

## FUNDAMENTAL TERMS OF LIGHT

Signalling technology distinguishes between several basic terms with which light can be determined. The most important standardised units of measurement are **Lumen**, **Candela** and **Lux**.

### LUMEN (lm) – LIGHT CURRENT

The light current is a measurement for the whole visible radiation emitted by a radiation source. It determines how much light is emitted by a radiation source in all directions. This value is weighed for the spectral recognition of human beings. The light current is well suitable for describing the effectiveness of a light source.

### CANDELA (CD) – LIGHT POWER

The light power describes the radiation emitted into a specific direction. It is calculated from the light current as

$$\text{Light power [cd]} = \text{Light current [lm]} / \text{angle in space (steradian) [sr]}$$

and a measurement for the light distribution in the space.

The technical definition describes Candela as the light power of a radiation source that emits a monochromatic radiation with a frequency of  $540 \times 10^6$  Hz (equal to 555 nm wave length) with a performance of 1/683 Watt per steradian.

A standard candle emits a light power of 1 Cd, which means it emits 12,566 lm into all directions.

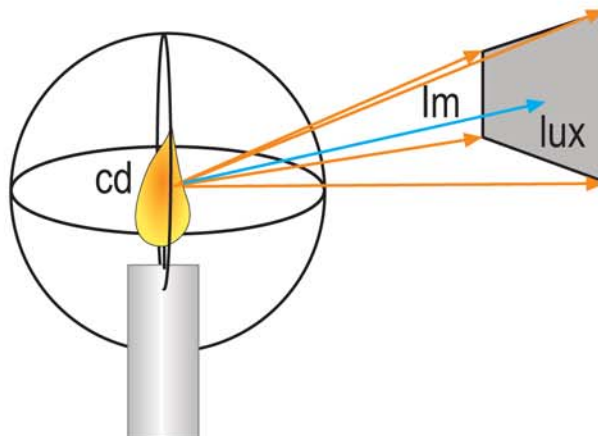
As the way of emitting of a visual signalling device is not only defined by the light source but also by the type of lens, the light power is best suitable to characterize the signalling effect of visual signalling devices.

### LUX (LX) – ILLUMINATION POWER

The illumination power is a measurement for the brightness with which an area is lit. It is calculated as quotient of light current and area ( $\text{lm}/\text{m}^2$ ).

The illumination power indicates how much light current of a light source per area unit arrives on a receiving area A.

Connections between the various measurements demonstrated in one picture:  
The illumination power is reversably proportional to the square of the distance, that means a doubling of the distance results in a reduction of the illumination power to one fourth.



### LIGHT RESULT/OUTPUT (lm/W)

The light output describes the produced light current in dependence of the electrical energy required; it corresponds to a „visual“ efficiency degree.

	lm/W
bulb:	8 – 18
halogen bulb:	14 – 25
energy saving bulb:	35 – 75
fluorescent lamp:	50 – 100
mercury vapour lamp:	30 – 60
LED white:	to 80