PELAJARAN HARI INI

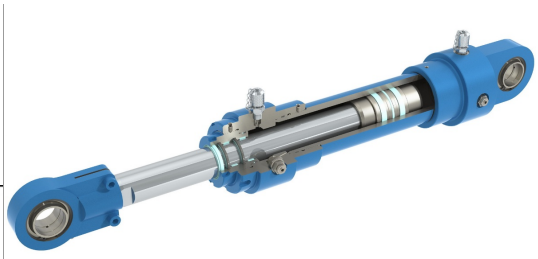
1. Fisika Dasar dan Satuan yang berkaitan dengan Sistem Pneumatik
2. Urutan Perangkat Penyuplai Angin
3. Cara Kerja Katup Sistem Pneumatik

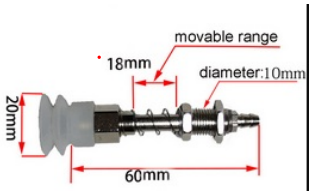
APA YANG DIKENDALIKAN DI SISTEM PNEUMATIC?

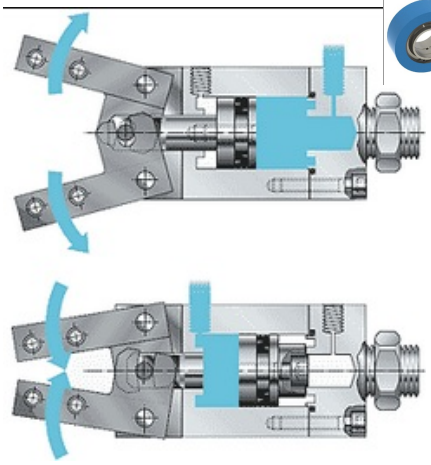
Actuators can be further broken down into groups:

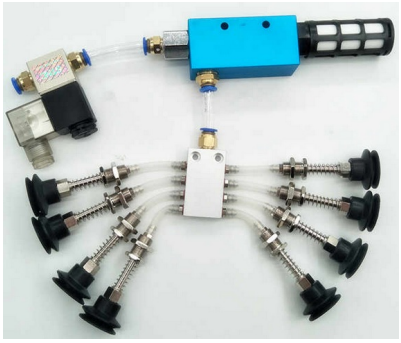
- Linear actuators
  - Single-acting cylinder
  - Double-acting cylinder
- Rotary actuators
  - Air motors
  - Rotary actuators

Fig. 2.13
Actuators, linear and rotary









UNTUK APA AKTUATORNYA?

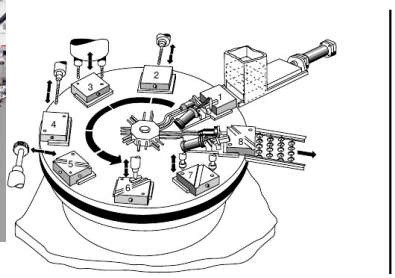


Fig. 1.2:
Processing station

Fig. 1.2
Points switch for two conveyor belts

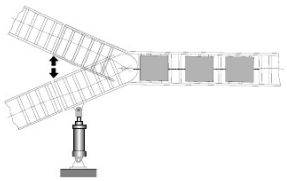


Fig. 1.3
Pneumatic cutter

Fig. 5.2:
Positional sketch of the lifting device

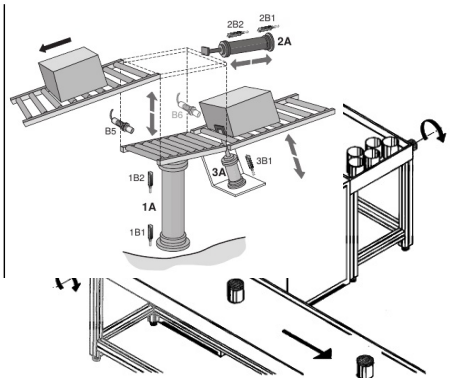


Fig. 1.3:
Assembly device for mounting lids on cans

Pneumatic

Electropneumatic

Mengenal Angin Bertekanan

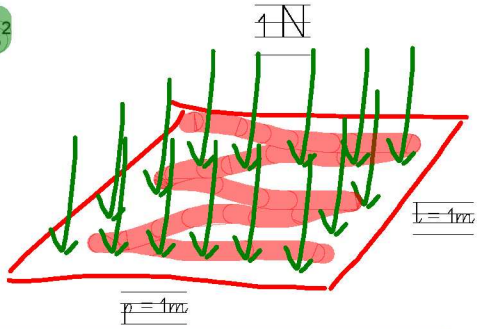
Basic units	**Quantity**	**Symbol**	**Units**
Panjang	Length	L	Meter (m)
Berat	Mass	m	Kilogram (kg)
Waktu	Time	t	Second (s)
Suhu	Temperature	T	Kelvin (K, 0 °C = 273.15 K)

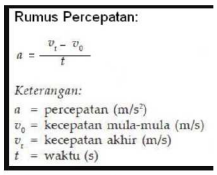
Derived units	**Quantity**	**Symbol**	**Units**
Gaya	Force	F	Newton (N) = 1 kg • m/s^2
Luas	Area	A	Square metre (m^2)
Volume	Volume	V	Cubic metre (m^3)
Debit	Flowrate	q_v	(m^3/s)
Tekanan	Pressure	p	Pascal (Pa)
			1 Pa= 1 N/m^2
			1 bar = 10^5 Pa

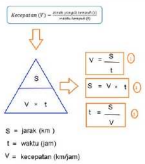
Akselerasi a $m/(s2)$

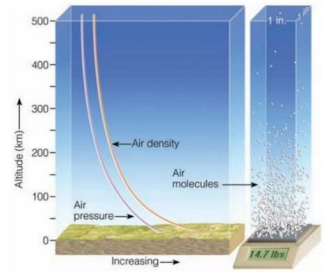
Hukum 2 Newton

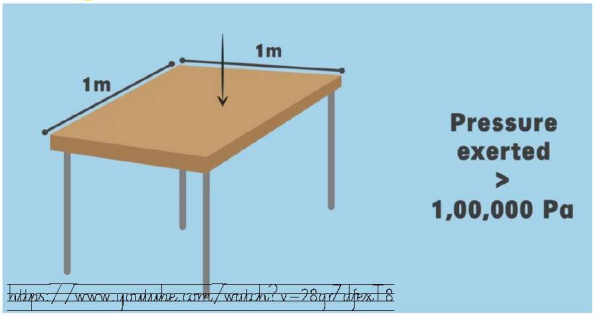
$$F = m\,a$$





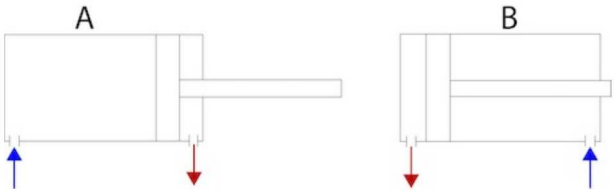




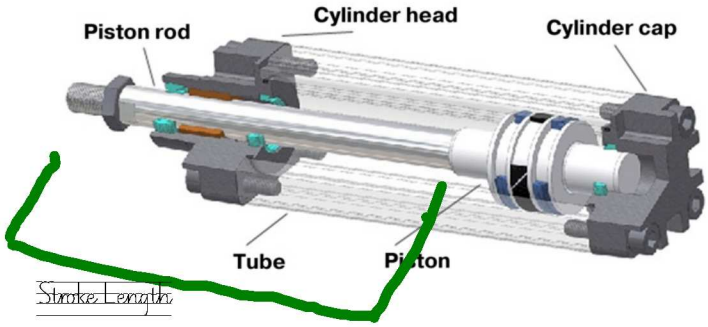


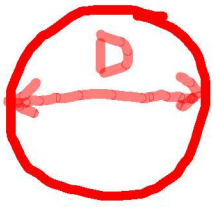
Menentukan Silinder

https://instrumen.com/pages/pneumatic-cylinder-force-calculation



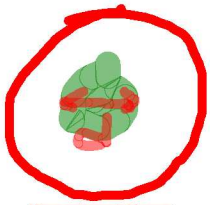
Components of a piston rod cylinder:





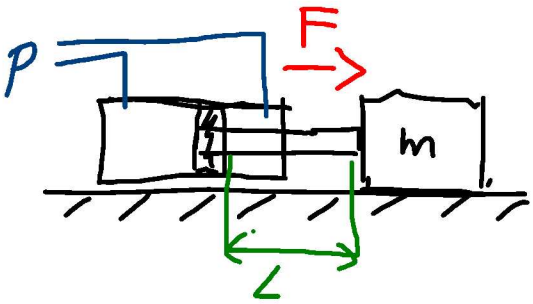
Piston Tunggal
Belakan (Emwand)

$A = \frac{\pi}{4} \times D^2$



Piston Tunggal Dengan
(Rebnut)

$A = \pi \times \frac{(D^2 - d^2)}{4}$



$F = m \cdot a$

$= m \cdot \frac{v_2 - v_1 = 0}{t}$

$= m \cdot \frac{(L/t)}{t}$

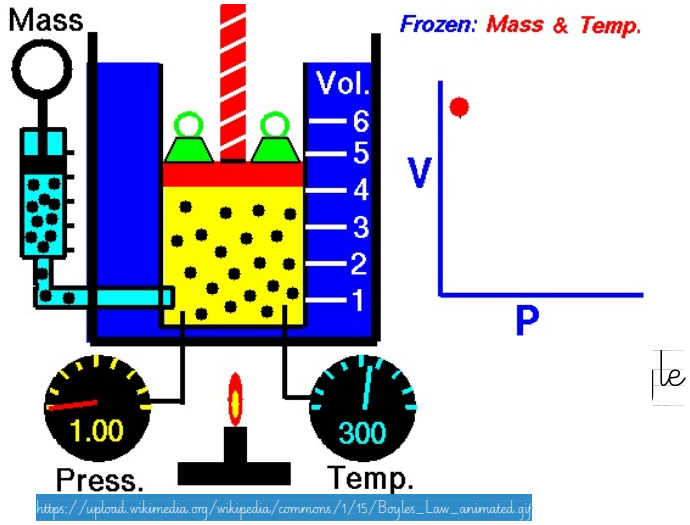
$F = m \cdot \frac{L}{t^2}$

$P = \frac{F}{A}$

$\frac{\pi}{4} \times D^2 = \frac{F}{P}$

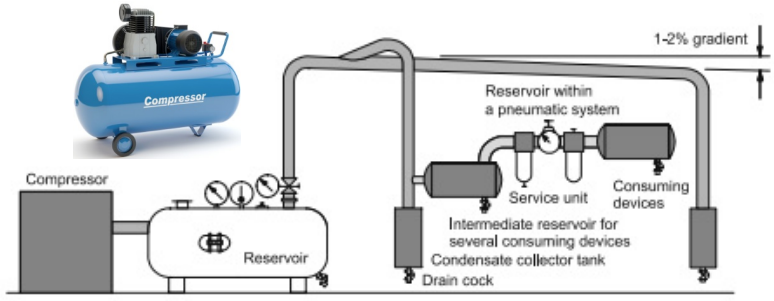
$D = \sqrt{\frac{F \cdot 4}{P \cdot \pi}}$

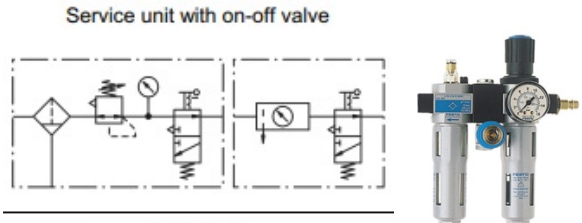
Karakteristik Angin

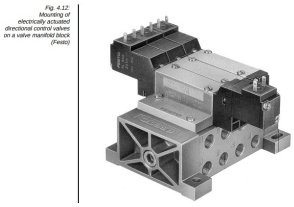


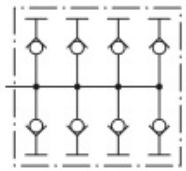
https://upload.wikimedia.org/wikipedia/commons/1/15/Boyles_Law_animated.gif

SUPLAY ELEMENT









Pneumatic

Electropneumatic

BAGIAN BAGIAN DARI PNEUMATIC

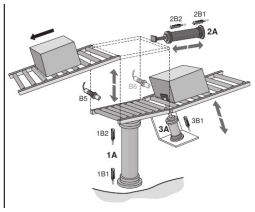
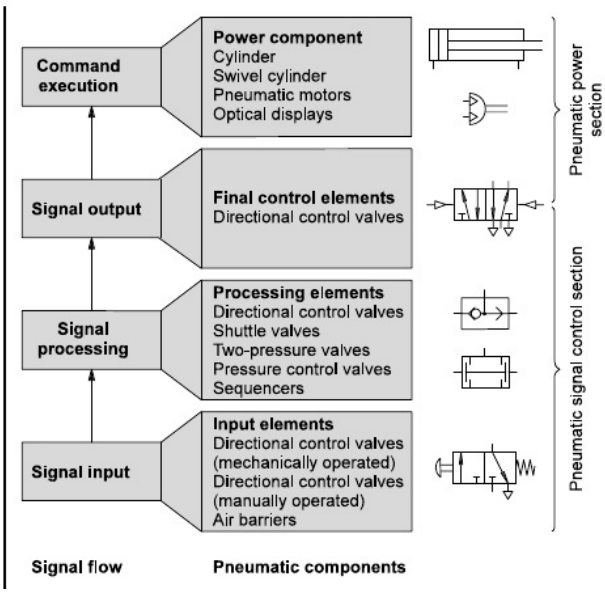


Fig. 1.7:
Signal flow and components of a pneumatic control system



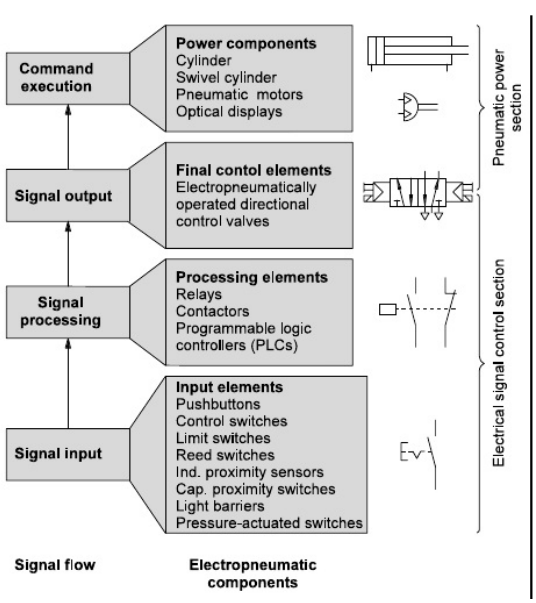
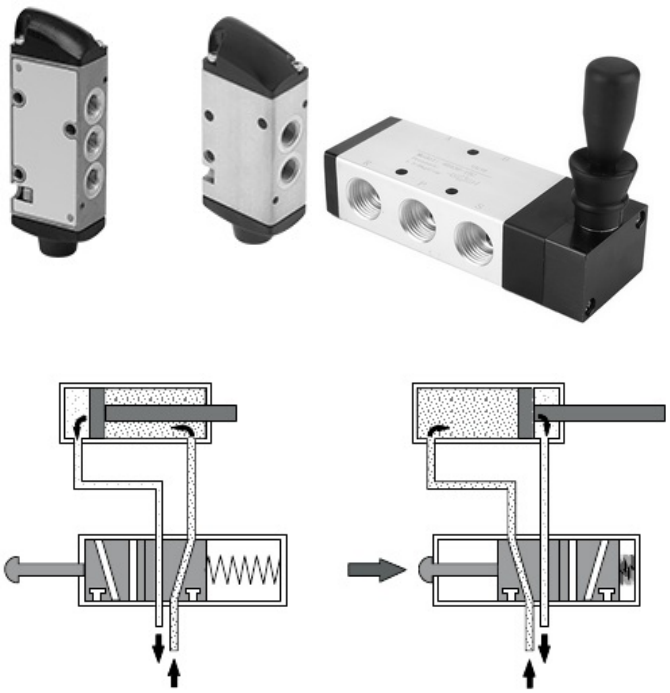


Fig. 1.8:
Signal flow and components of an electropneumatic control system

Pneumatic

Electropneumatic

BAGAIMANA MENGENDALIKAN AKTUATORNYA?



Pneumatic

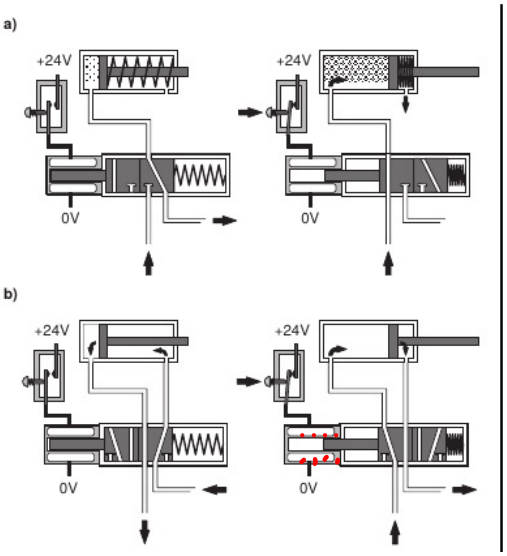
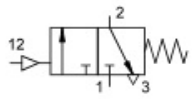
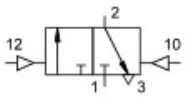


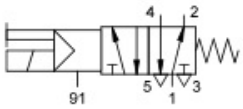
Fig. 4.1: Actuation of a pneumatic cylinder a) Single-acting b) Double-acting

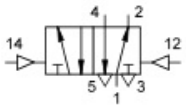
Electropneumatic

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

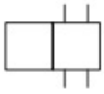
Valve switching positions
are represented as squares

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

Lines indicate flow paths,
arrows shows the direction of flow

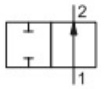
Shut off positions are identified in the boxes
by lines drawn at right angles

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

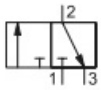


Number of ports
Number of positions

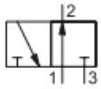
2/2 – Way directional control valve, normally open



3/2 – Way directional control valve, normally closed

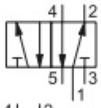


3/2 – Way directional control valve, normally open

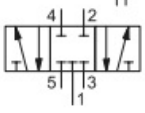


4/2 – Way directional control valve
Flow from 1 → 2 and from 4 → 3

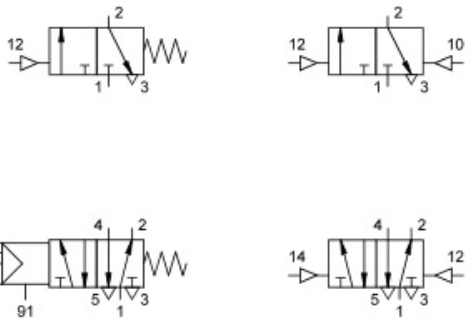
5/2 – Way directional control valve
Flow from 1 → 2 and von 4 → 5



5/3 – Way directional control valve
Mid position closed



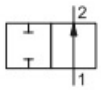
MENGENAL VALVE 2



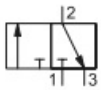
Manual	General	
	Pushbutton	
	Lever Operated	
	Detend lever operated	
	Foot pedal	
Mechanical	Plunger	
	Roller operated	
	Idle return, roller	
	Spring return	
	Spring centred	
Pneumatic	Direct pneumatic actuation	
	Indirect pneumatic actuation (piloted)	
Electrical	Single solenoid operation	
	Double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

Number of ports
Number of positions

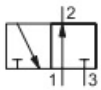
2/2 – Way directional control valve, normally open



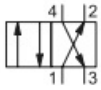
3/2 – Way directional control valve, normally closed



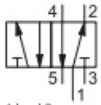
3/2 – Way directional control valve, normally open



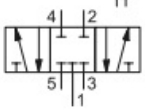
4/2 – Way directional control valve
Flow from 1 → 2 and from 4 → 3



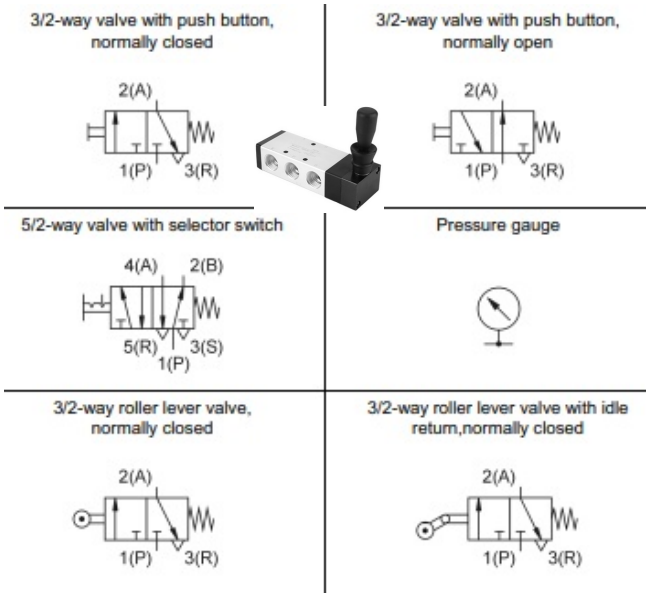
5/2 – Way directional control valve
Flow from 1 → 2 and von 4 → 5



5/3 – Way directional control valve
Mid position closed



INPUT ELEMENT 1



Pneumatic

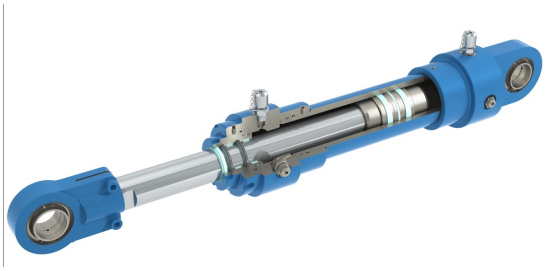
Electropneumatic

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