylinder with double ended piston rod



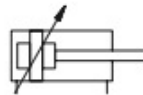
Double-acting cylinder with non-adjustable cushioning in one direction



Double-acting cylinder with single adjustable cushioning



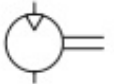
Double-acting cylinder with adjustable cushioning at both ends



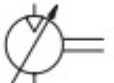
Linear drive with magnetic coupling



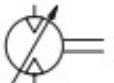
Air motor, rotation in one direction fixed capacity



Air motor, rotation in one direction variable capacity



Air motor, rotation in both directions variable capacity

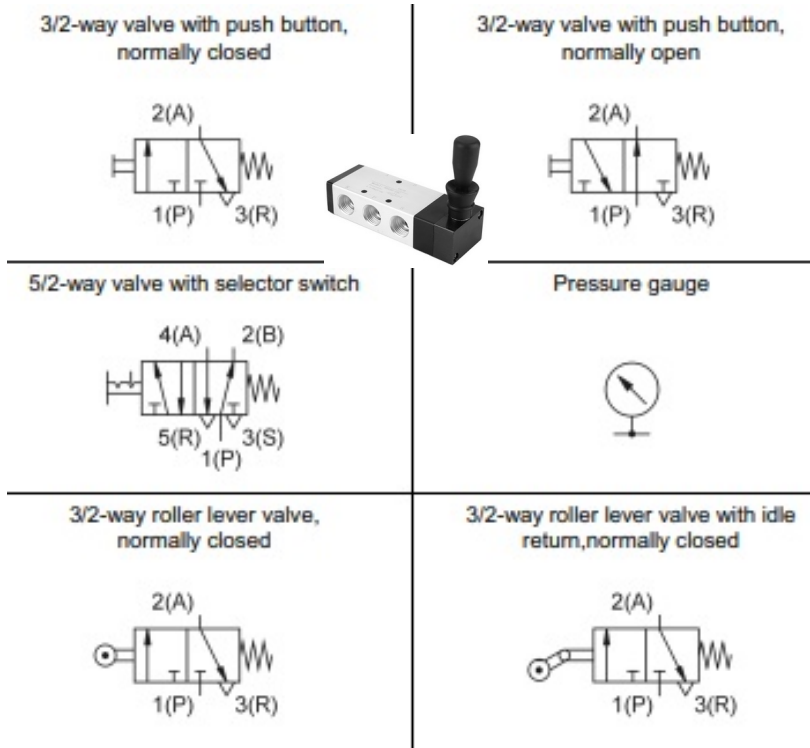


Rotary actuator



ctropneumatic
Pneumatic

INPUT ELEMENT 1



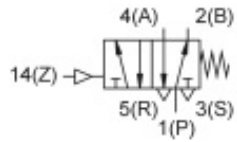
Pneumatic

Electropneumatic

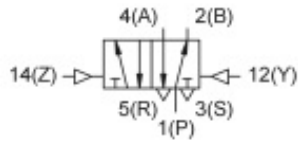
FINAL CONTROL ELEMENT



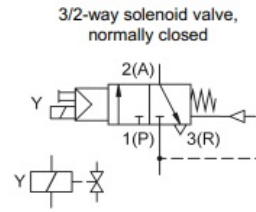
5/2-way pilot valve



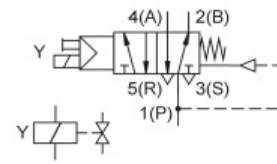
5/2-way double pilot valve



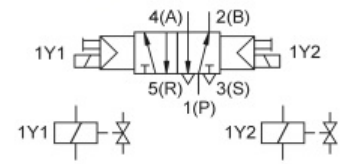
Pneumatic



5/2-way solenoid valve



5/2-way double solenoid valve

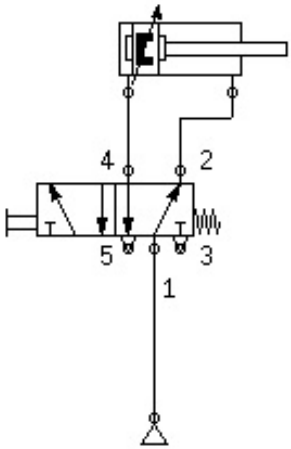


Indicator and distributor plate, electrical



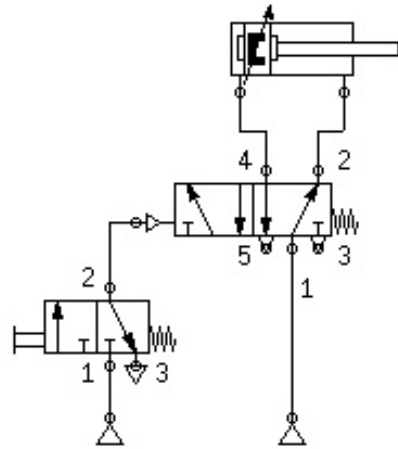
Electropneumatic

KENDALI SECARA LANGSUNG DAN TIDAK LANGSUNG

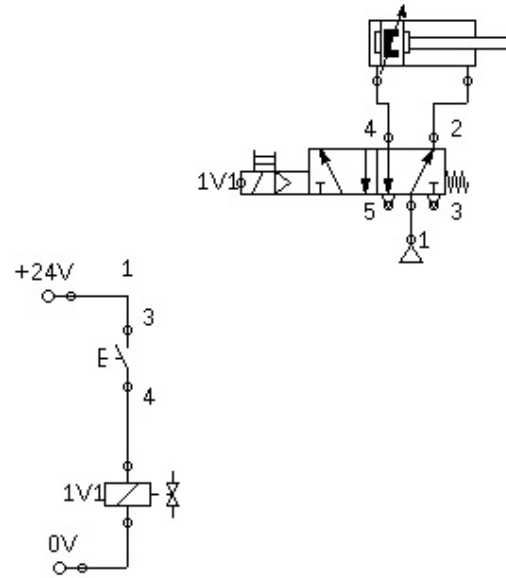


Langsung

Pneumatic

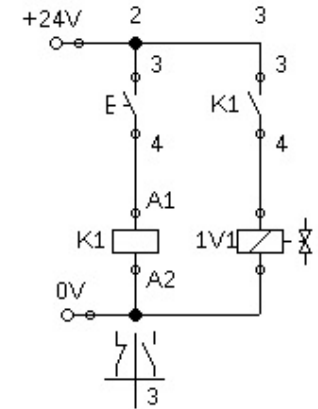


Tidak Langsung



Langsung

Electropneumatic



Tidak Langsung

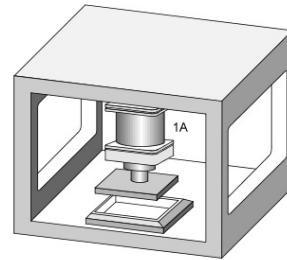
Mendesain Rangkaian Dengan FluidSim

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

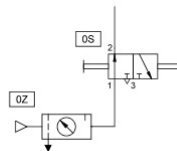


What happens to the cylinder, if the push button is pressed for a very short period and is then immediately released? **Question**

Describe the operation of the circuit.



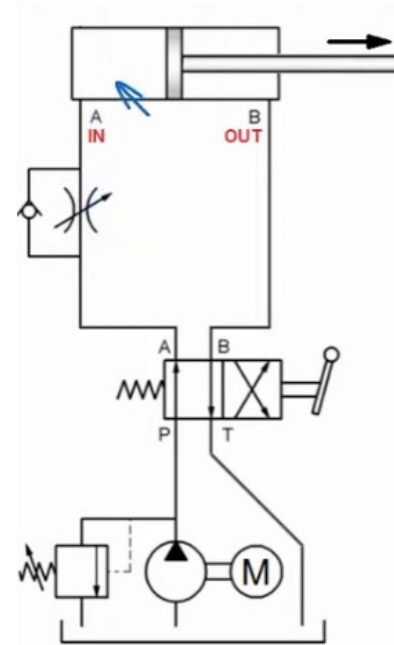
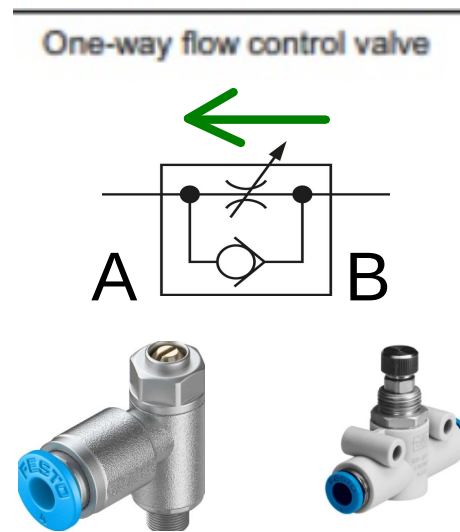
Fig. 5.8
Circuit diagram



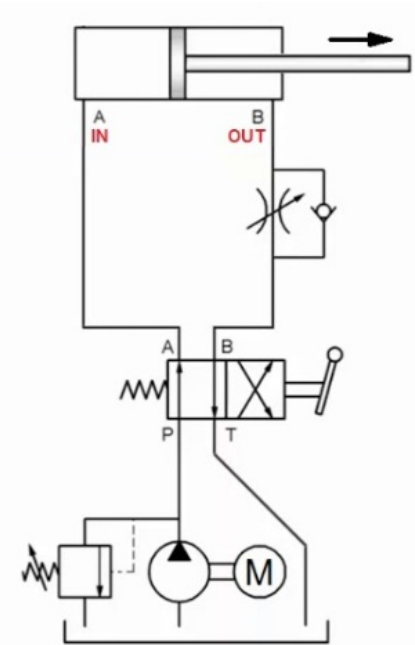
Pneumatic

Electropneumatic

PROCESSING ELEMENT 1

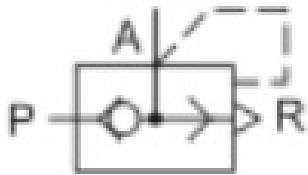


Meter-in for Extension
Uncontrolled for Retraction



Meter-out for Extension
Uncontrolled for Retraction

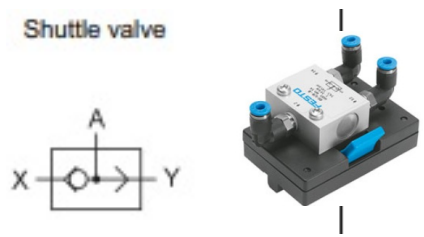
Quick exhaust valve



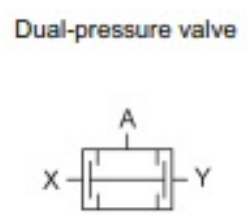
Pneumatic

PROCESSING ELEMENT 2

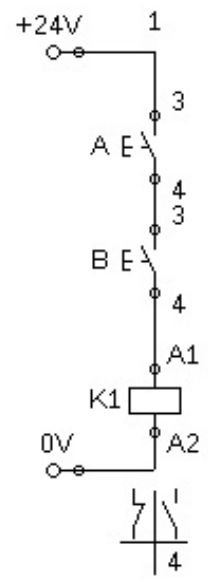
OR



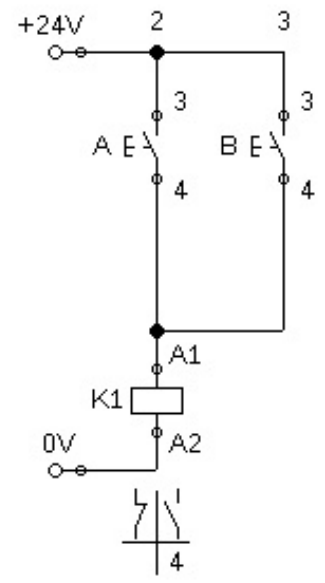
AND



AND



OR



AND

A	B	$A \wedge B$
True	True	True
True	False	False
False	True	False
False	False	False

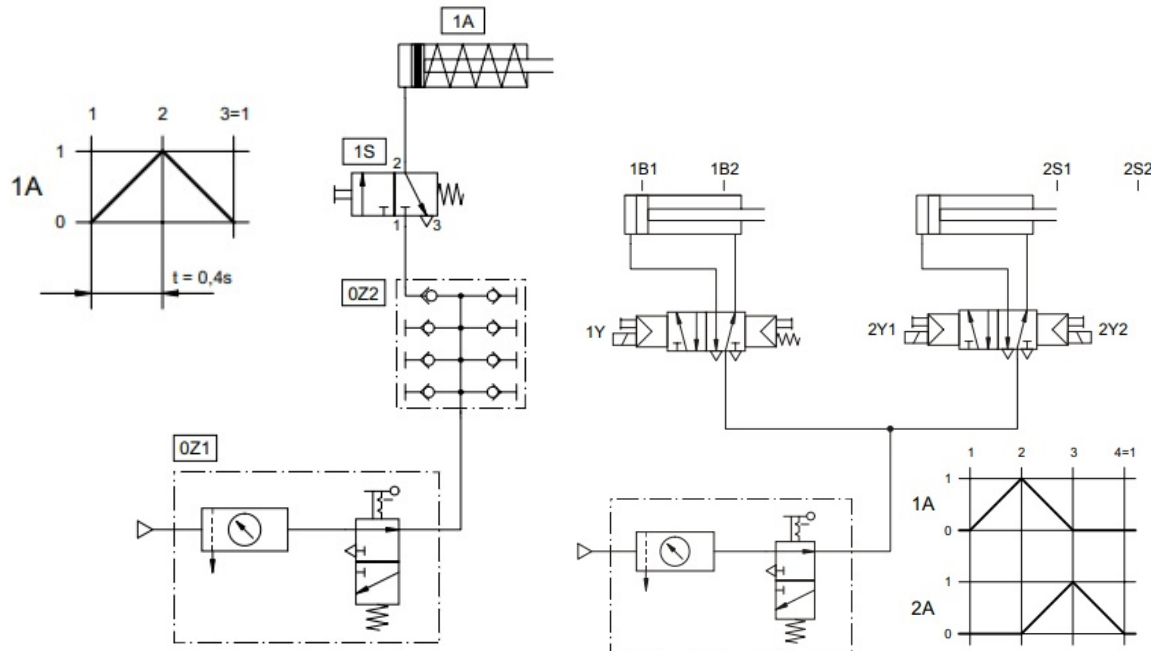
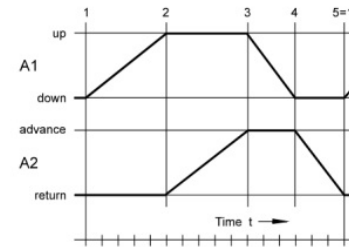
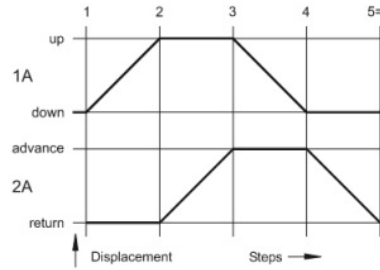
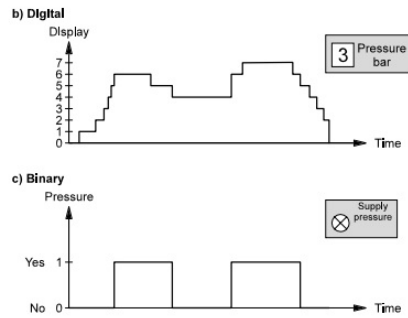
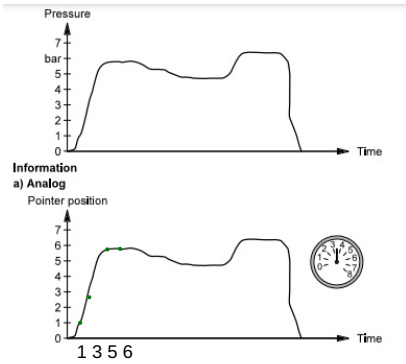
OR

A	B	$A \vee B$
True	True	True
True	False	True
False	True	True
False	False	False

Pneumatic

Electropneumatic

Grafik Pergerakan Pneumatic



PRAKTIKUM 1

PEMBERIAN LABEL KOMPONEN

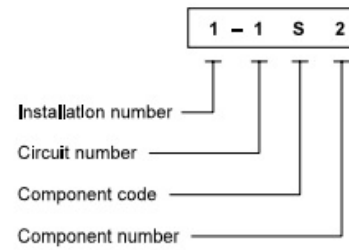


Fig. 6.21:
Identification code for components in pneumatic circuit diagrams

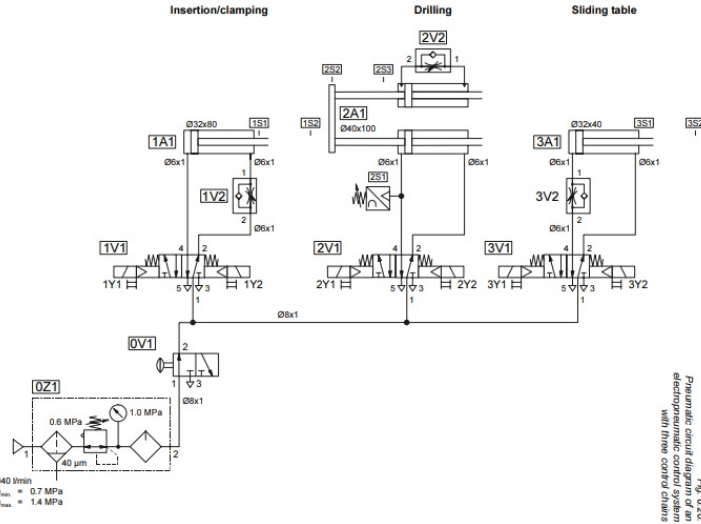
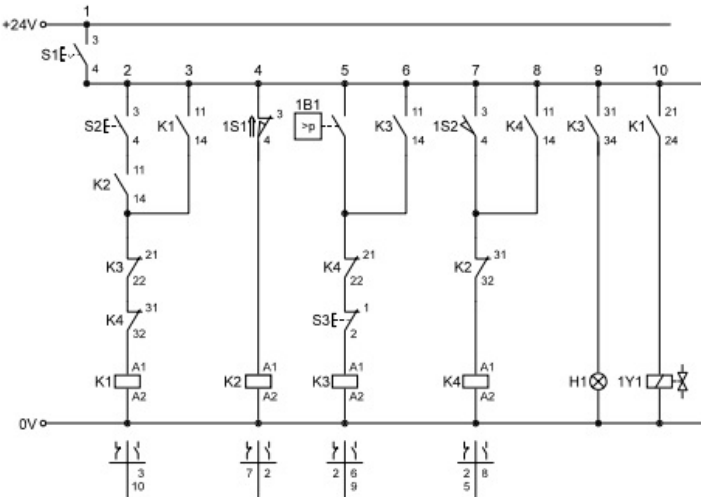


Fig. 6.20:
Pneumatic circuit diagram of an electro-pneumatic control system with three control valves

Fig. 6.28:
Electrical circuit diagram of an electro-pneumatic control system



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

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**

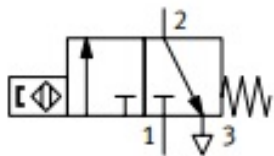
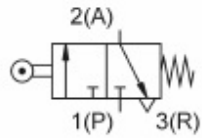
* national supplement in German standard
** or any other letter not included in the list

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
Contactors	K
Solenoid coil of a valve	Y

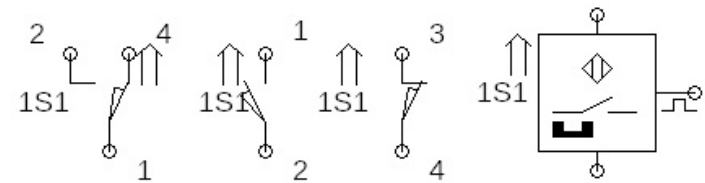
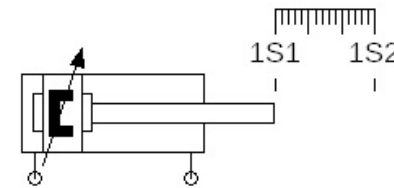
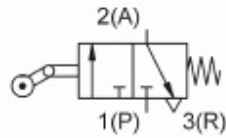
Table 6.4:
Designation of components in an electrical circuit diagram (DIN 40719, Part 2)

INPUT ELEMENT 2

3/2-way roller lever valve,
normally closed



3/2-way roller lever valve with idle
return, normally closed



Limit switch, electrical,
Actuation from left or right*

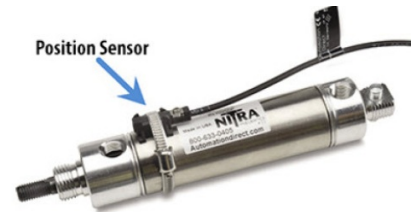
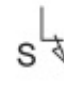
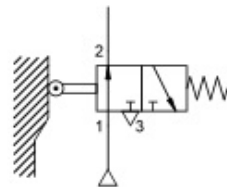
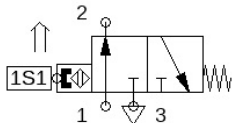


Fig. 4.6
Actuated initial position

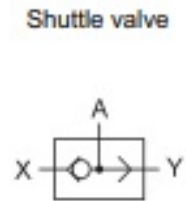


Pneumatic

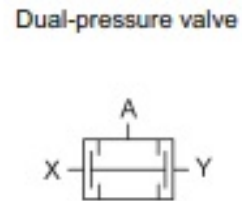
Electropneumatic

PROCESSING ELEMENT 3

OR



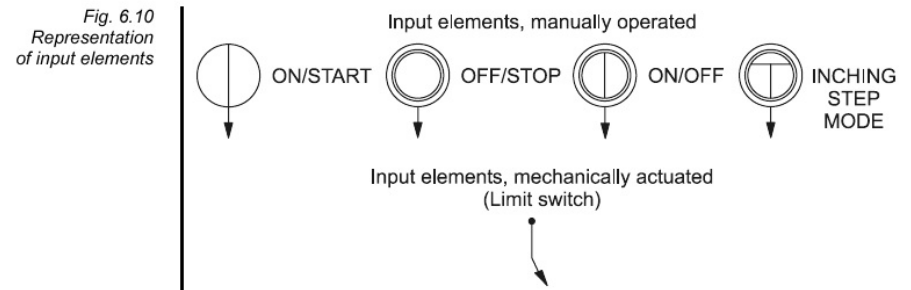
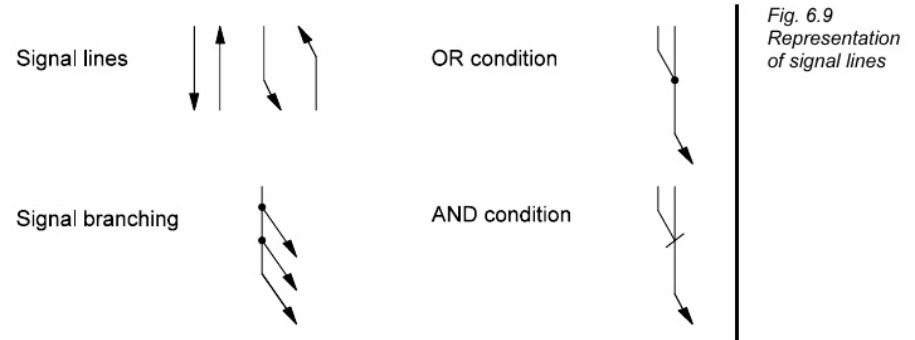
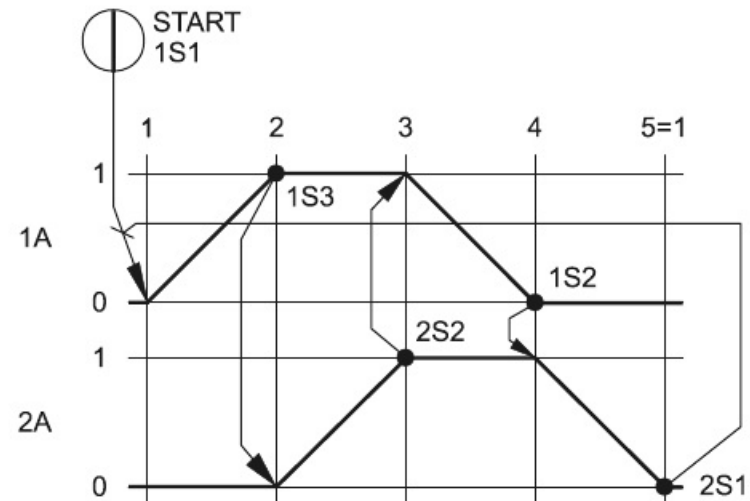
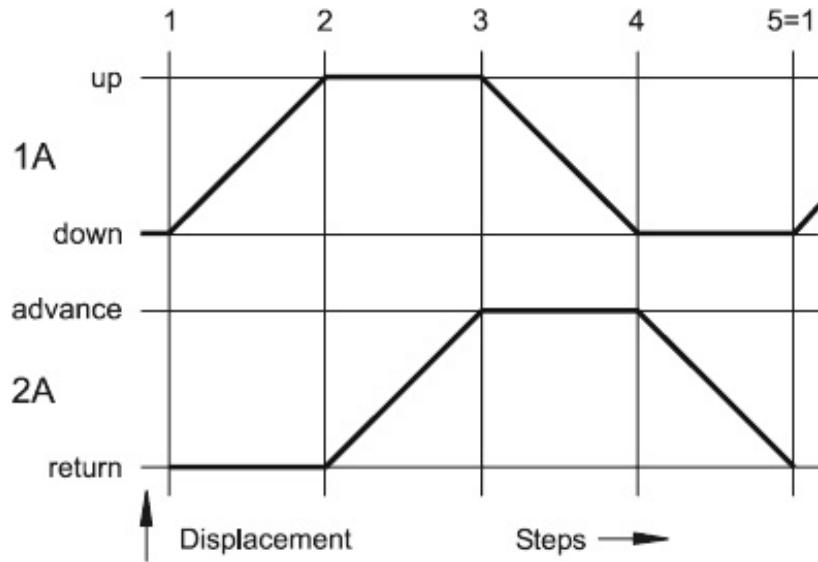
AND



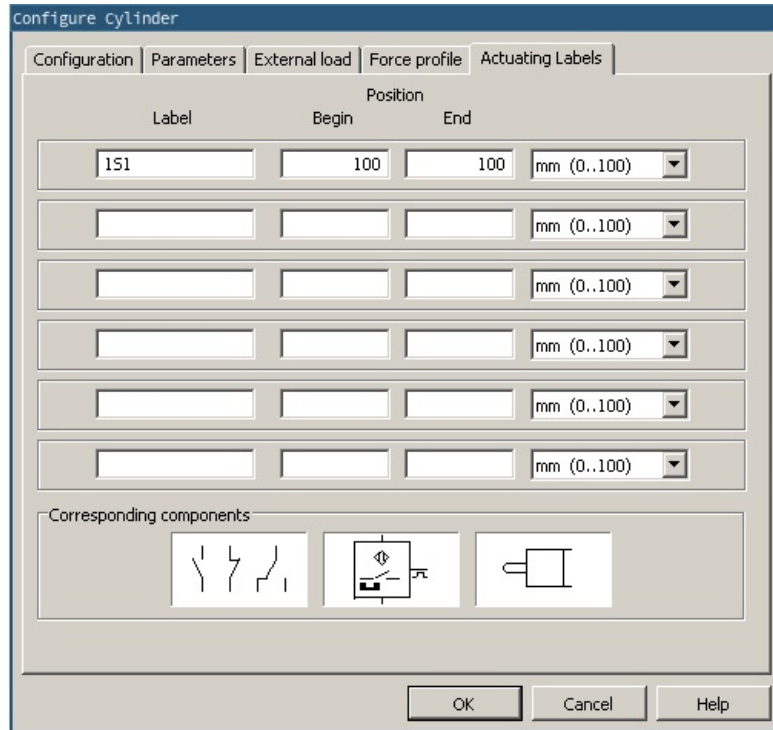
Pneumatic

Electropneumatic

Grafik Pergerakan Pneumatic 2



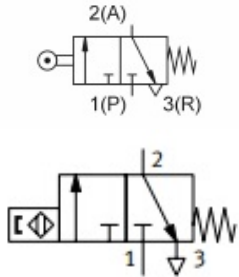
Cara memberikan label limit



PRAKTIKUM 2

INPUT ELEMENT 2

3/2-way roller lever valve, normally closed



3/2-way roller lever valve with idle return, normally closed

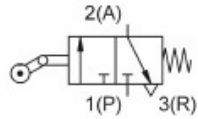
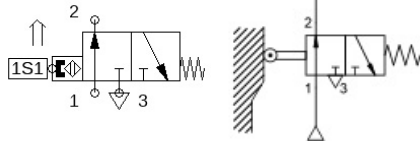
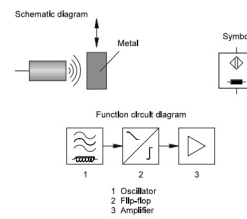


Fig. 4.6 Actuated initial position



Pneumatic

Fig. 3.7: Inductive proximity sensor



Capacitive proximity sensor

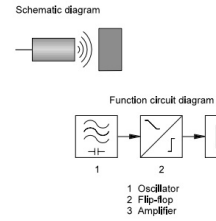


Fig. 3.6: Reed switch (normally open contact)

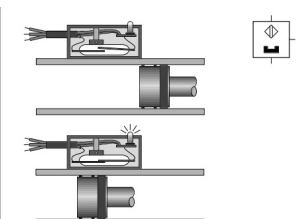
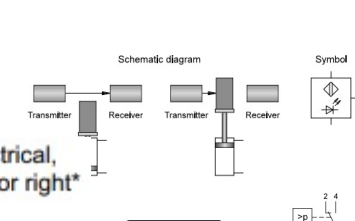
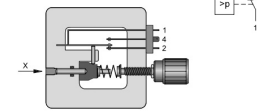


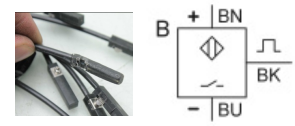
Fig. 3.8: Capacitive proximity sensor



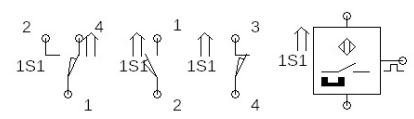
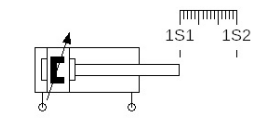
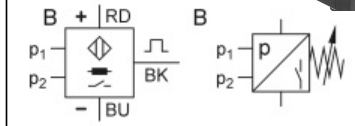
Limit switch, electrical, Actuation from left or right*



Proximity sensor with cylinder mounting



Pneumatic-electric converter

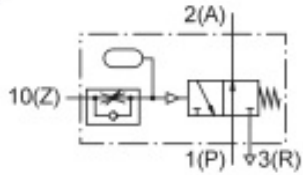


Electropneumatic

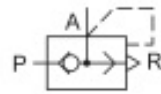
PROCESSING ELEMENT



Time delay valve normally closed

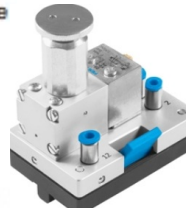
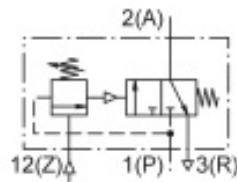


Quick exhaust valve

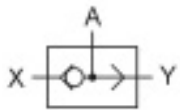


One-way flow control valve

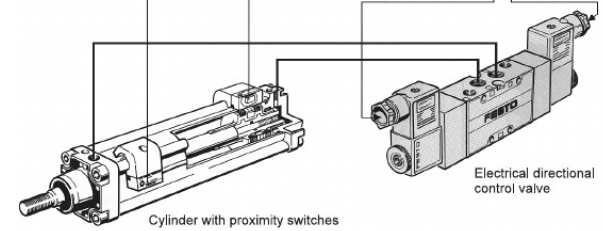
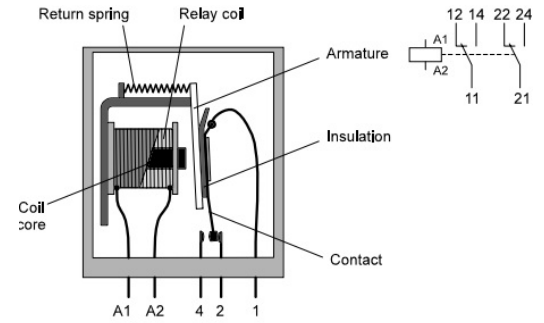
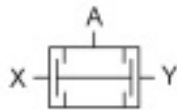
Pressure sequence valve



Shuttle valve



Dual-pressure valve



Cylinder with proximity switches

Electrical directional control valve

Pneumatic

Electropneumatic