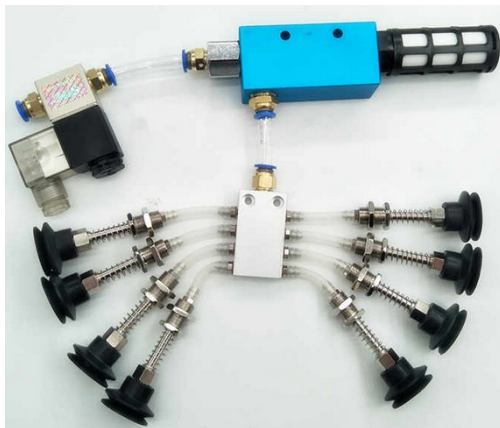
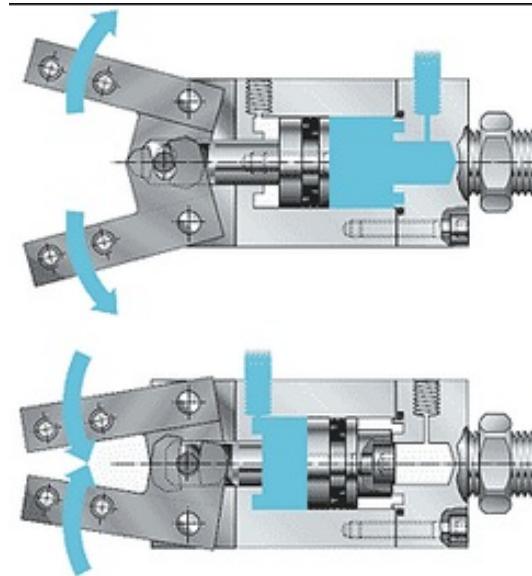
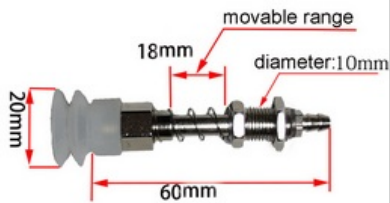
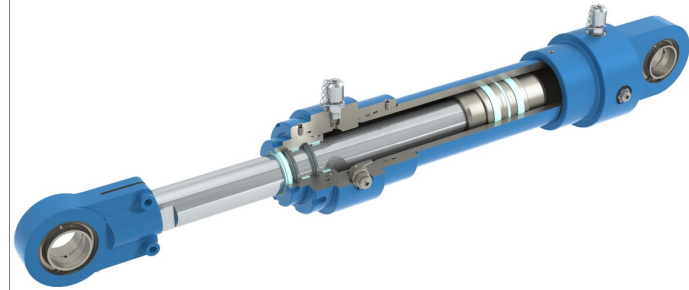


APA YANG DIKENDALIKAN DI SISTEM PNEUMATIC?

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?



Pneumatic

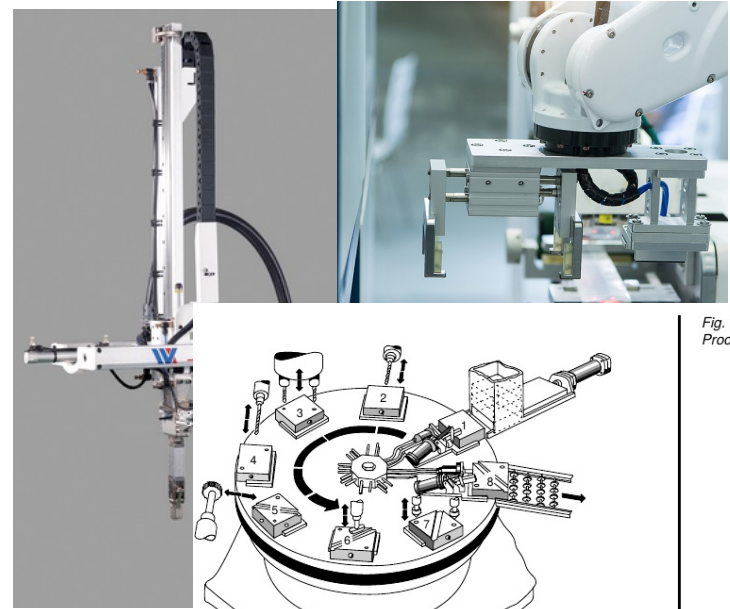


Fig. 1.2:
Processing station

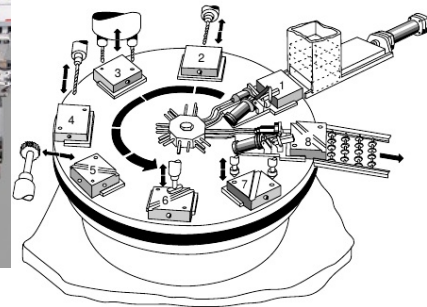


Fig. 5.2:
Positional sketch of the
lifting device

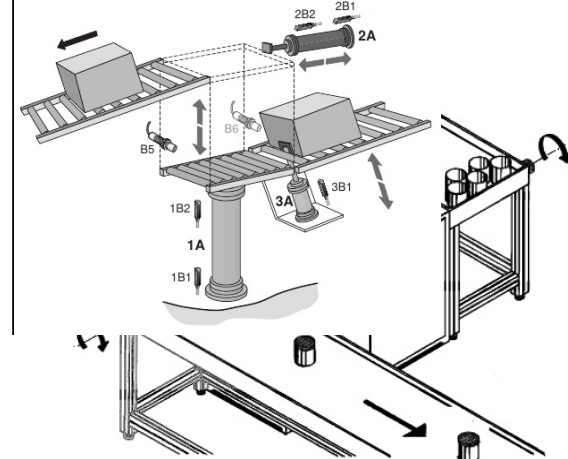


Fig. 1.3:
Assembly device for
mounting lids on cans

Electropneumatic

Fig. 1.2
Points switch for two
conveyor belts

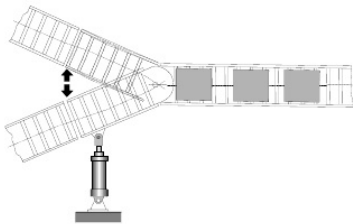


Fig. 1.3
Pneumatic cutter



BAGIAN BAGIAN DARI PNEUMATIC

Fig. 5.2:
Positional sketch of the
lifting device

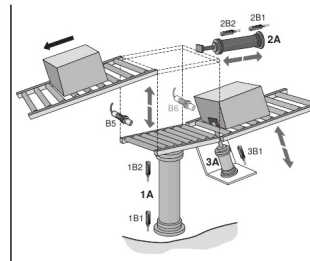
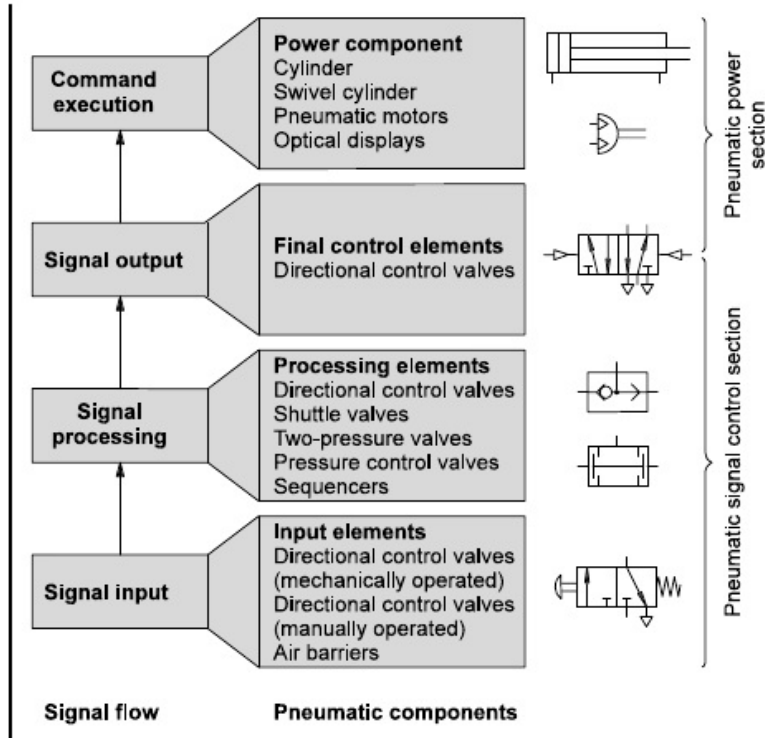
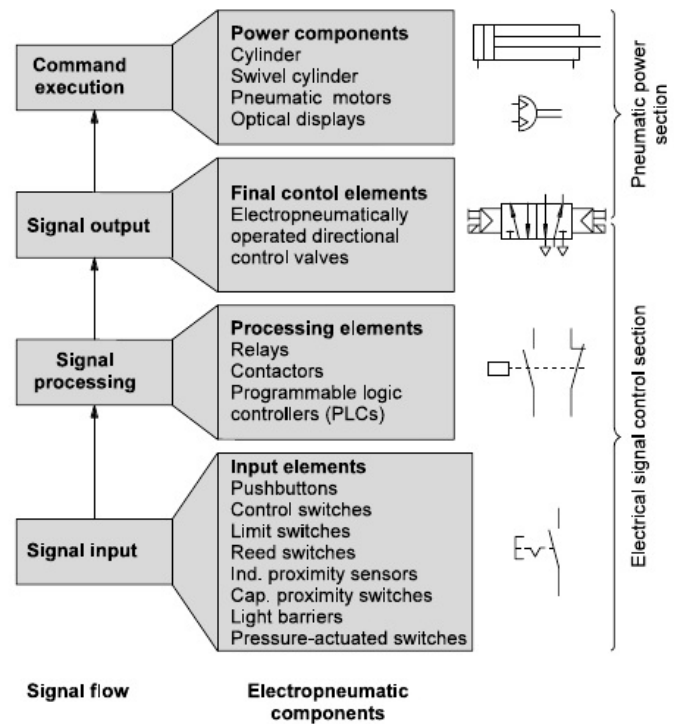


Fig. 1.7:
Signal flow and
components of a
pneumatic control system



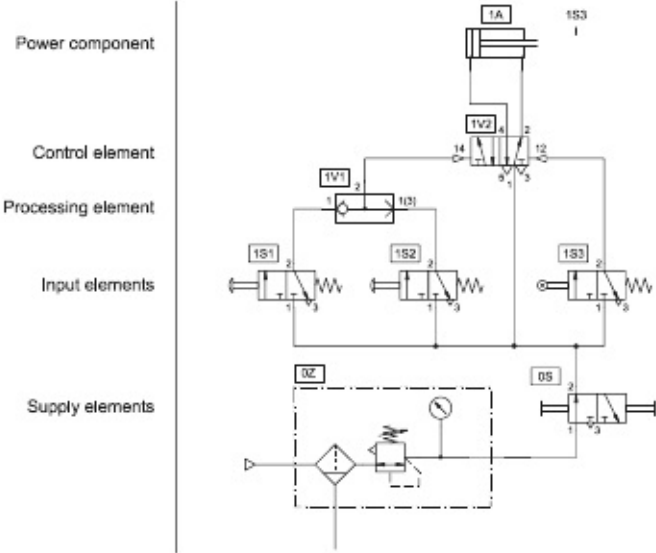
Pneumatic

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



Electropneumatic

BAGIAN BAGIAN DARI PNEUMATIC



Pneumatic

Fig. 5.5:
Pneumatic circuit diagram
of the lifting device

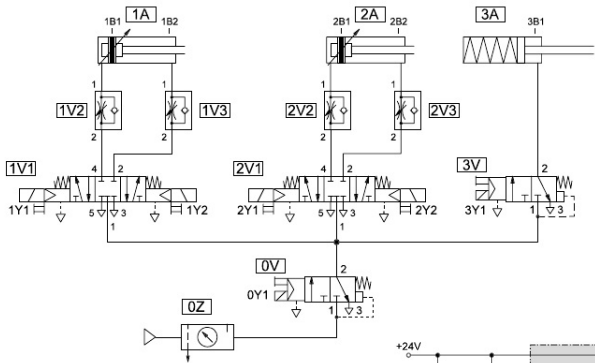


Fig. 4.3
Circuit diagram

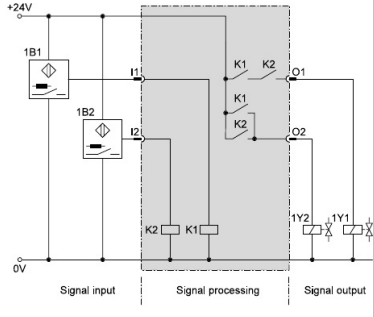
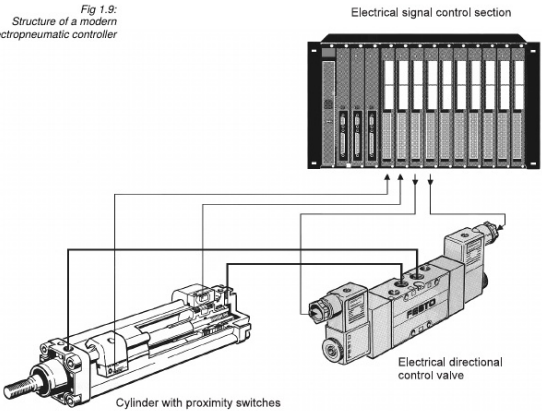


Fig. 3.20:
Signal control section of
relay control system
(schematic, circuit diagram
not compliant with standard)

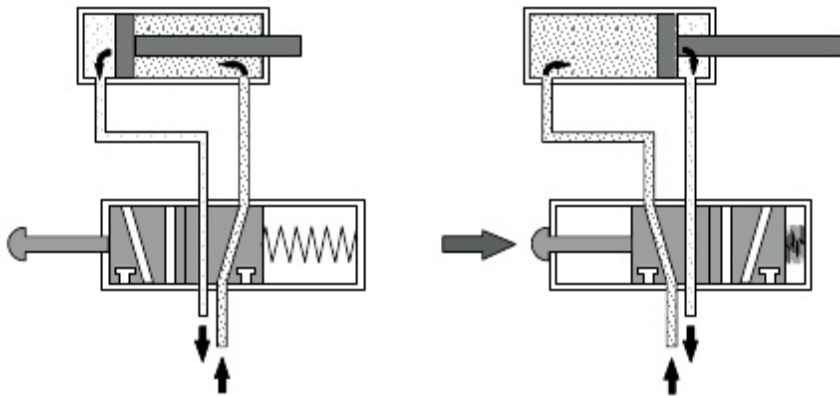


Fig 1.9:
Structure of a modern
electropneumatic controller



Electronpneumatic

BAGAIMANA MENGENDALIKAN AKTUATORNYA?



Pneumatic

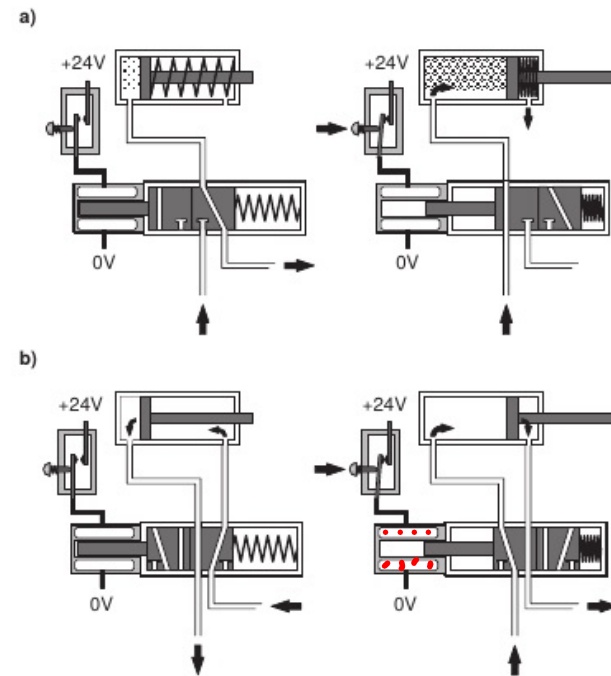
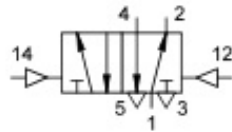
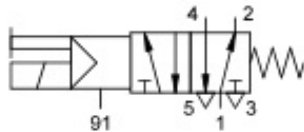
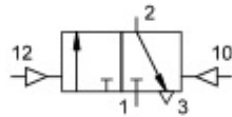
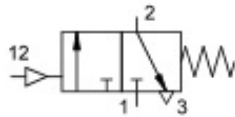


Fig. 4.1: Actuation of a pneumatic cylinder a) Single-acting b) Double-acting



Electropneumatic

MENGENAL VALVE 1



Valve switching positions are represented as squares



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



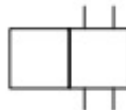
Lines indicate flow paths, arrows shows the direction of flow



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

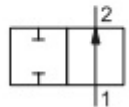
ISO 5599-3	Lettering System	Port or Connection
1	P	Pressure port
2, 4	A, B	Working lines
3, 5	R, S	Exhaust ports

Pilot lines

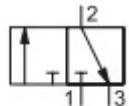
10	Z	Applied signal inhibits flow from port 1 to port 2
12	Y, Z	Applied signal connects port 1 to port 2
14	Z	Applied signal connects port 1 to port 4
81, 91	Pz	Auxiliary pilot air

Number of ports
Number of positions

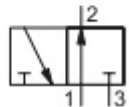
2/2 – Way directional control valve, normally open



3/2 – Way directional control valve, normally closed



3/2 – Way directional control valve, normally open



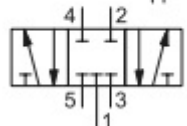
4/2 – Way directional control valve
Flow from 1 → 2 and from 4 → 3



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

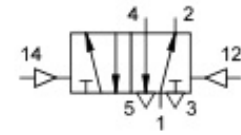
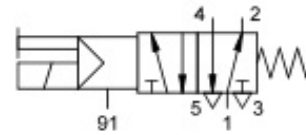
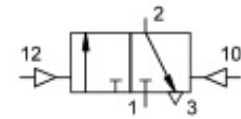
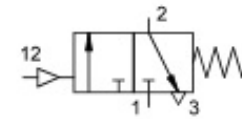


5/3 – Way directional control valve
Mid position closed



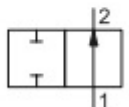
MENGENAL VALVE 2

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	

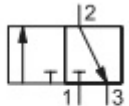


Number of ports
Number of positions

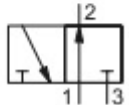
2/2 – Way directional control valve, normally open



3/2 – Way directional control valve, normally closed



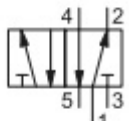
3/2 – Way directional control valve, normally open



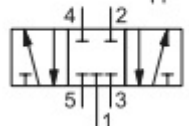
4/2 – Way directional control valve
Flow from 1 → 2 and from 4 → 3



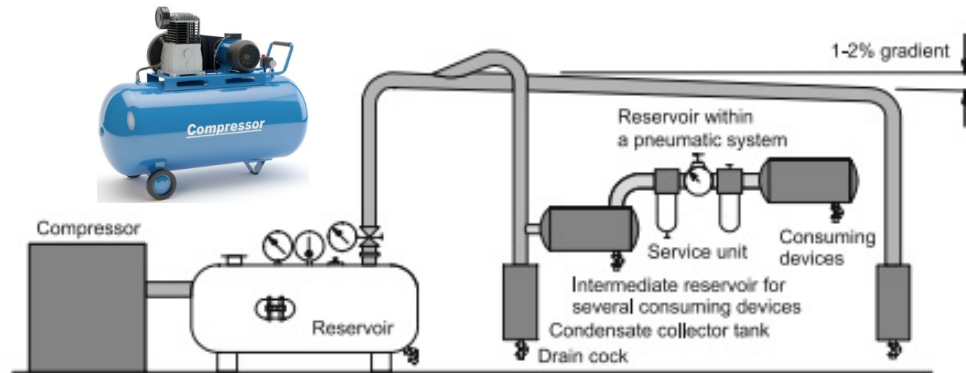
5/2 – Way directional control valve
Flow from 1 → 2 and von 4 → 5



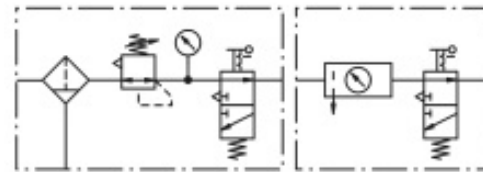
5/3 – Way directional control valve
Mid position closed



SUPLAY ELEMENT



Service unit with on-off valve



Manifold

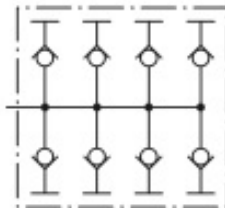
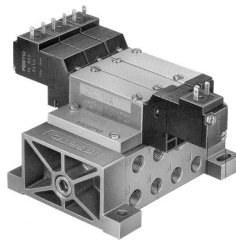


Fig. 4.12:
Mounting of
electrically actuated
directional control valves
on a valve manifold block
(Festo)



Pneumatic

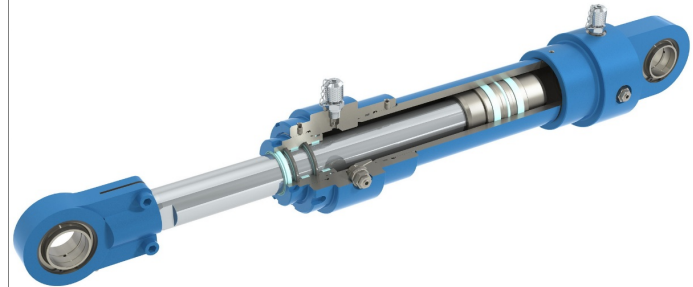
Electropneumatic

POWER COMPONENTEN

Actuators can be further broken down into groups:

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

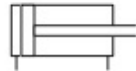
Fig. 2.13
Actuators, linear and rotary



Single-acting cylinder



Double-acting cylinder



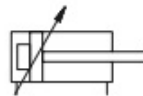
Double-acting cylinder
with double ended piston rod



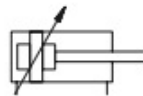
Double-acting cylinder
with non-adjustable cushioning
in one direction



Double-acting cylinder
with single adjustable cushioning



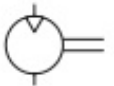
Double-acting cylinder
with adjustable cushioning
at both ends



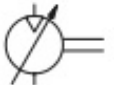
Linear drive with
magnetic coupling



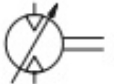
Air motor, rotation in one direction
fixed capacity



Air motor, rotation in one direction
variable capacity



Air motor, rotation in both directions
variable capacity

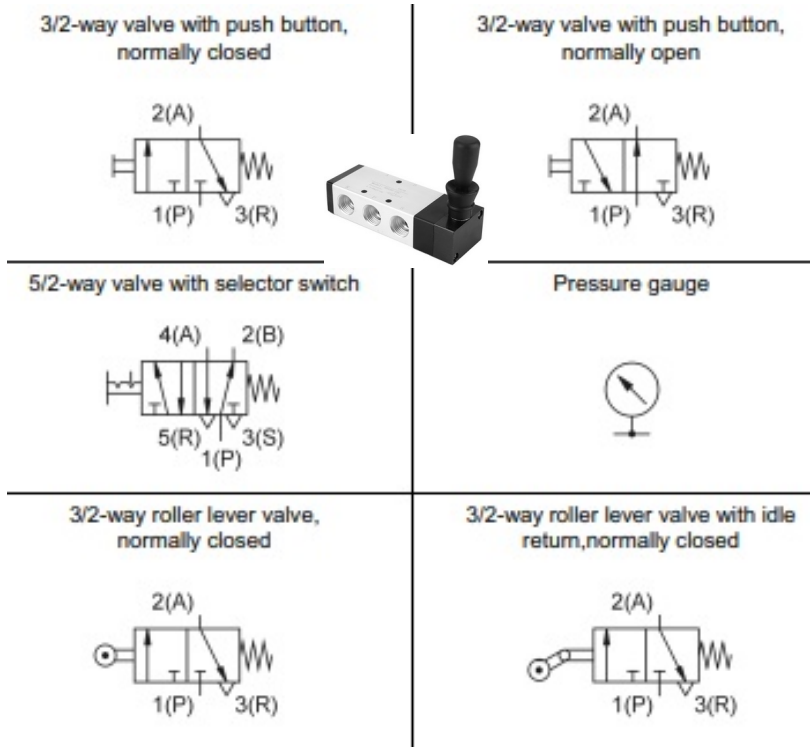


Rotary actuator



ctropneumatic
Pneumatic

INPUT ELEMENT 1



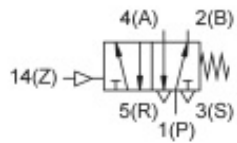
Pneumatic

Electropneumatic

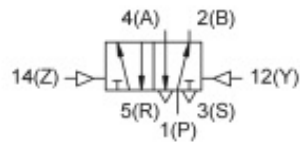
FINAL CONTROL ELEMENT



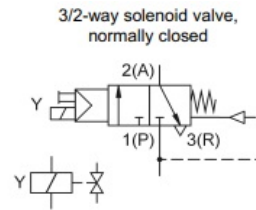
5/2-way pilot valve



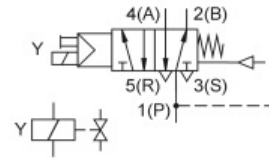
5/2-way double pilot valve



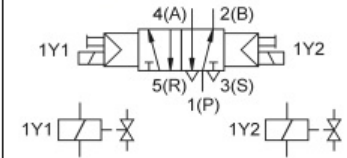
Pneumatic



5/2-way solenoid valve



5/2-way double solenoid valve

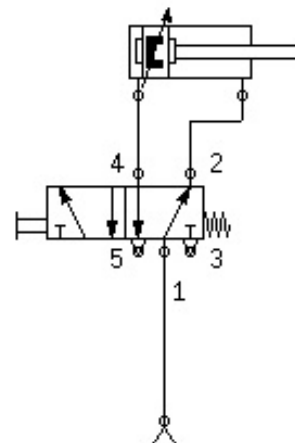


Indicator and distributor plate, electrical

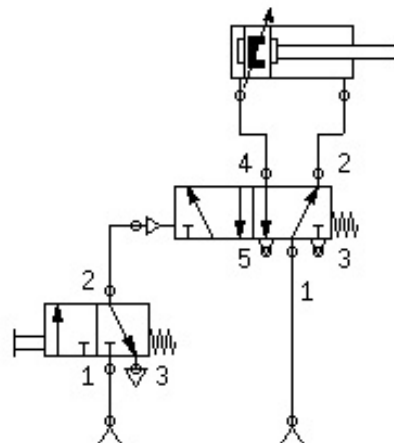


Electropneumatic

KENDALI SECARA LANGSUNG
DAN TIDAK LANGSUNG

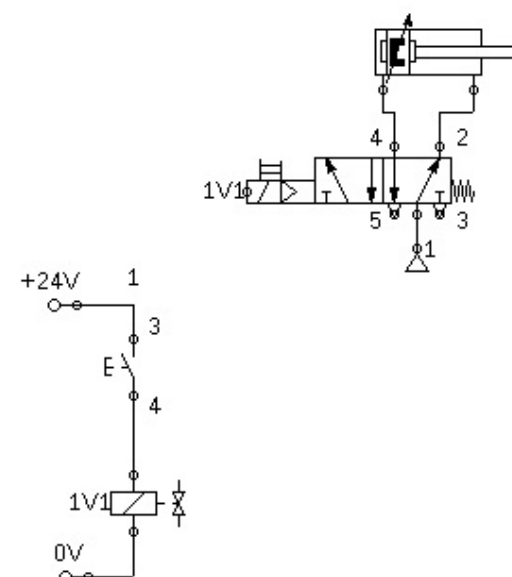


Langsung

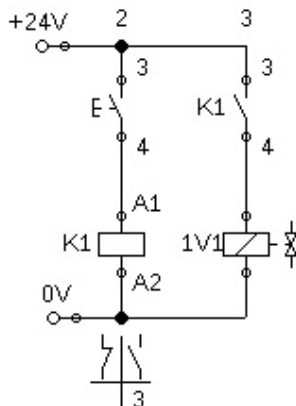


Tidak Langsung

Pneumatic



Langsung

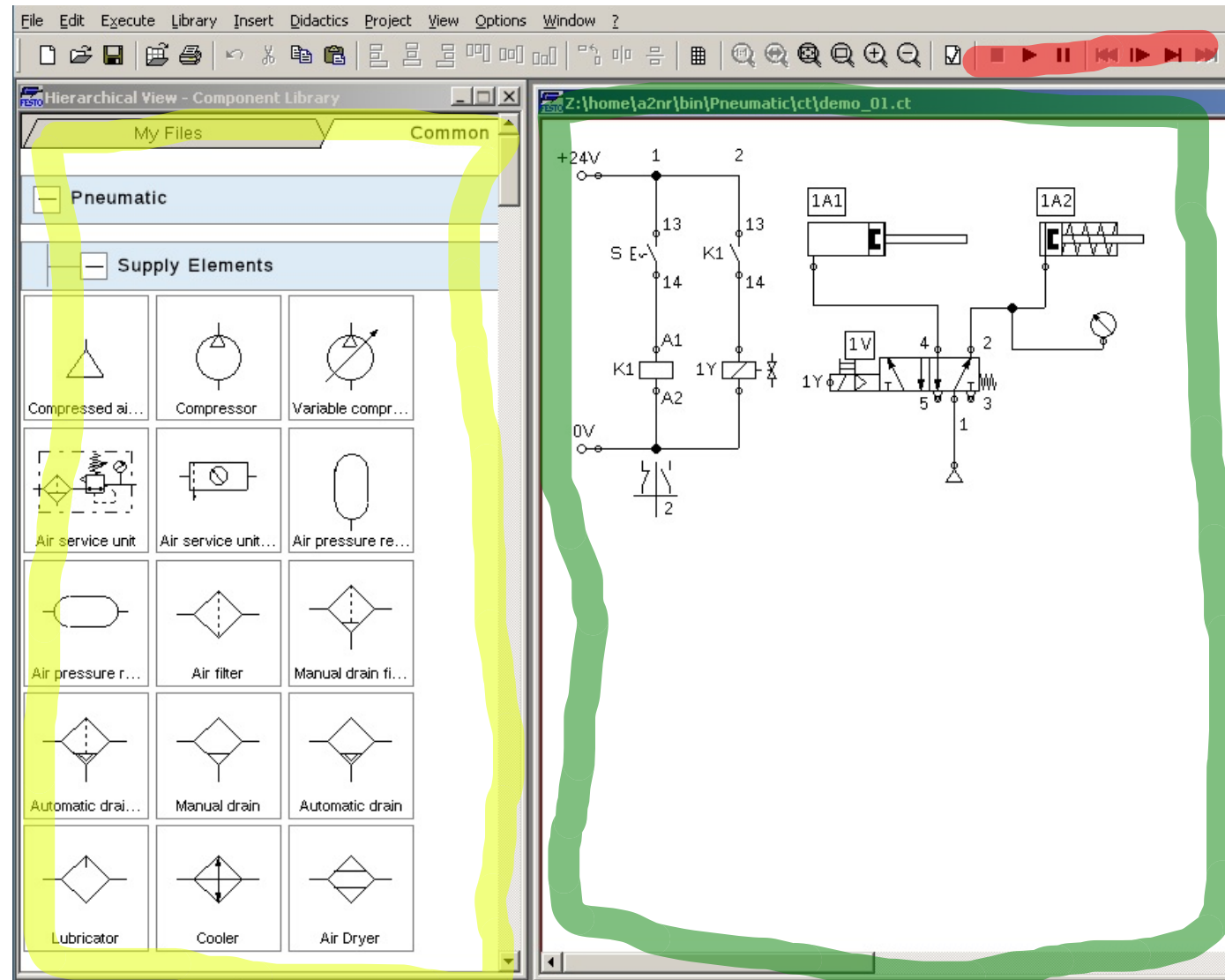


Tidak Langsung

Electropneumatic

Mendesain Rangkaian Dengan FluidSim

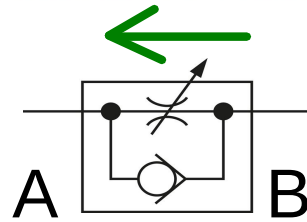
- *Untuk mencari komponen
- *untuk meletakkan komponen
- *untuk menjalankan simulasi



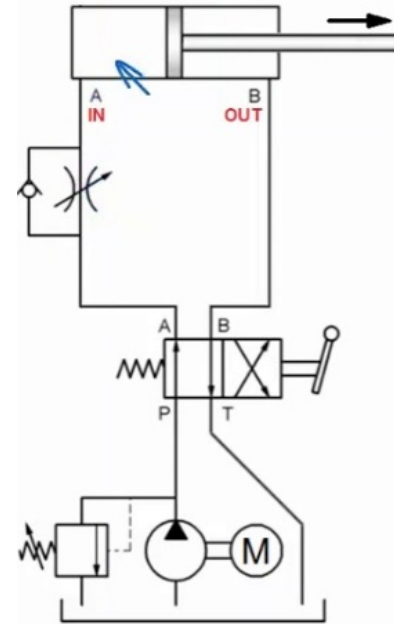
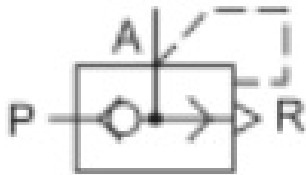
PRAKTIKUM 1

PROCESSING ELEMENT 1

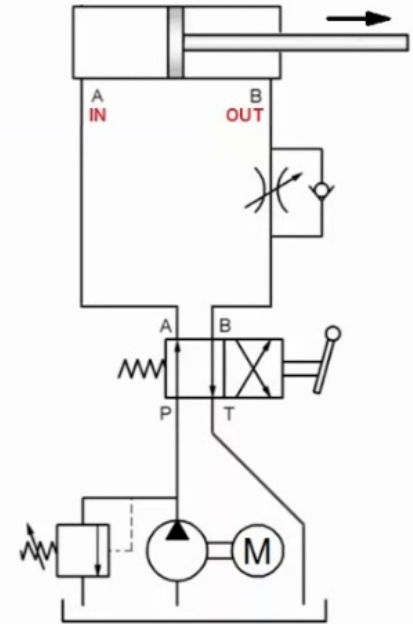
One-way flow control valve



Quick exhaust valve



Meter-in for Extension
Uncontrolled for Retraction



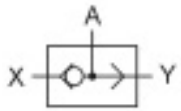
Meter-out for Extension
Uncontrolled for Retraction

Pneumatic

PROCESSING ELEMENT 2

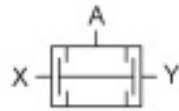
OR

Shuttle valve



AND

Dual-pressure valve

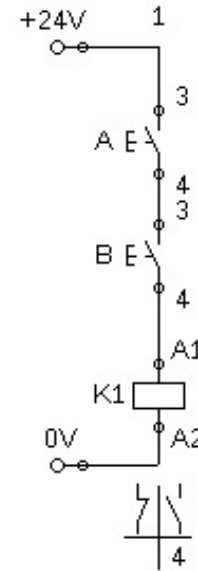


AND

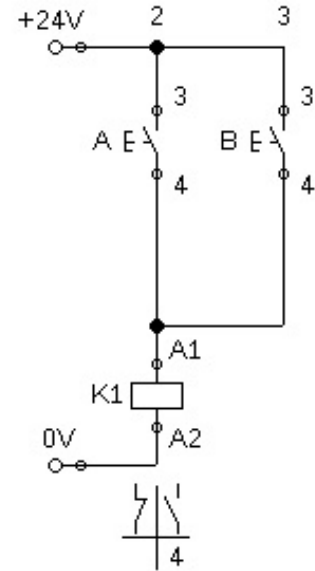
A	B	$A \wedge B$
True	True	True
True	False	False
False	True	False
False	False	False

Pneumatic

AND



OR

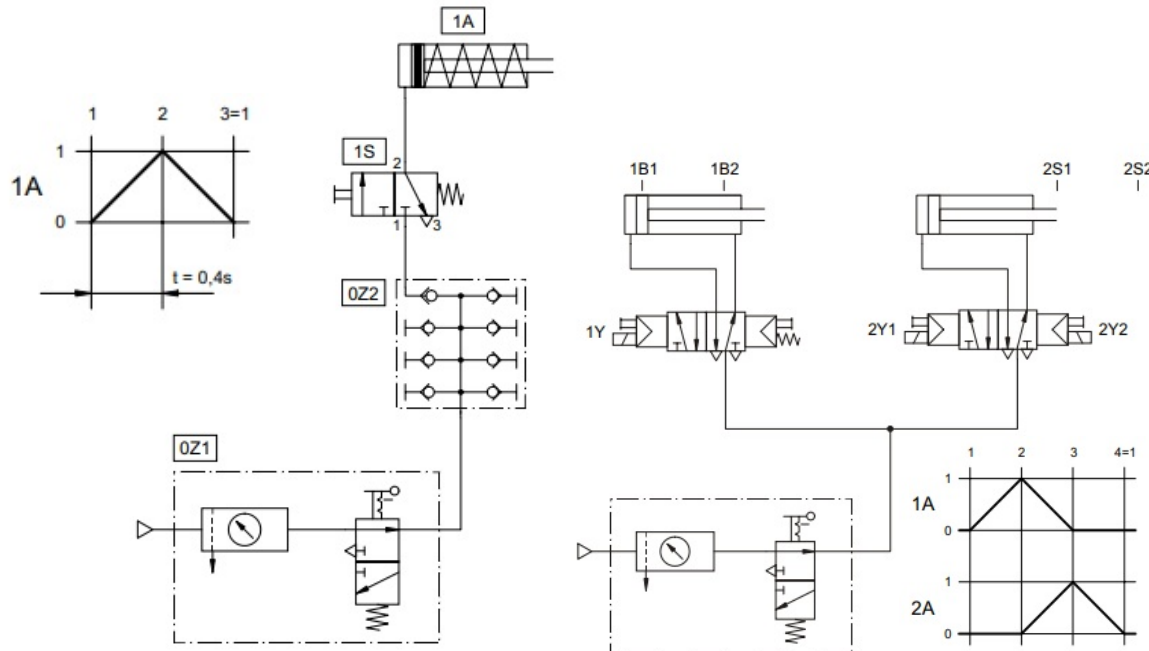
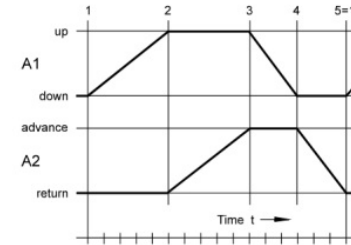
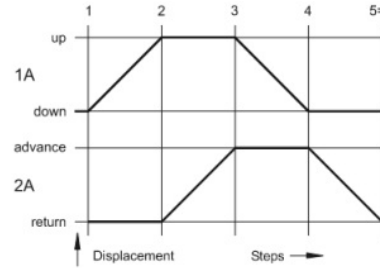
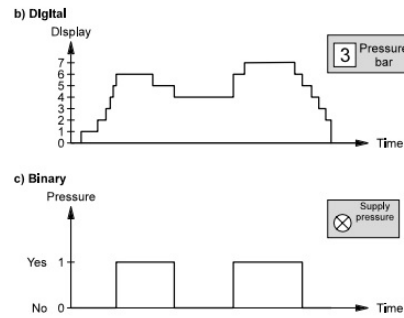
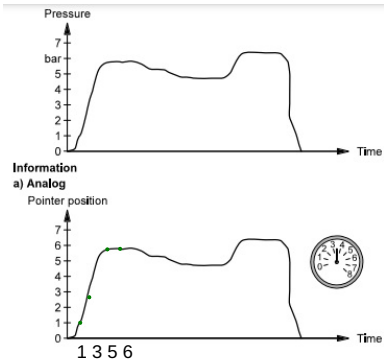


OR

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

Electropneumatic

Grafik Pergerakan Pneumatic



PRAKTIKUM 2

PEMBERIAN LABEL KOMPONEN

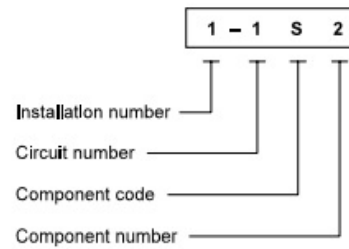


Fig. 6.21:
Identification code for
components in pneumatic
circuit diagrams

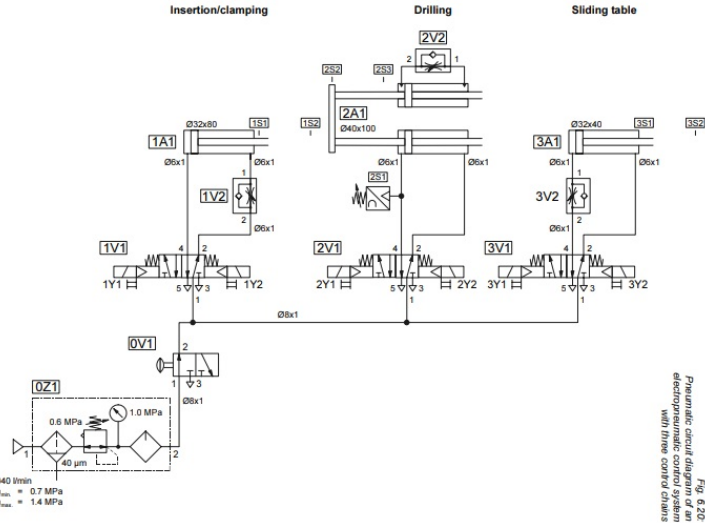
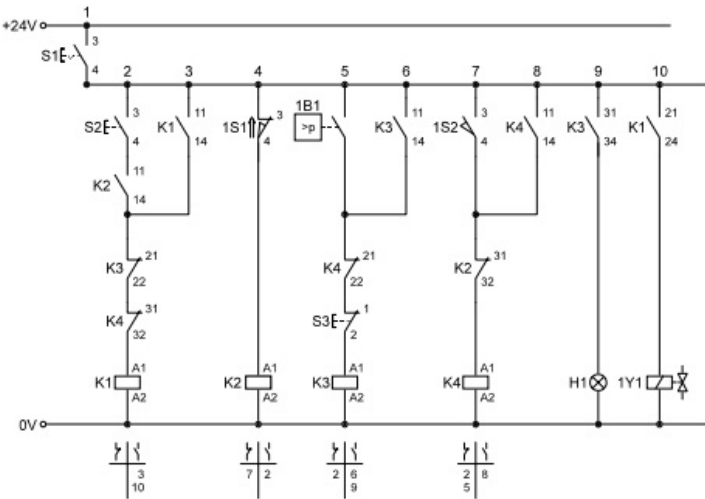


Fig. 6.28:
*Electrical circuit diagram
of an electropneumatic
control system*



S1 = Main switch
S2 = Start switch
S3 = Acknowledgement switch

1S1/1S2 = Limit switch
1B1 = Pressure switch

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

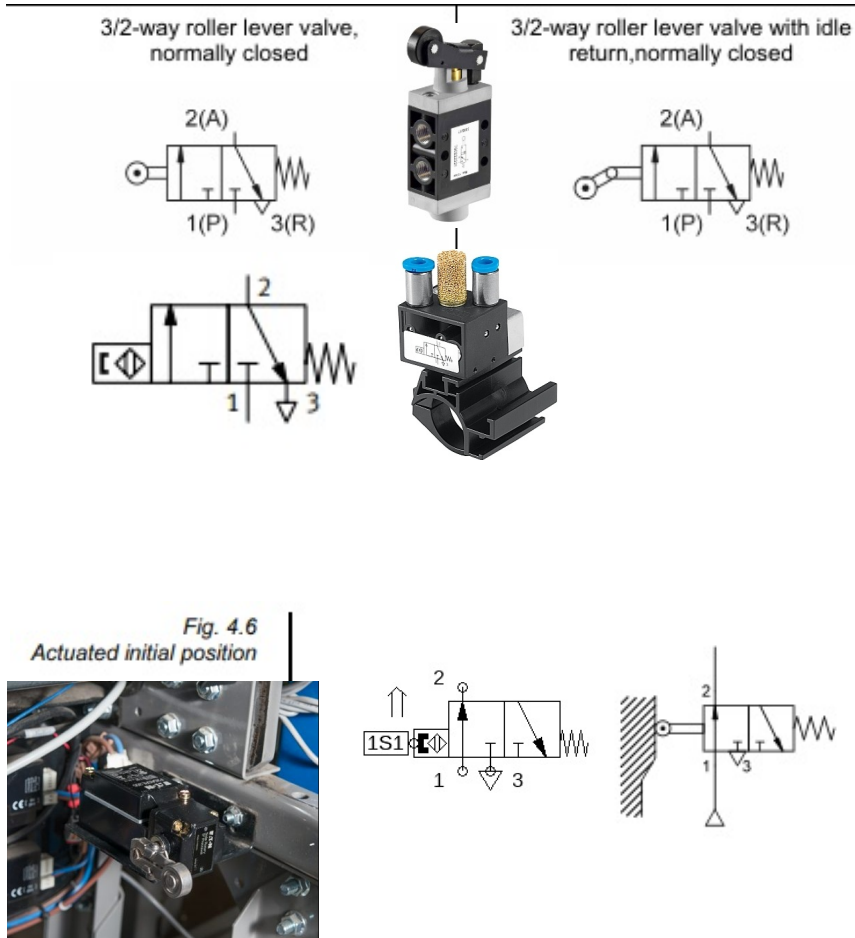
<i>Components</i>	<i>Identification</i>
Compressors	P
Power components	A
Drive motors	M
Sensors	S
Valves	V
Valve coils	Y*
Other components	Z**

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

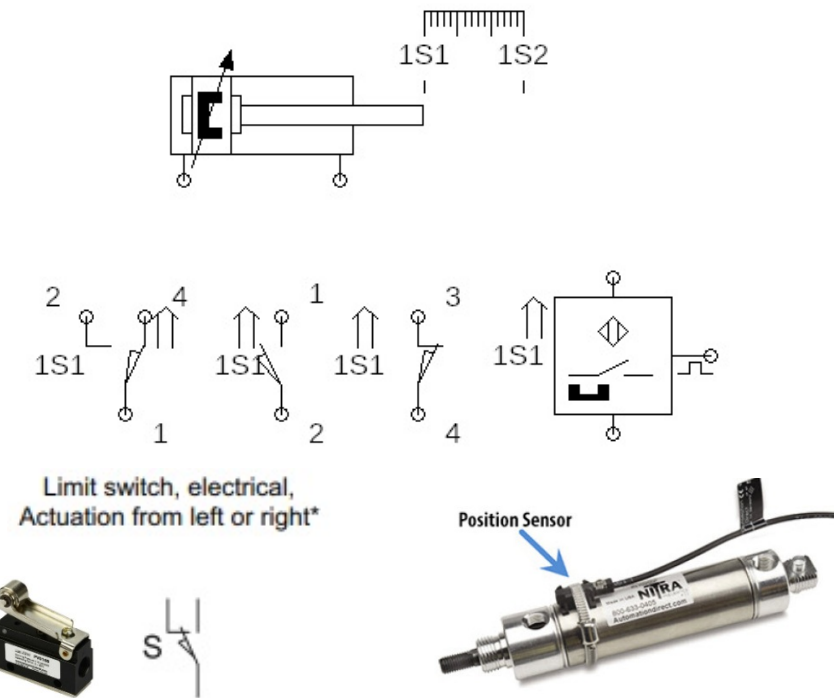
<i>Component type</i>	<i>Identification</i>
Limit switch	S
Manually operated pushbutton, input elements	S
Reed switch	B
Electronic proximity switch	B
Pressure switch	B
Indicator	H
Relay	K
Contactors	K
Solenoid coil of a valve	Y

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

INPUT ELEMENT 2



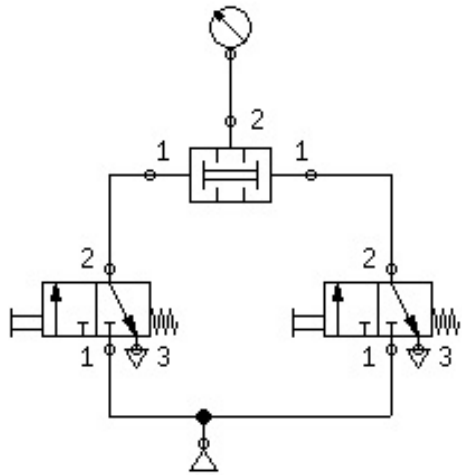
Pneumatic



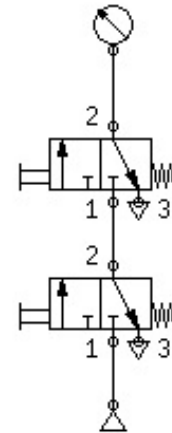
Electropneumatic

PROCESSING ELEMENT 3

Logika AND



Pneumatic



Electropneumatic

Grafik Pergerakan Pneumatic 2

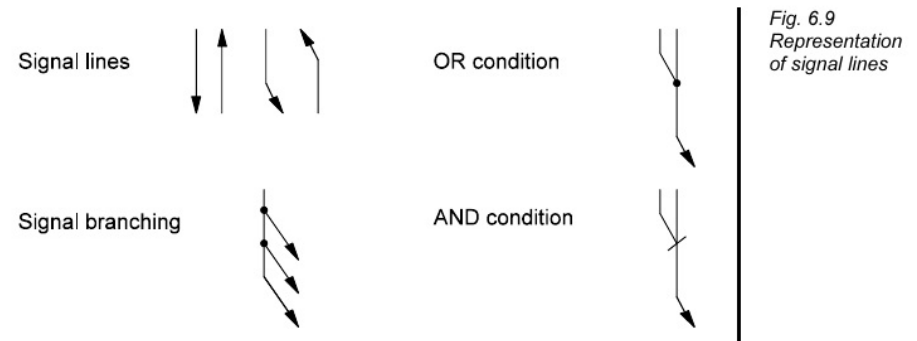
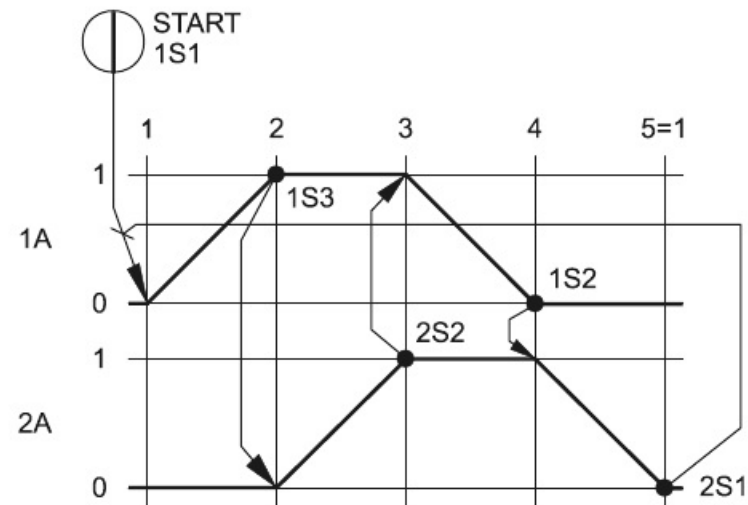
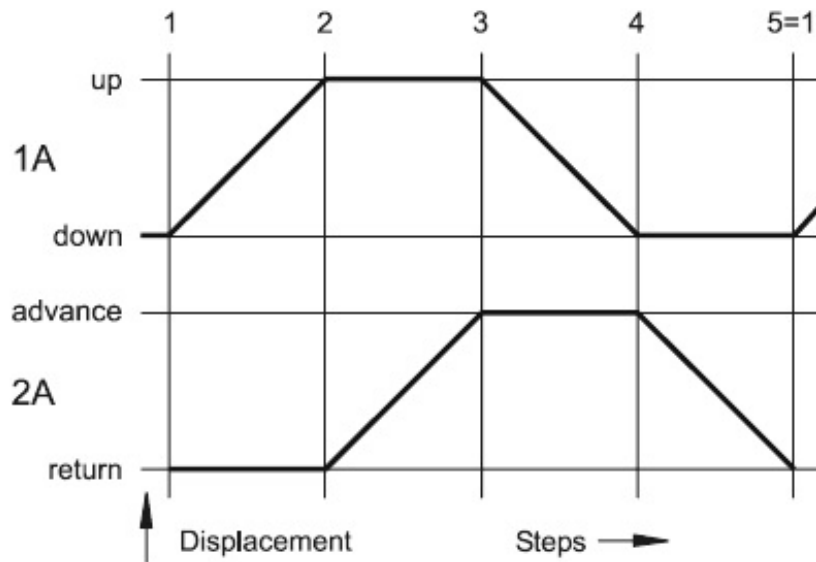
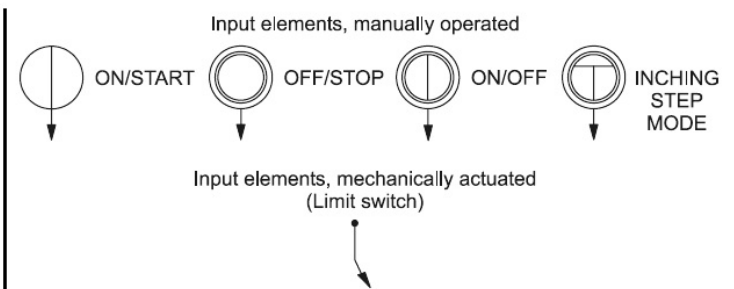


Fig. 6.10
Representation
of input elements



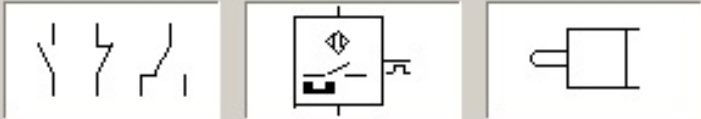
Cara memberikan label limit

Configure Cylinder

Configuration Parameters External load Force profile Actuating Labels

Label	Position	Begin	End	
1S1		100	100	mm (0..100) ▼
				mm (0..100) ▼
				mm (0..100) ▼
				mm (0..100) ▼
				mm (0..100) ▼
				mm (0..100) ▼

Corresponding components



OK Cancel Help

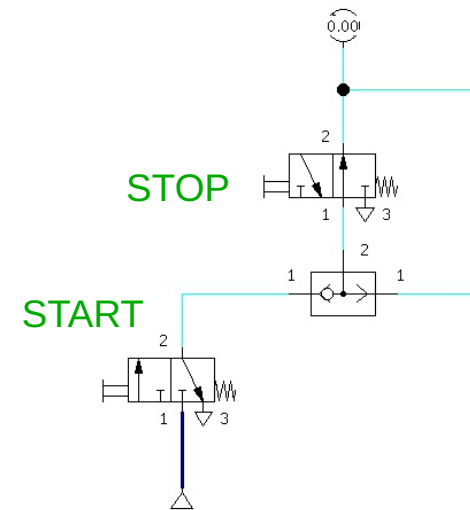
PRAKTIKUM 3

PROCESSING ELEMENT 3

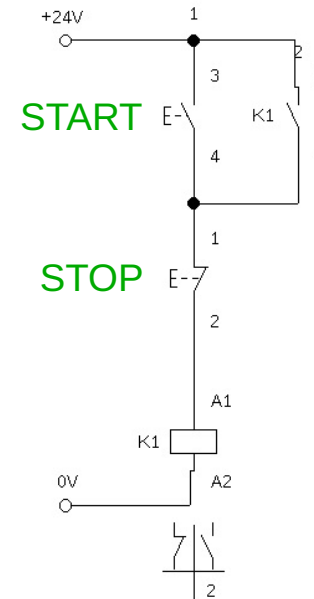
Dominan-OFF

Ciri - Ciri

- Valve Start ditekan,
angin/listrik keluar dari valve Stop
- Valve Start ditekan, valve stop ditekan,
angin tidak keluar



Pneumatic

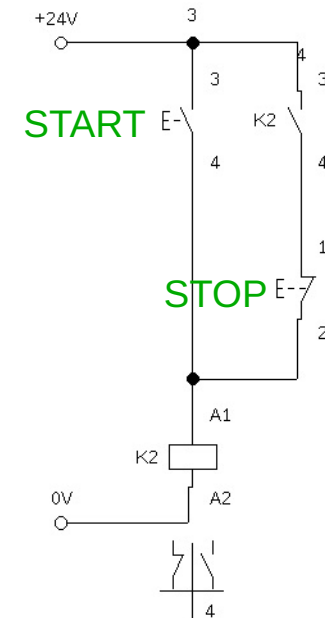
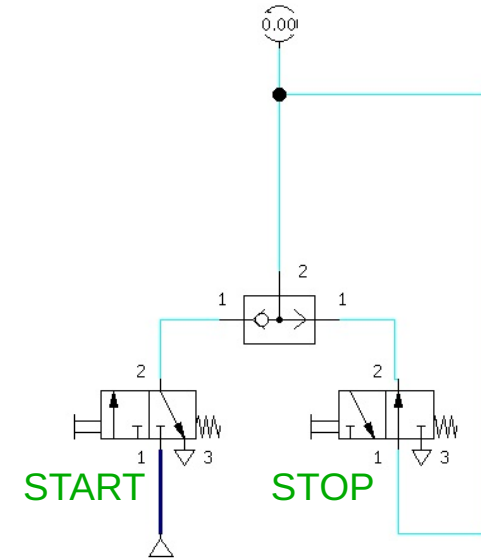


Electropneumatic

Dominan-ON

Ciri - Ciri

- Valve Start ditekan, angin/listrik keluar dari valve Stop
- Valve Start ditekan, valve stop ditekan, angin keluar

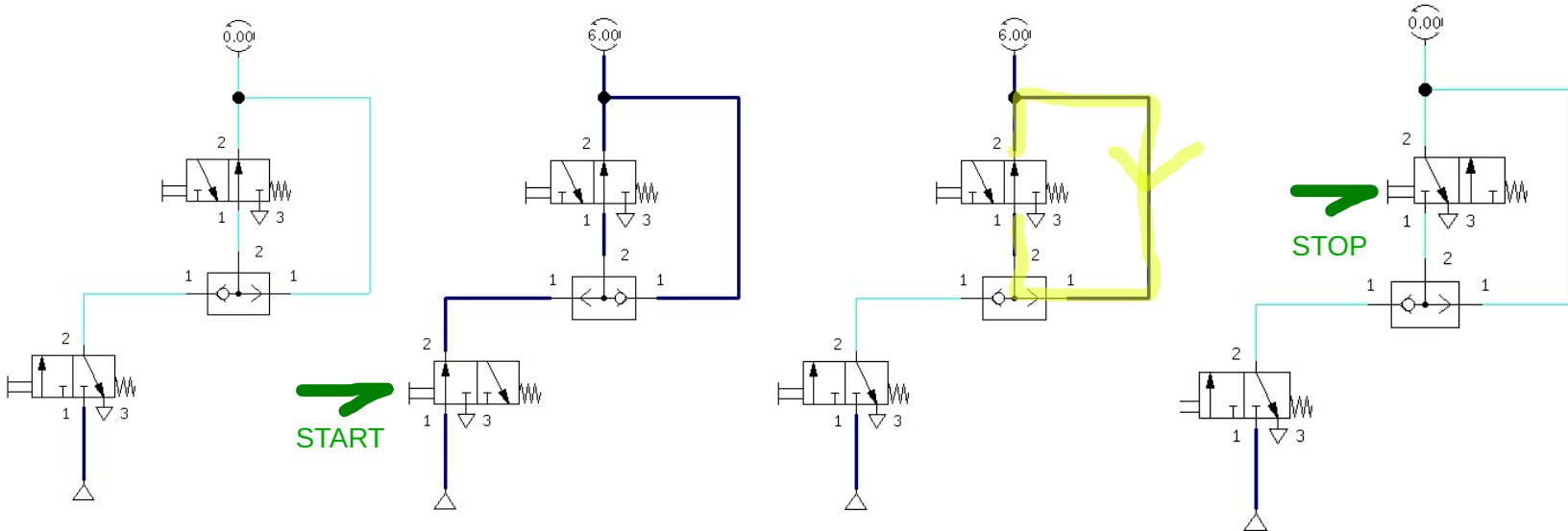


Pneumatic

Electropneumatic

PROCESSING ELEMENT 3

Dominan-OFF

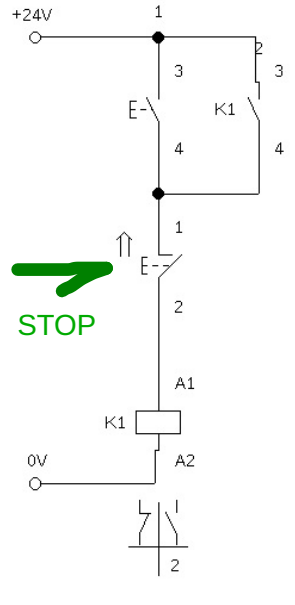
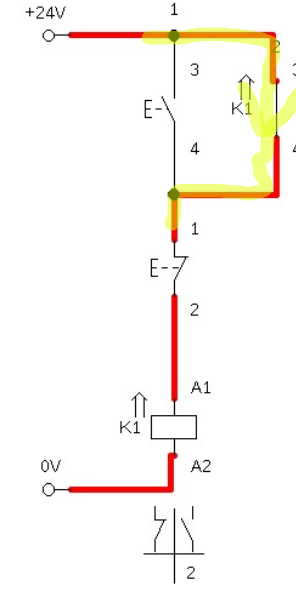
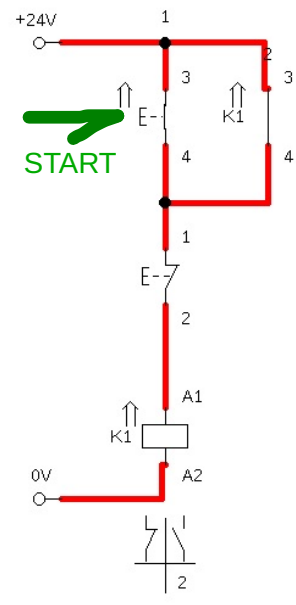
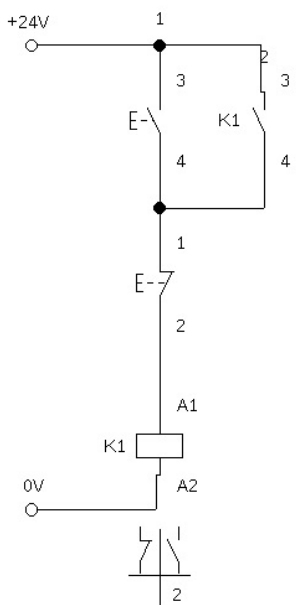


1

2

3

4

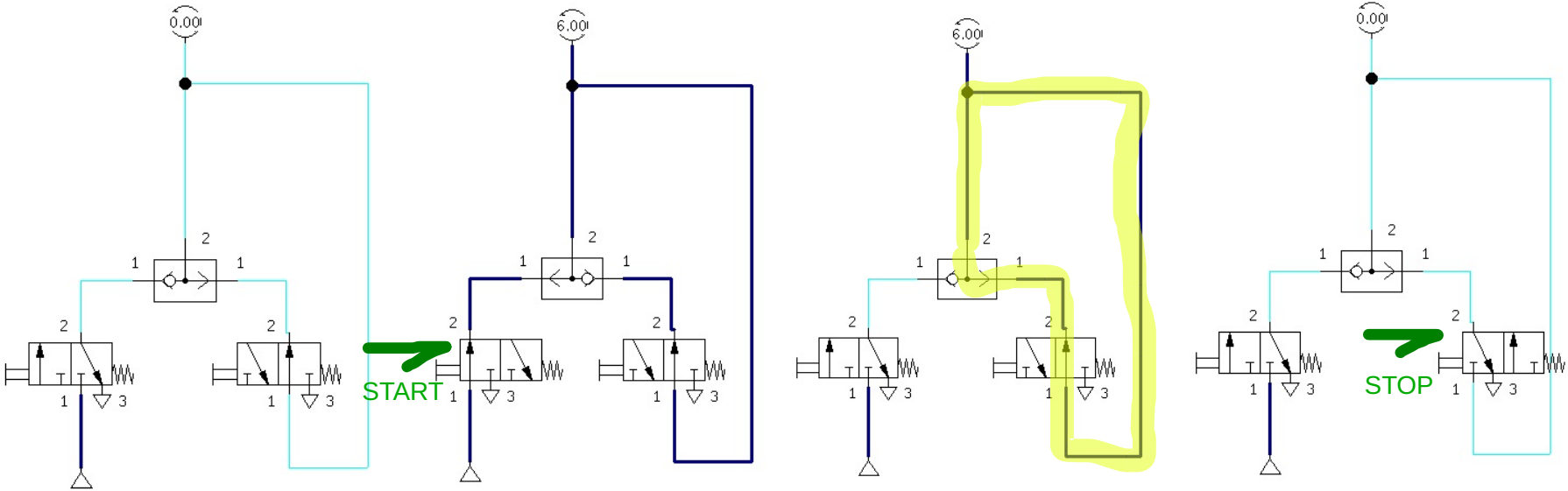


Pneumatic

Electropneumatic

PROCESSING ELEMENT 3

Dominan-ON

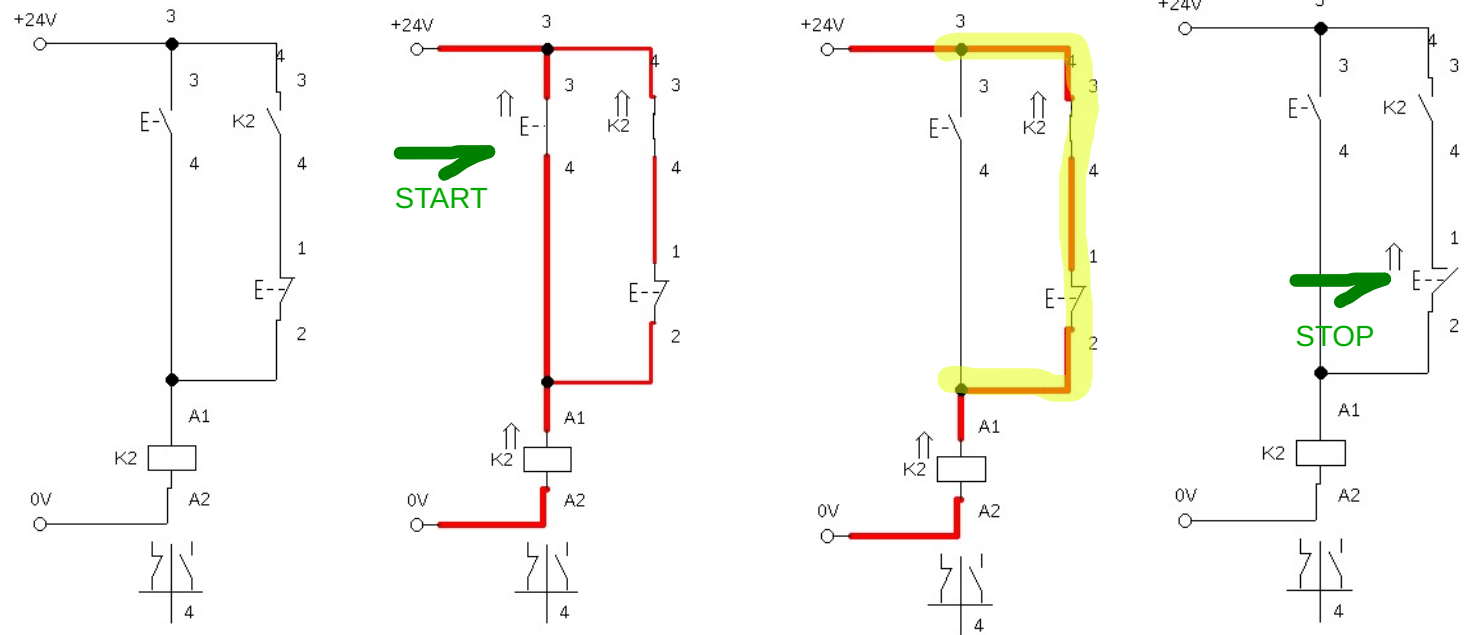


1

2

3

4

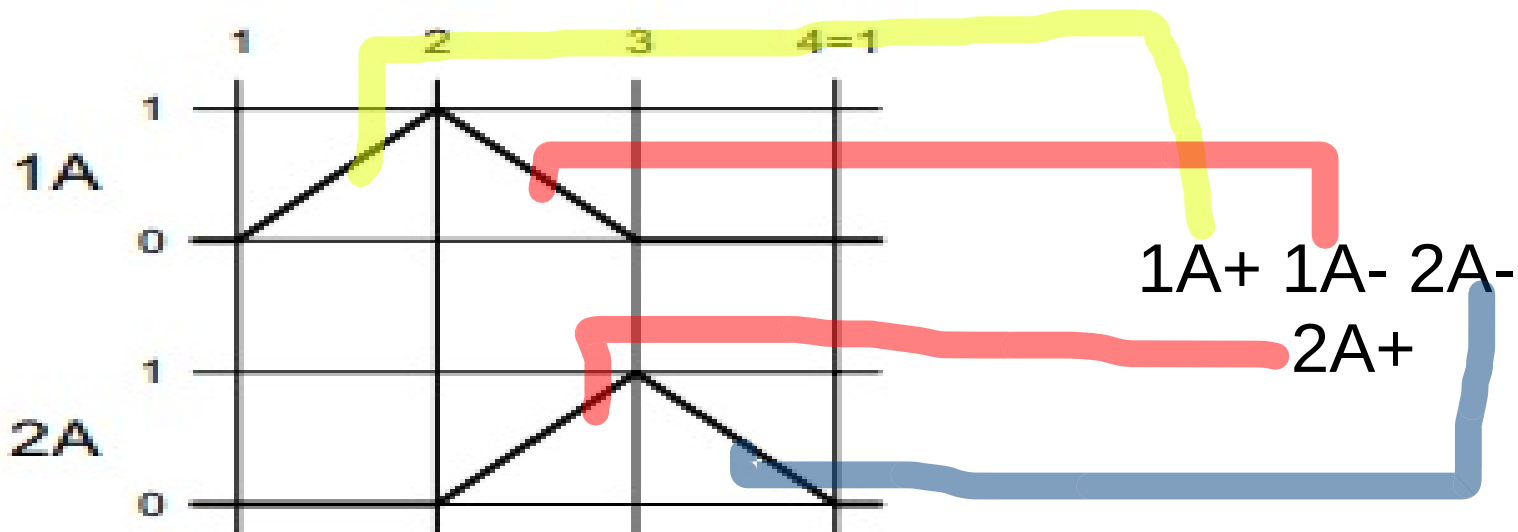
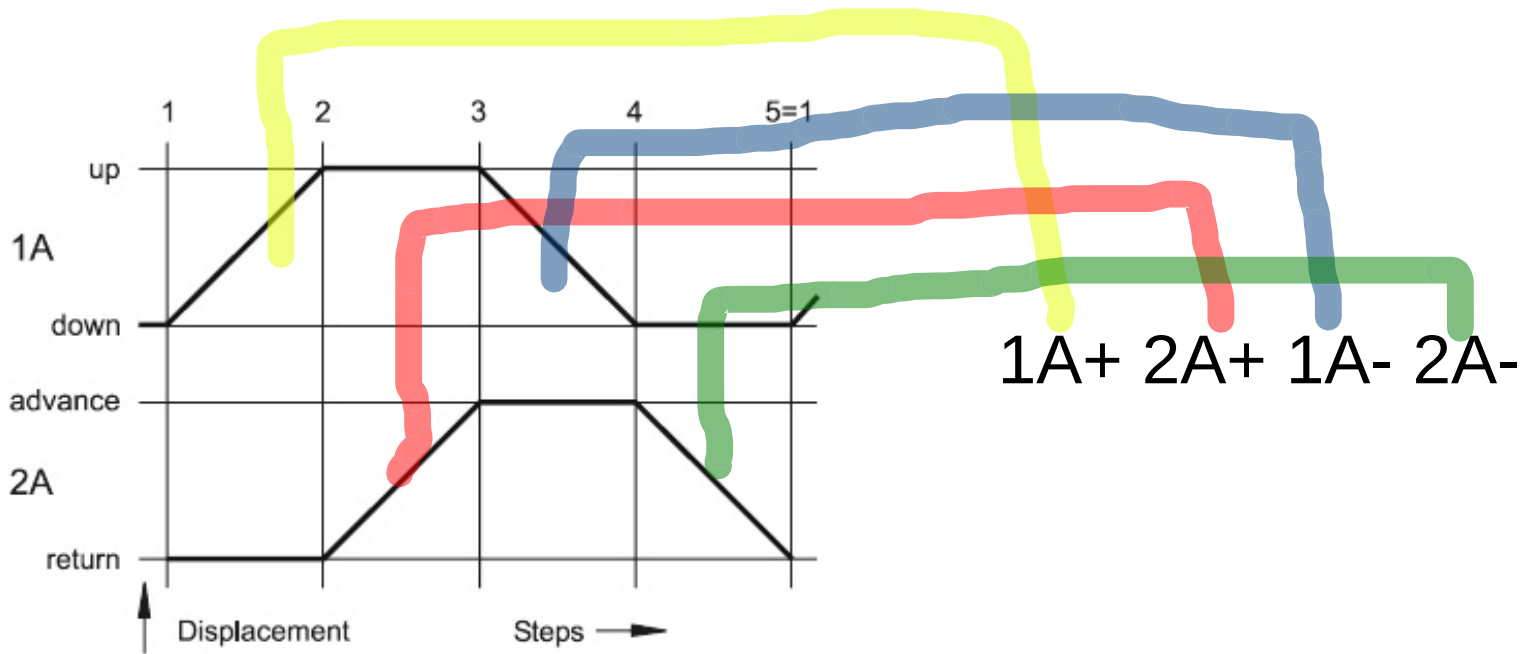


Pneumatic

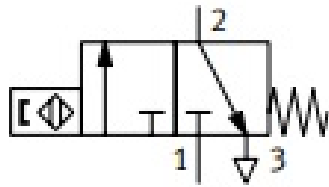
Electropneumatic

PRAKTIKUM 4

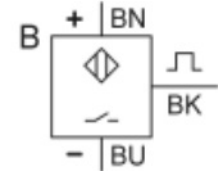
Grafik Pergerakan Pneumatic 3



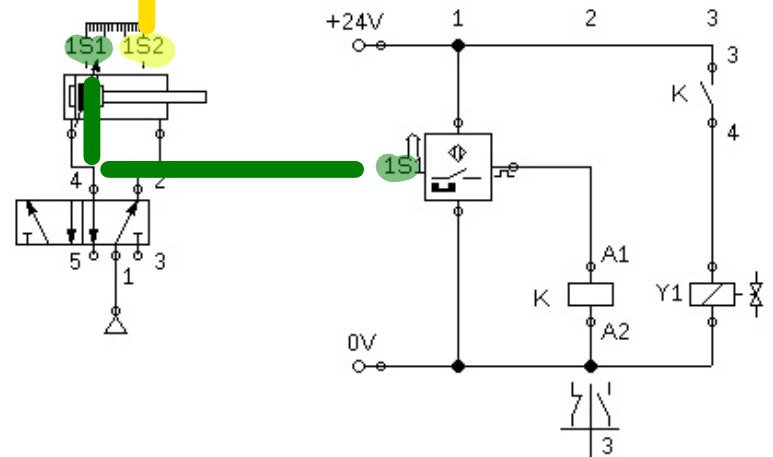
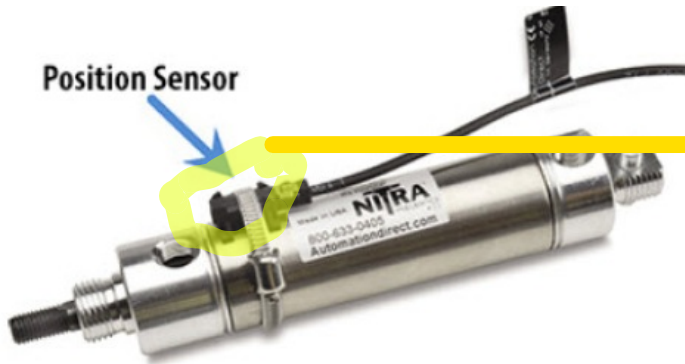
INPUT ELEMENT 3



Proximity sensor with cylinder mounting



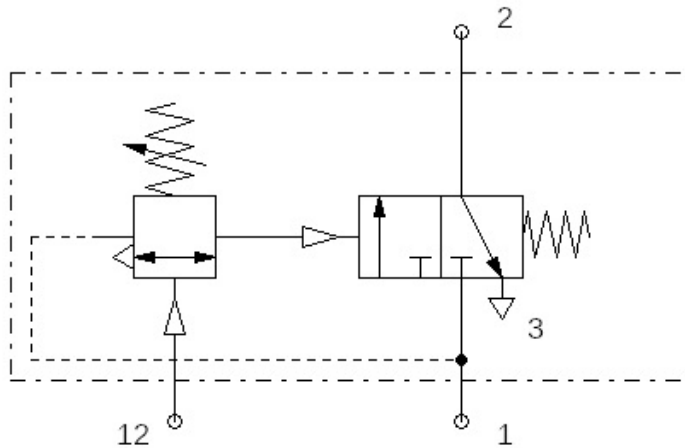
Position Sensor



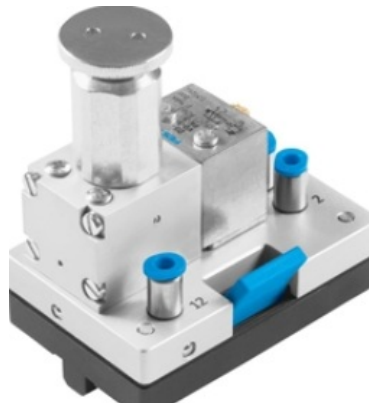
Pneumatic

Electronpneumatic

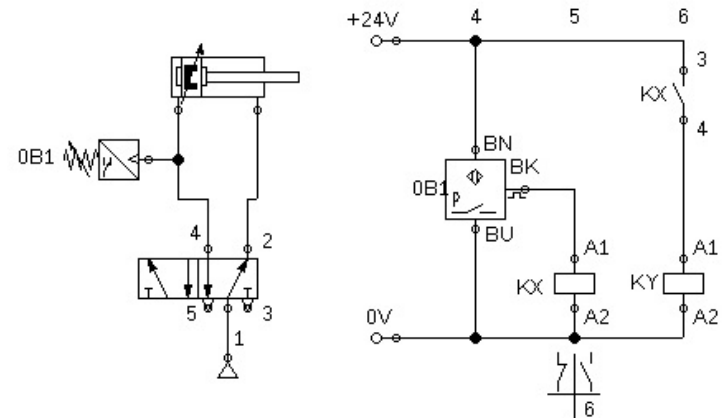
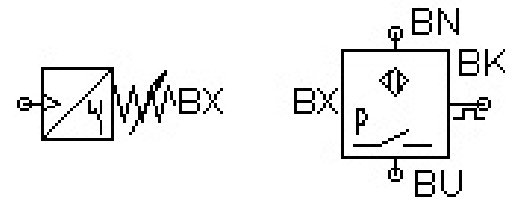
INPUT ELEMENT 3



Pressure Squance Valve



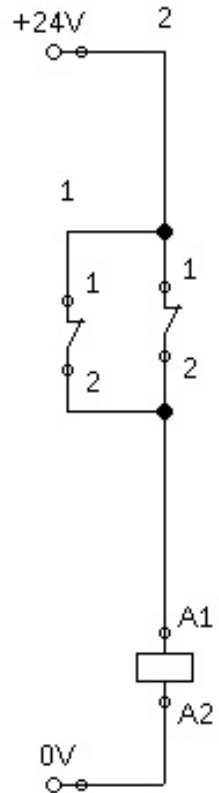
Pneumatic



Electronneumatic

PROCESSING ELEMENT 3

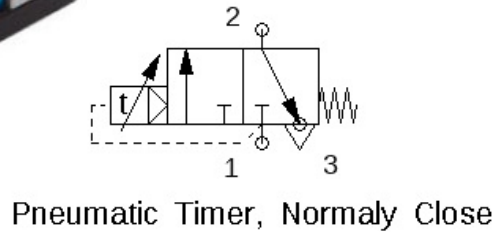
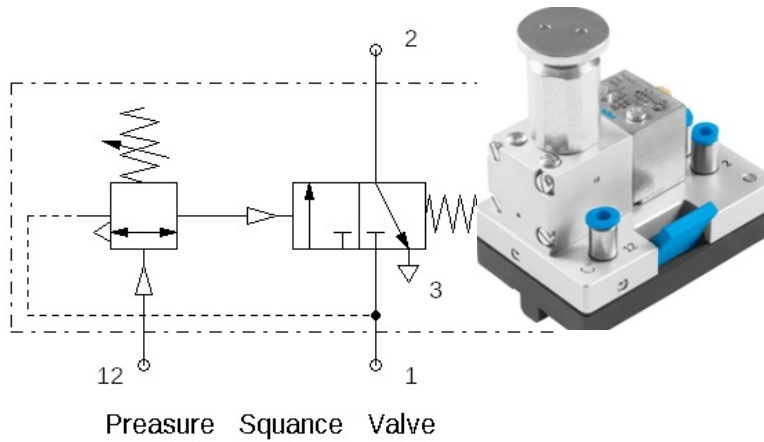
Logika NAND



Pneumatic

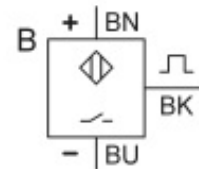
Electropneumatic

INPUT ELEMENT 3



Pneumatic

Proximity sensor with cylinder mounting



Position Sensor

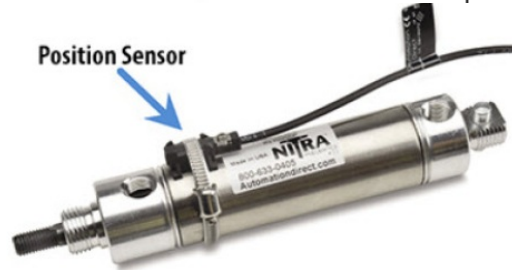
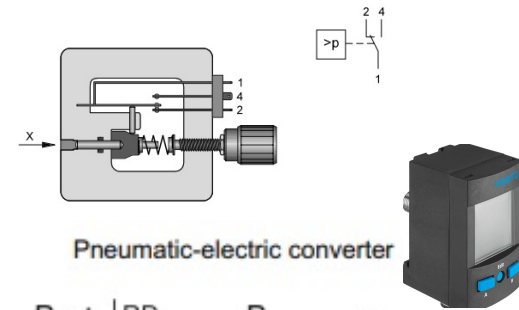
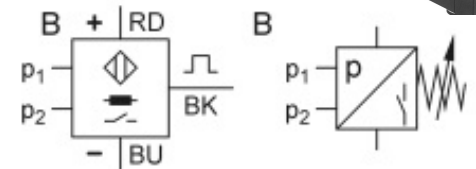


Fig. 3.12: Piston-actuated pressure switch



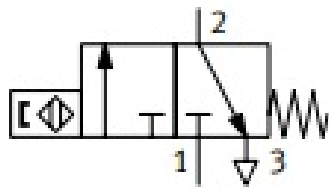
Pneumatic-electric converter



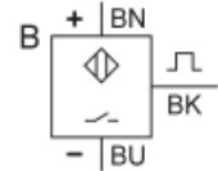
Electropneumatic

PRAKTIKUM 5

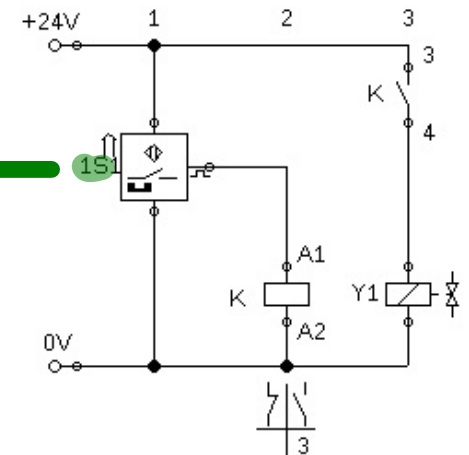
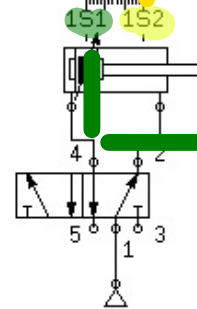
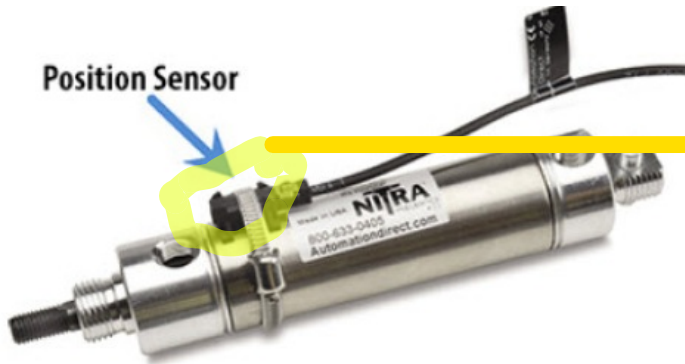
INPUT ELEMENT 3



Proximity sensor with cylinder mounting



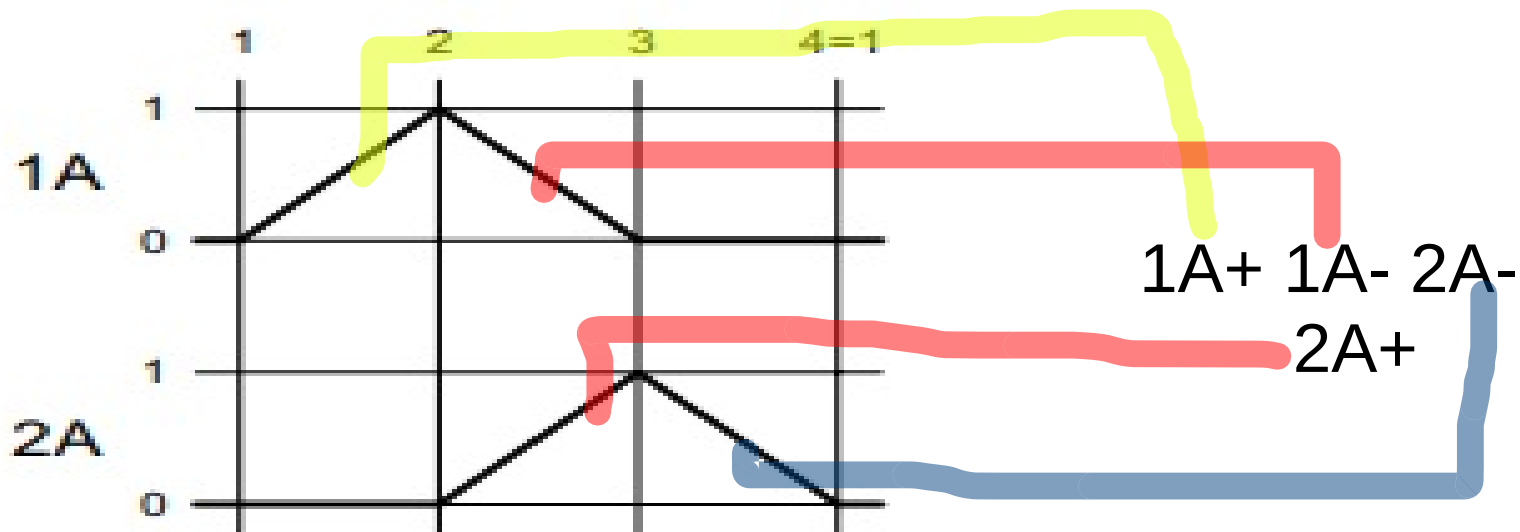
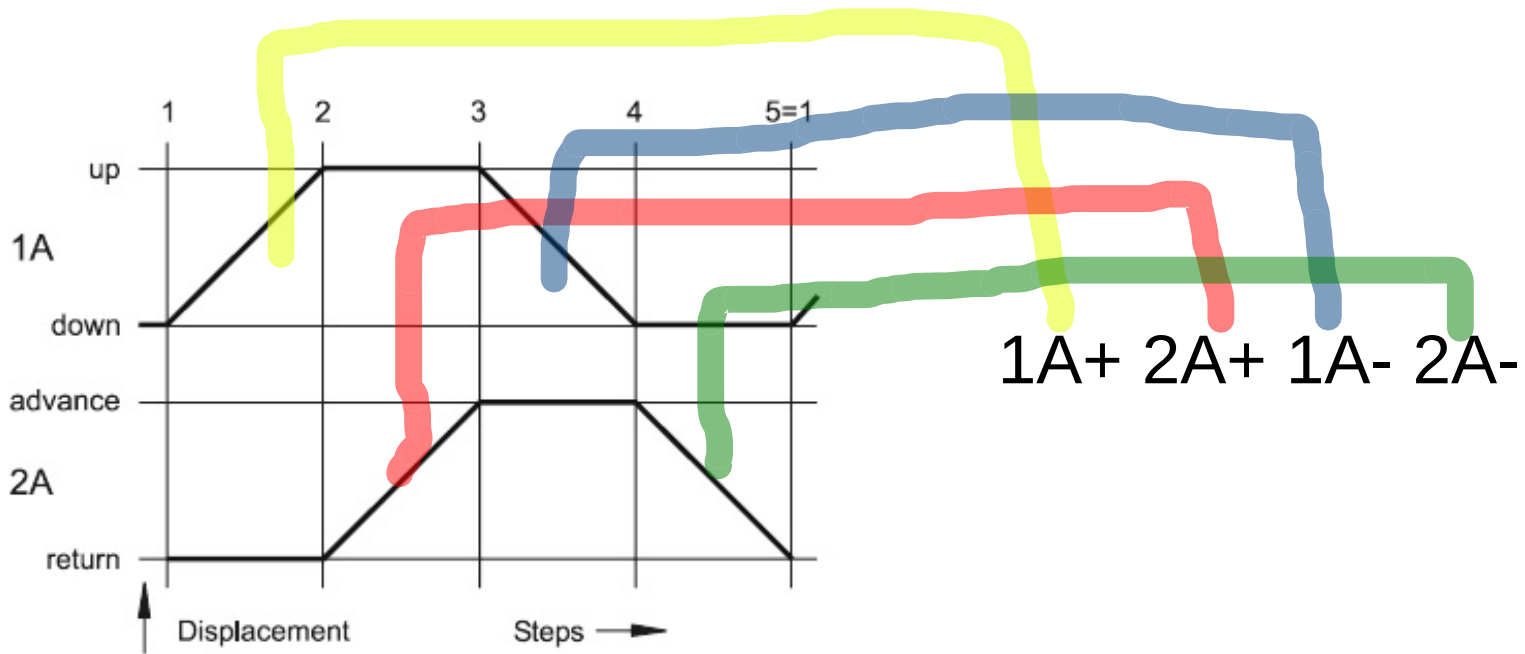
Position Sensor



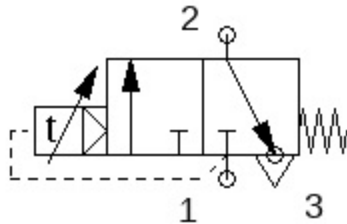
Pneumatic

Electronneumatic

Grafik Pergerakan Pneumatic 3

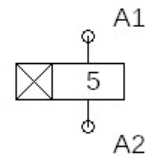


INPUT ELEMENT 3

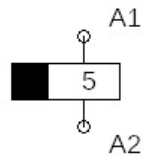
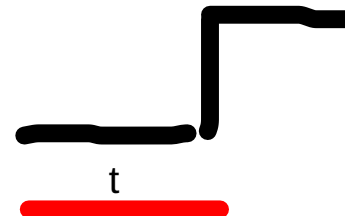


Pneumatic Timer, Normally Close

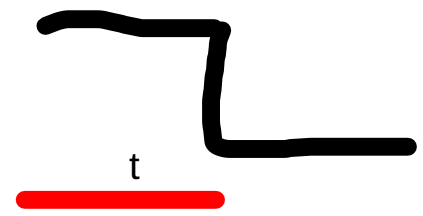
Pneumatic



Switch-On Delay

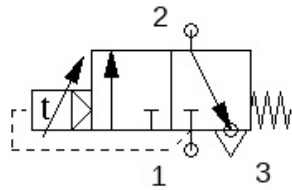


Switch-Off Delay

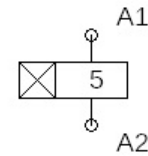


Electronneumatic

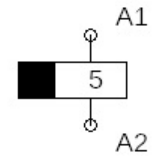
INPUT ELEMENT 3



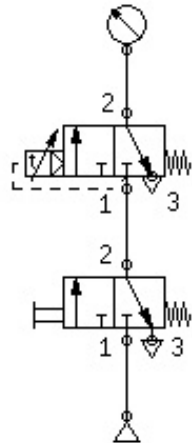
Pneumatic Timer, Normally Close



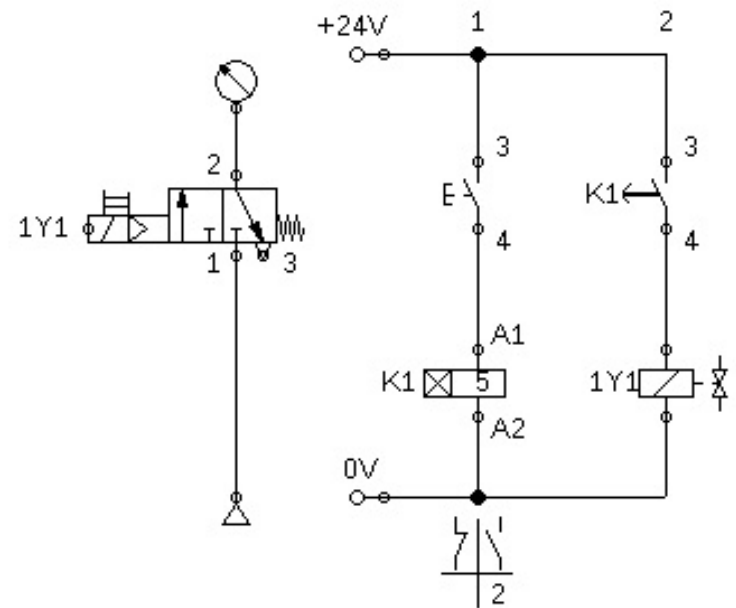
Switch-On Delay



Switch-Off Delay



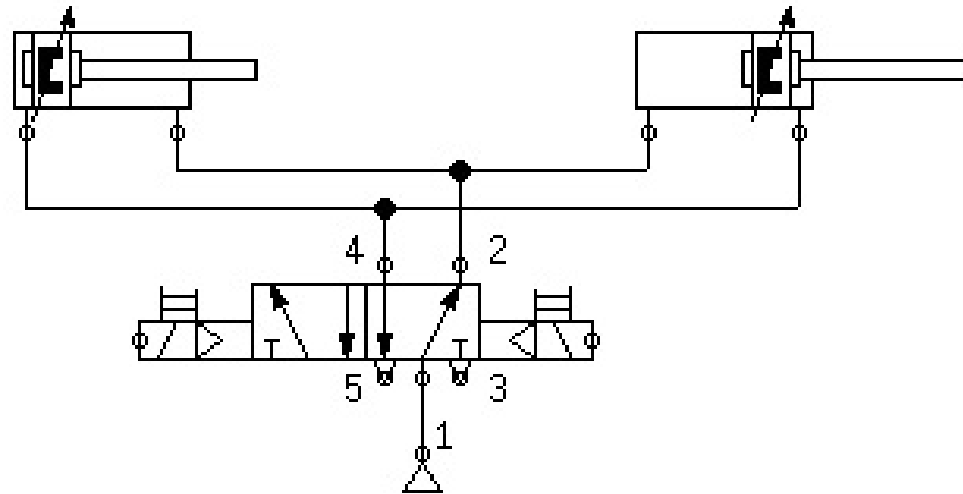
Pneumatic



Electronpneumatic

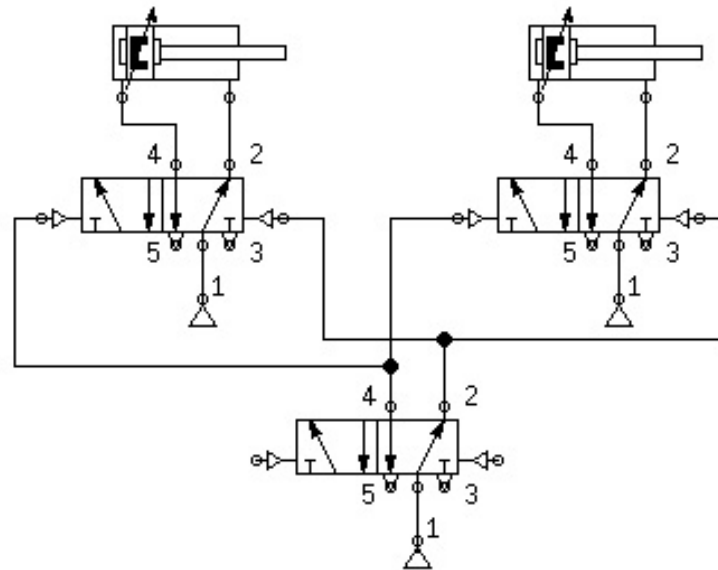
PRAKTIKUM 6

Mengendalikan Silinder Lebih Dari Satu secara langsung



- + Satu valve mengendalikan banyak aktuator
- + Satu aktuator mempresentasikan kondisi aktuator lain
- Kendali setiap aktuator terbatas
- Gaya dorong satu valve terbagi menjadi dua

Mengendalikan Silinder Lebih Dari Satu secara tidak langsung



- + Satu valve mengendalikan banyak aktuator
- + Banyak kombinasi gerak yang bisa dilakukan
- + Gaya dorong yang kuat dan sama
- Rangkaian menjadi kompleks
- Banyak membutuhkan komponen

PRAKTIKUM 7