

## BAB 1. PENGUKURAN

### A. BESARAN DAN SATUAN

**Besaran** adalah segala sesuatu yang dapat diukur dan dinyatakan dengan angka.

**Satuan** adalah ukuran besaran.

**Pengukuran** adalah kegiatan membandingkan suatu besaran dengan besaran sejenis yang ditetapkan sebagai satuan.

Di dalam ilmu fisika dikenal dua besaran, yaitu **besaran pokok** dan **besaran turunan**.

#### 1. Besaran Pokok

Besaran pokok adalah besaran yang satuannya telah ditetapkan lebih dahulu sesuai dengan **Sistem Internasional (SI)**. Dalam fisika ada 7 besaran pokok yang harus diingat, yaitu :

No	Besaran Pokok	Satuan	Singkatan
1.	Panjang	meter	m
2.	Massa	kilogram	kg
3.	Waktu	sekon	s
4.	Kuat Arus	ampere	A
5.	Suhu	kelvin	K
6.	Intensitas Cahaya	candela	cd
7.	Jumlah Zat	mol	mol

#### 2. Besaran Turunan

Besaran turunan adalah besaran yang dibentuk atau diturunkan dari besaran pokok. Berikut beberapa contoh besaran turunan.

No	Besaran Turunan	Satuan	
		MKS	CGS
1.	Luas	m <sup>2</sup>	cm <sup>2</sup>
2.	Volume	m <sup>3</sup>	cm <sup>3</sup>
3.	Kecepatan	m/s	cm/s
4.	Percepatan	m/s <sup>2</sup>	cm/s <sup>2</sup>
5.	Gaya	Newton (N)	dyne
6.	Energi	Joule (J)	erg

Berdasarkan nilai dan arahnya, besaran ada dua yaitu **besaran skalar** dan **besaran vektor**.

- Besaran vektor**, yaitu besaran yang mempunyai nilai dan arah. Contohnya : gaya, kecepatan dan percepatan.
- Besaran skalar**, yaitu besaran yang hanya mempunyai nilai dan tidak mempunyai arah. Contohnya : panjang, waktu, massa.

#### 3. Sistem Satuan

Dalam sistem satuan dikenal singkatan, awalan, dan pangkat bilangan sepuluh seperti

Awalan	Simbol	Konversi
Yotta	Y	10 <sup>24</sup>
Zetta	Z	10 <sup>21</sup>
Exa	E	10 <sup>18</sup>
Peta	P	10 <sup>15</sup>
Tera	T	10 <sup>12</sup>
Giga	G	10 <sup>9</sup>
Mega	M	10 <sup>6</sup>
kilo	k	10 <sup>3</sup>
hekto	h	10 <sup>2</sup>
deka	da	10 <sup>1</sup>
desi	d	10 <sup>-1</sup>
centi	c	10 <sup>-2</sup>
milli	m	10 <sup>-3</sup>
mikro	μ	10 <sup>-6</sup>
nano	n	10 <sup>-9</sup>
piko	p	10 <sup>-12</sup>
Femto	f	10 <sup>-15</sup>
Atto	a	10 <sup>-18</sup>
Zepito	z	10 <sup>-21</sup>
Yokto	y	10 <sup>-24</sup>

Contoh: 15 nm = .... m  
= 15 × 10<sup>-9</sup> m atau 0,000 000 015 m

#### a. Satuan Internasional (SI)

Pada tahun 1960 ditetapkan sistem satuan yang berlaku secara internasional yang berfungsi sebagai satuan standar dan disebut Sistem Internasional (SI).

**Syarat Satuan Internasional :**

- (1) Tetap, tidak mengalami perubahan dalam keadaan apapun.
- (2) Bersifat internasional, sehingga dapat dipakai di manapun.
- (3) Mudah ditiru oleh setiap orang yang menggunakan.

#### b. Satuan MKS (meter-kilogram-sekon)

- Panjang; satuannya meter (m).
- Massa; satuannya kilogram (kg).
- Waktu; satuannya sekon (s).

#### c. Satuan CGS (centimeter-gram-sekon)

- Panjang; satuannya centimeter (cm).
- Massa; satuannya gram (g).
- Waktu; satuannya sekon (s).

#### d. Satuan Baku dan Tidak Baku

- **Satuan baku**; satuan yang sudah diakui secara internasional sehingga dapat digunakan di mana manapun. Contoh: meter, kilogram dan liter.
- **Satuan tidak baku**; satuan yang tidak diakui secara internasional, sehingga hanya digunakan di daerah tertentu saja. Contoh: hasta, depa, jengkal, dan gajuh.

## B. PENGUKURAN

Ada dua macam kesalahan pada pengukuran, yaitu sebagai berikut  
a. Kesalahan karena alat ukur yang digunakan tidak berfungsi dengan baik. Contoh:

- Kesalahan titik nol (*zero error*) adalah kesalahan pengukuran yang disebabkan oleh bacaan alat ukur tidak tepat pada posisi nol.
- Skala alat ukur tidak jelas atau kurang bisa dibaca.

b. kesalahan yang dilakukan oleh manusia yang melakukan pengukuran. Contoh:

- Kesalahan paralaks (*parallax error*) adalah kesalahan pembacaan alat ukur yang disebabkan oleh posisi mata yang tidak tepat/miring
- Kesalahan penggunaan alat ukur, misal tidak memulai pengukuran dari skala terkecil

#### 1. Pengukuran Panjang

Standar panjang dalam SI adalah meter [m]. Satu meter didefinisikan sebagai jarak yang ditempuh cahaya dalam ruang hampa selama selang waktu 1/299.792.458 sekon.

Alat ukur besaran panjang diantaranya:

- Pita ukur
- Mistar, memiliki ketelitian 1 mm atau 0,1 cm
- Jangka sorong, memiliki ketelitian 0,1 mm atau 0,01 cm
- Mikrometer sekrup, memiliki ketelitian 0,01 mm atau 0,001 cm

#### Cara Pengukuran Panjang

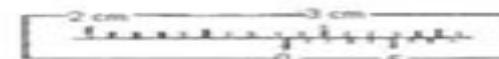
##### 1. Mistar & Pita Ukur



Hasil Pengukuran: 2,3 cm

##### 2. Jangka Sorong

- Jangka sorong memiliki 2 jenis skala  
a. skala utama (dalam satuan cm)  
b. skala nonius (dalam satuan mm)



Hasil pengukuran pada jangka sorong:

1. Skala utama: 2,8 cm
2. Skala nonius: 0,01 cm × 4 = 0,04 cm
3. Hasil pengukuran: 2,8 + 0,04 = 2,84 cm

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**CH Cherryholmes**



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