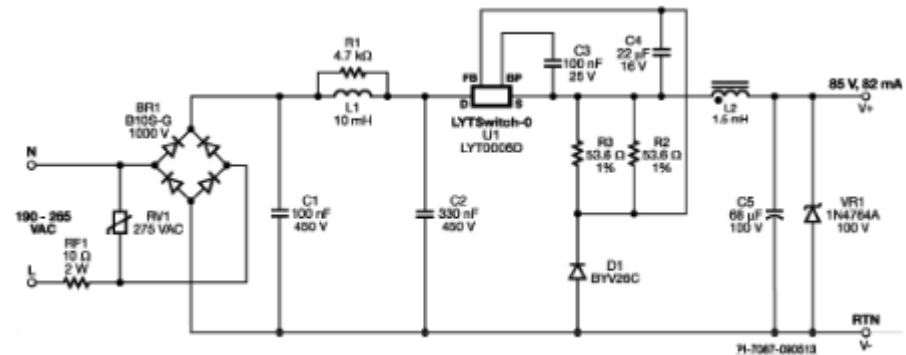


# De elektrische valkuilen van ledverlichting

Inschakelstromen, powerfactor en lekstromen

**VOLTA**

## Led vs. traditioneel



**VOLTA**



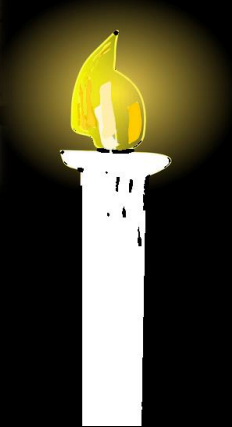
16 A x 230 V = 3650W



50 armaturen x 50W per armatuur = 2500W

**3650 W > 2500W →**



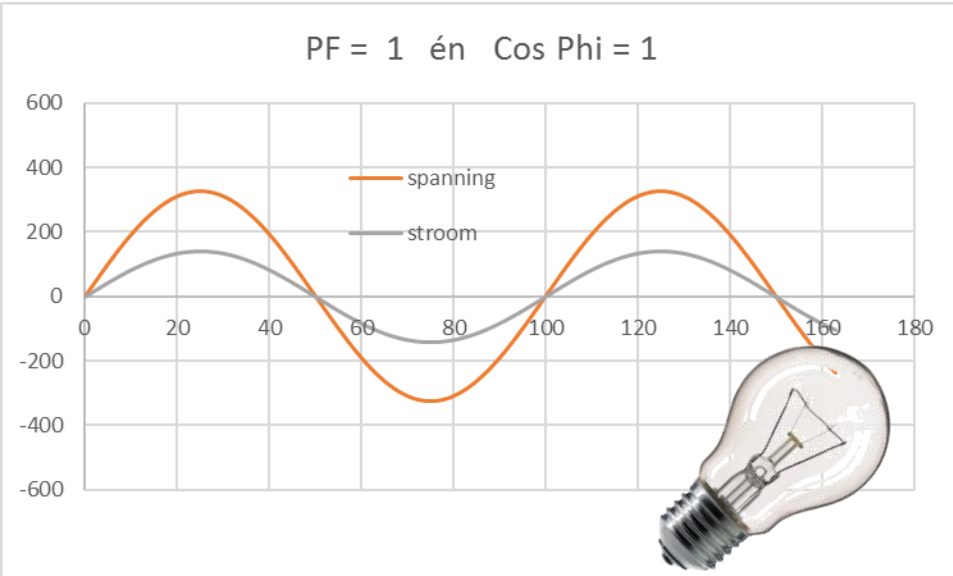


# Powerfactor

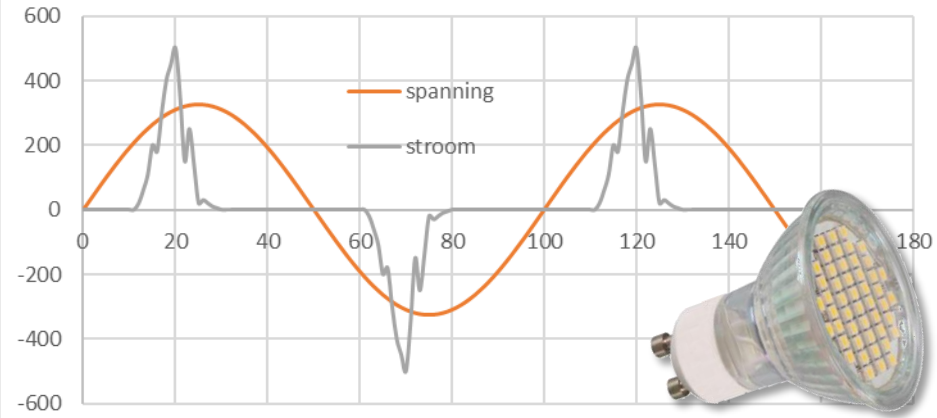
**VOLTA**

## Powerfactor vs Cos Phi

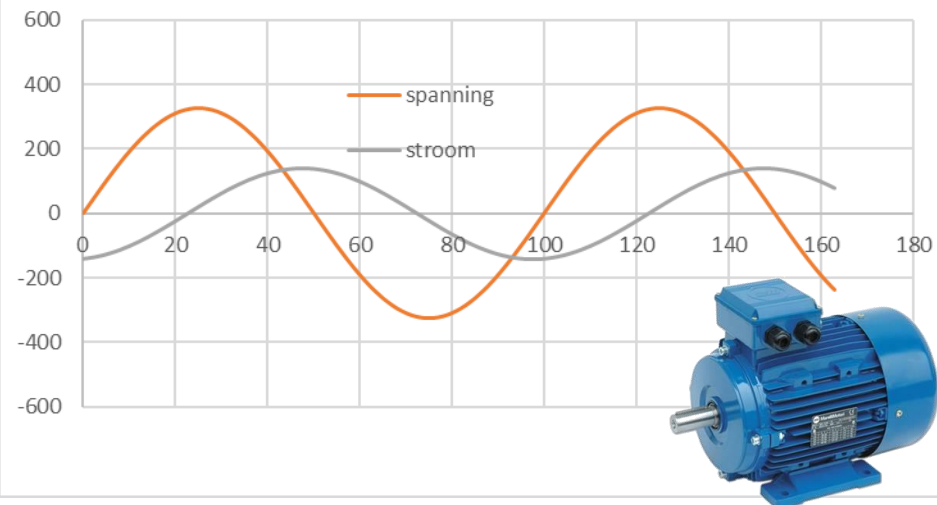
PF = 1 éñ Cos Phi = 1



PF = 0,3

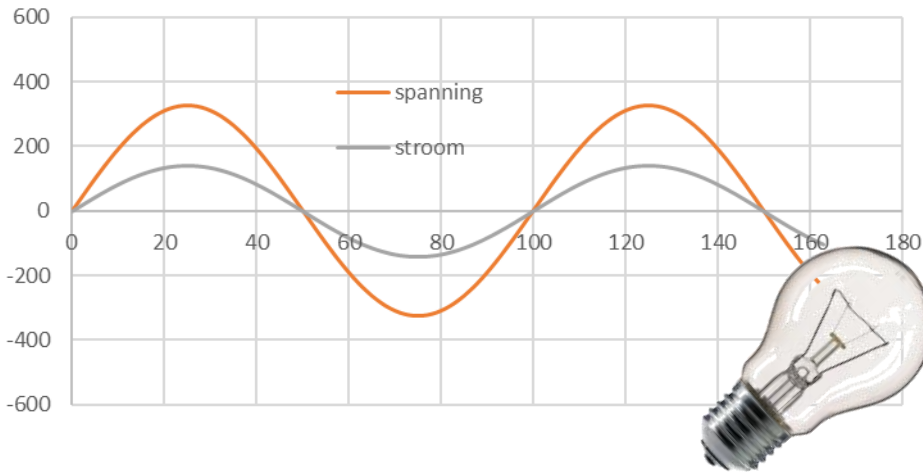


Cos Phi = 0,7



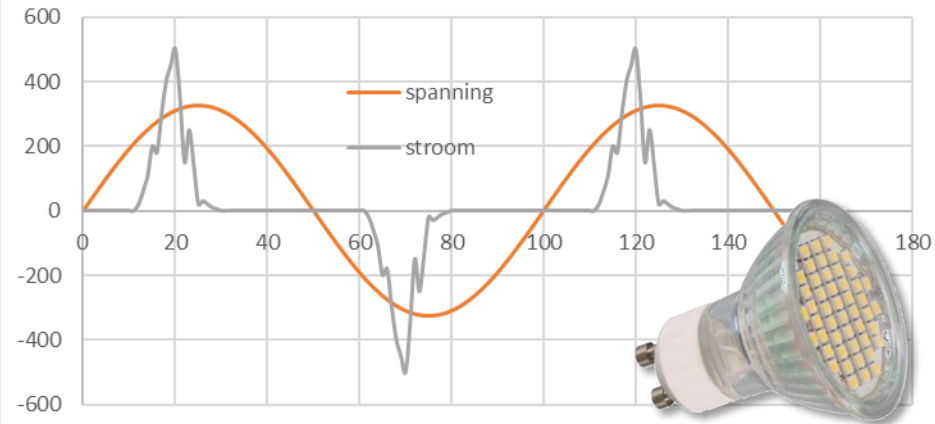
## Powerfactor

PF = 1 én Cos Phi = 1



$P = 60W$   
 $I_{\text{piek}} = 0,37A$

PF = 0,3



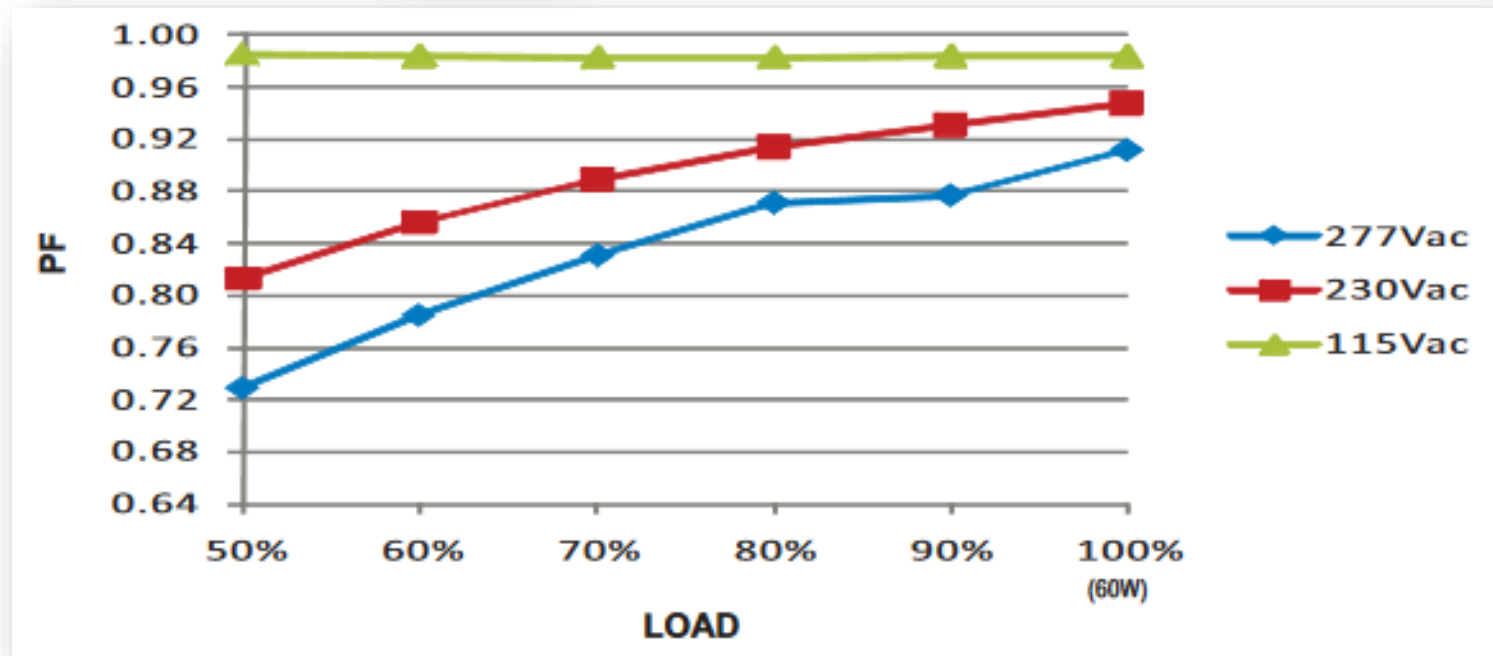
$P = 40W$   
 $I_{\text{piek}} = 0,5A$

## Powerfactor

Power Factor: >0.9

Power factor at full load <sup>Ⓟ</sup>	0.9
Power factor at min. load <sup>Ⓟ</sup>	0.7

$\lambda$  0.96





# Wettelijke vereisten

## Class C >25W

Harmonic order  
(n)

Maximum permissible harmonic  
current expressed as a  
PERCENTAGE OF THE INPUT  
CURRENT AT THE FUNDAMENTAL  
FREQUENCY  
(Amps)

2  
3  
5  
7  
9  
11 to 39 (odd only)

2 %  
30 x PF %  
10 %  
7 %  
5 %  
3 %

\*Where PF is the circuit power factor.

## Ecodesign eisen

< 2 W → geen eis

2 - 5 W → PF > 0,4

5 - 25 W → PF > 0,5

> 25 W → PF > 0,9

# Inschakelstromen

**VOLTA**

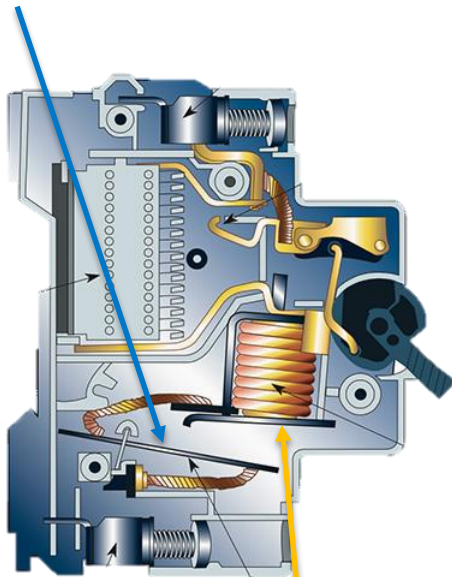
# Inschakelströmen



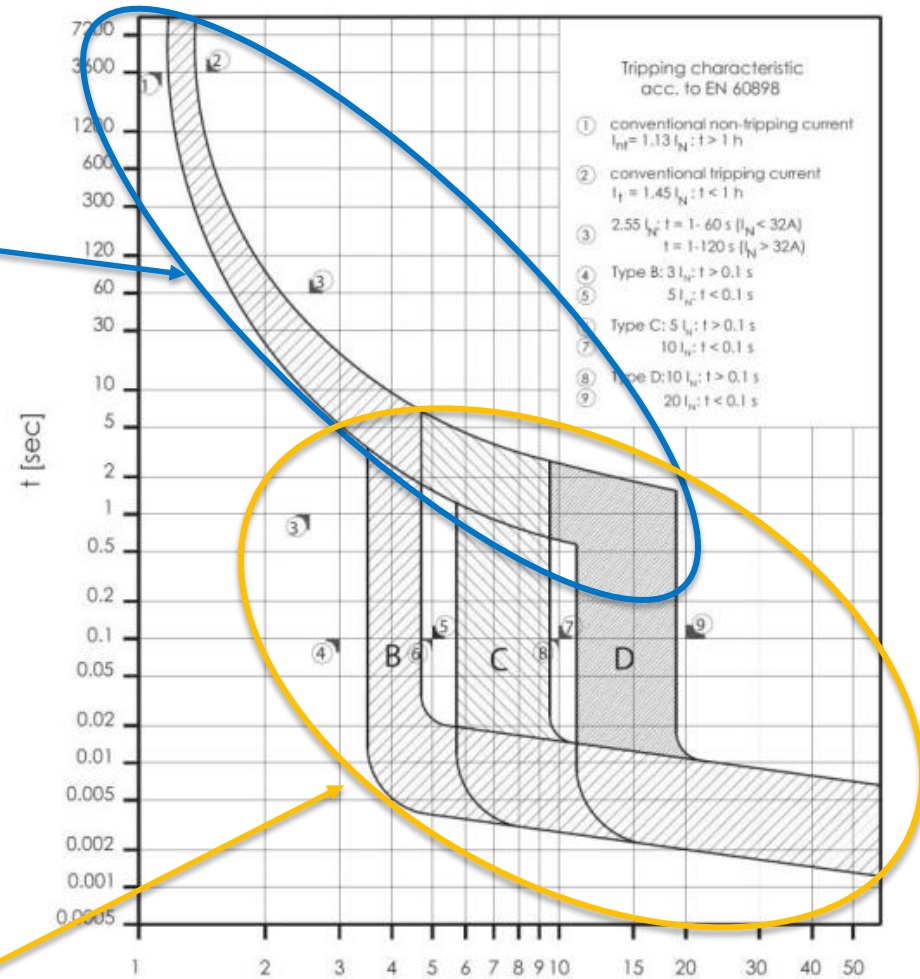
**20A/div**

## Inschakelstromen

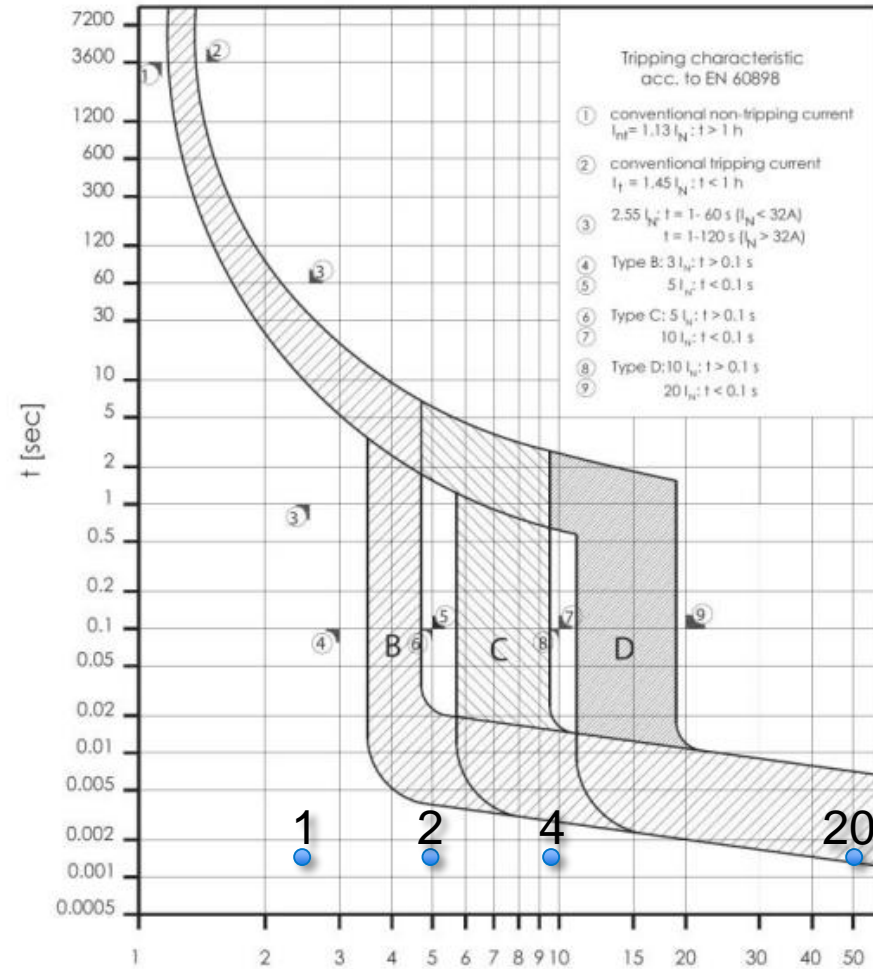
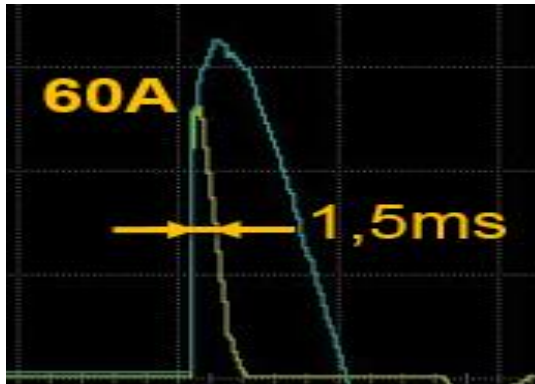
Thermische beveiliging



Magnetische beveiliging



## Inschmelzströmen



## Inschakelstromen



Rated switch voltage	250V AC/440VAC Supply
Rated switch current	16A lighting load, Max inrush 500A
Operation times	>1000000

Max. inschakelstroom	400 A, 150 $\mu$ s
	200 A, 600 $\mu$ s



+



=



## Inschakelstromen



<b>INRUSH CURRENT (Typ.)</b>	COLD START 75A (width=570 $\mu$ s measured at 50% I <sub>peak</sub> ) at 230VAC; Per NEMA 410
<b>MAX. No. of PSUs on 16A CIRCUIT BREAKER</b>	2 units (circuit breaker of type B) / 4 units (circuit breaker of type C) at 230VAC



<b>INRUSH CURRENT (Typ.)</b>	COLD START 70A (width=120 $\mu$ s measured at 50% I <sub>peak</sub> ) at 230VAC
<b>MAX. No. of PSUs on 16A CIRCUIT BREAKER</b>	17 units (circuit breaker of type B) / 29 units (circuit breaker of type C) at 230VAC

## Oplossingen

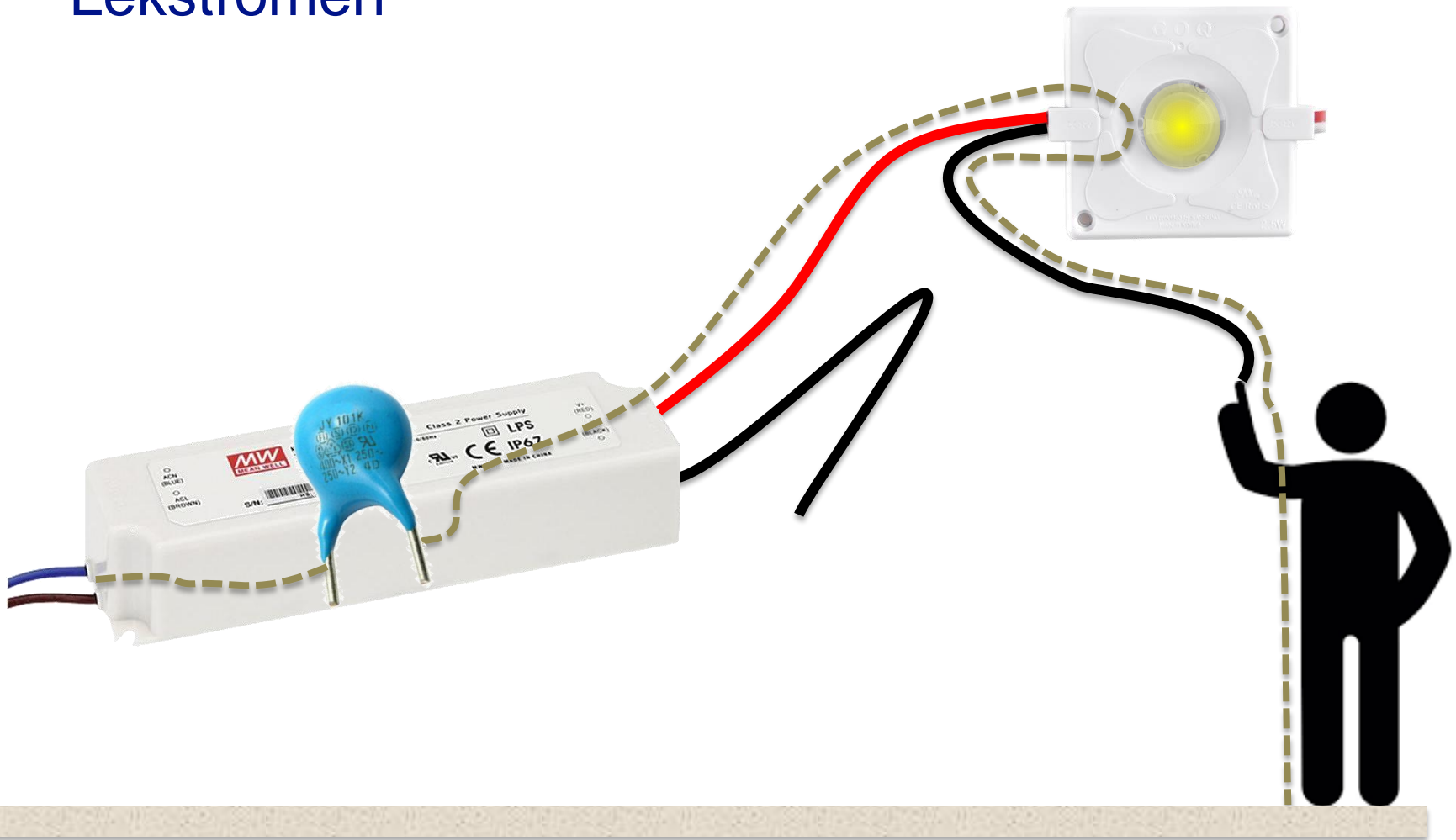
- Minder drivers, maar met hogere vermogens
- Opdelen in meerdere voedingskringen
- Inrush current limiters gebruiken
- Tijdrelais (bv. 100 ms) gebruiken
- D-automaat gebruiken



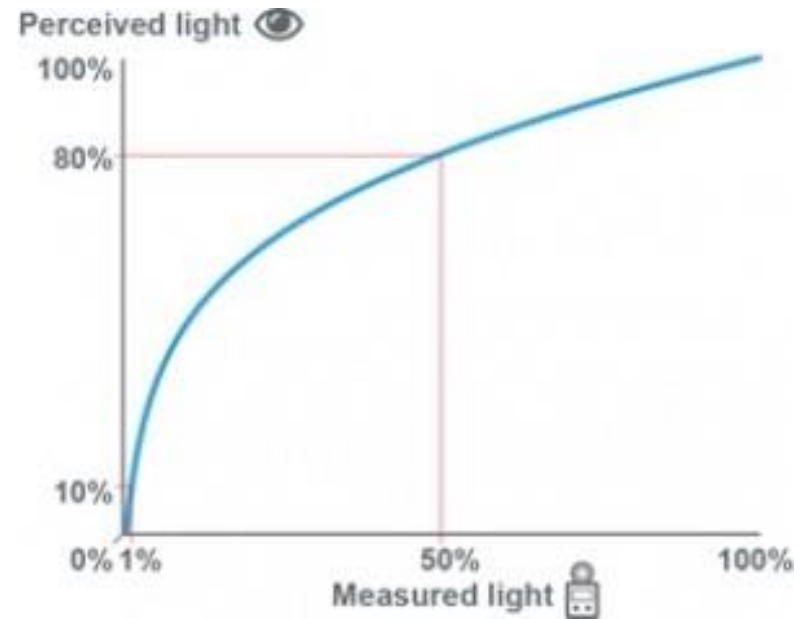
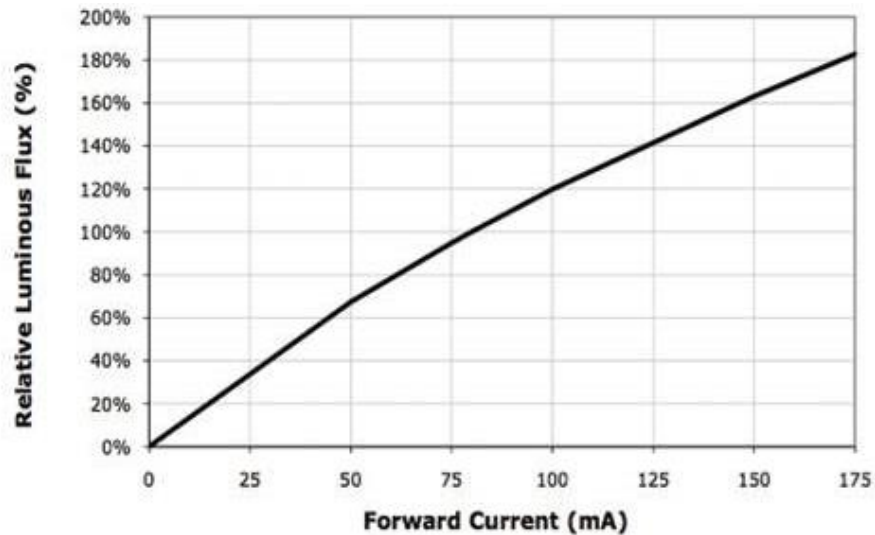
# Lekstromen

**VOLTA**

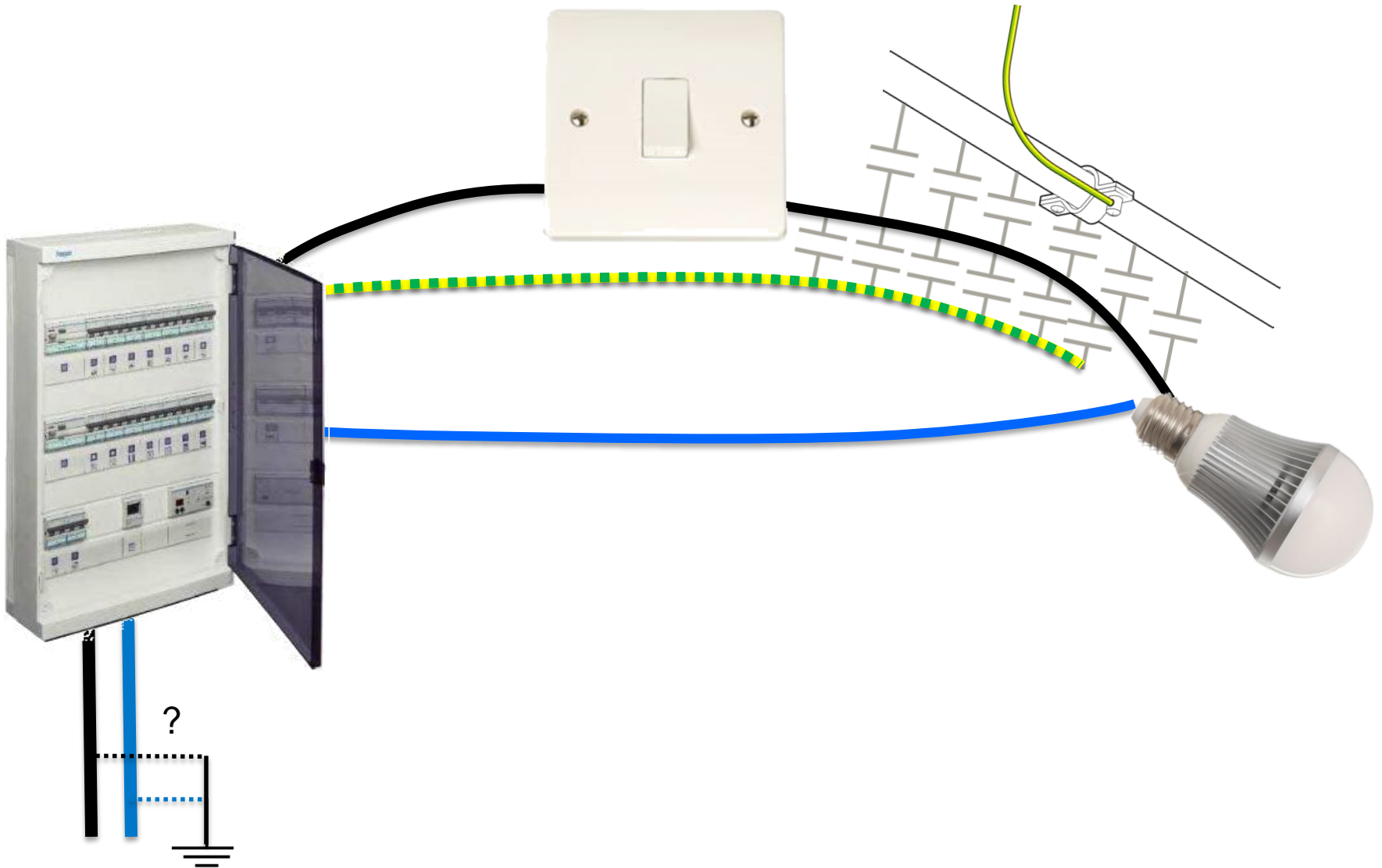
## Lekstromen



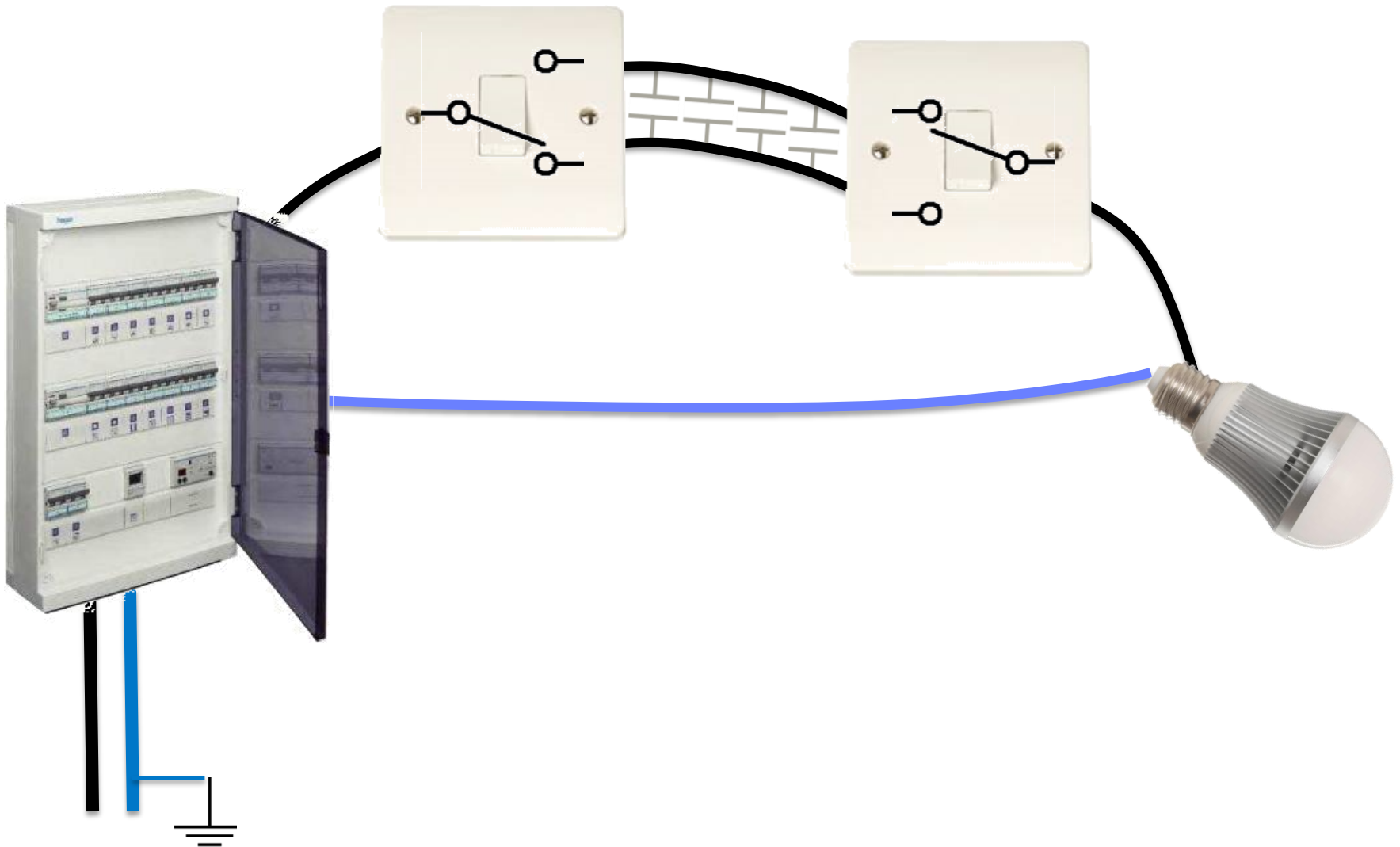
## Lekstromen



## Lekstromen



## Lekstromen



## Oplossingen

- Ander type ledlampen gebruiken
- Dubbelpolig afschakelen
- Extra belasting over ledlampen (weerstand van enkele 100kOhm)
- Lijn en nulleider omwisselen

Bedankt voor uw aandacht !

