



# Elektrotechnika – zasilanie

Moduł 4

Dr inż.  
Patryk Król

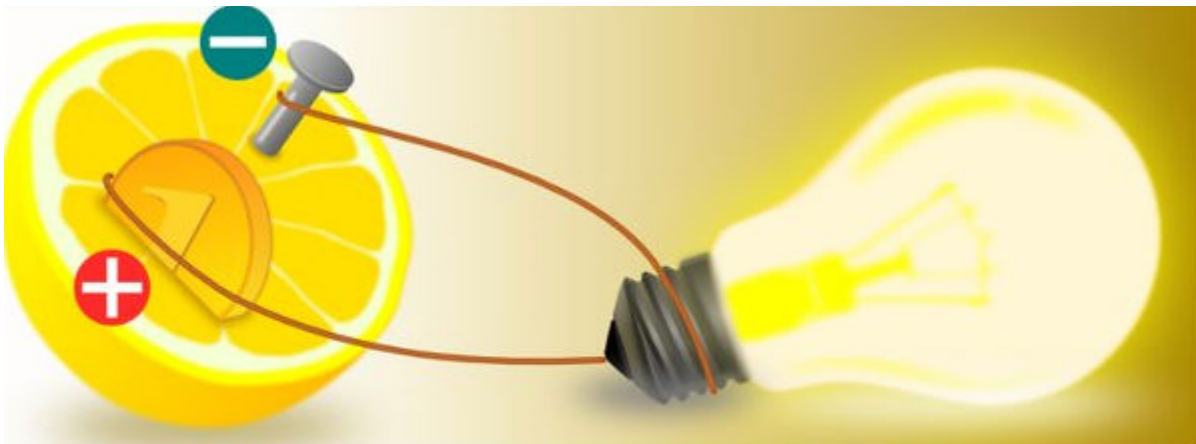
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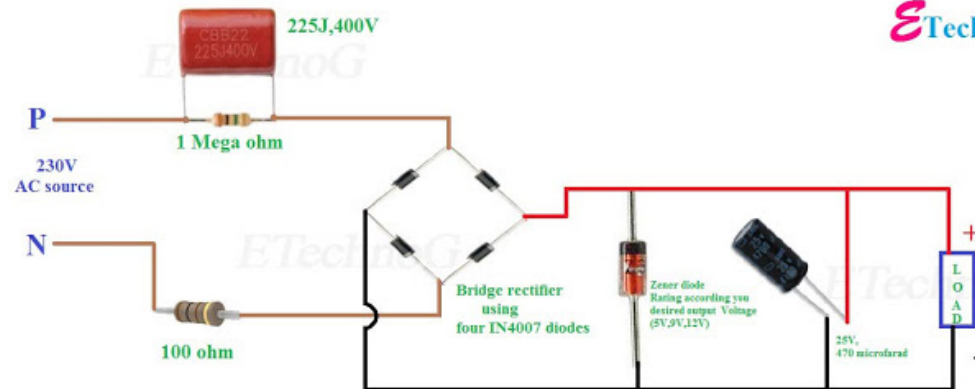
# Moduł 4

- Zasilanie
- Prąd stały/prąd zmienny
- Zasilacze i baterie
- Elektrownie

# Zasilanie

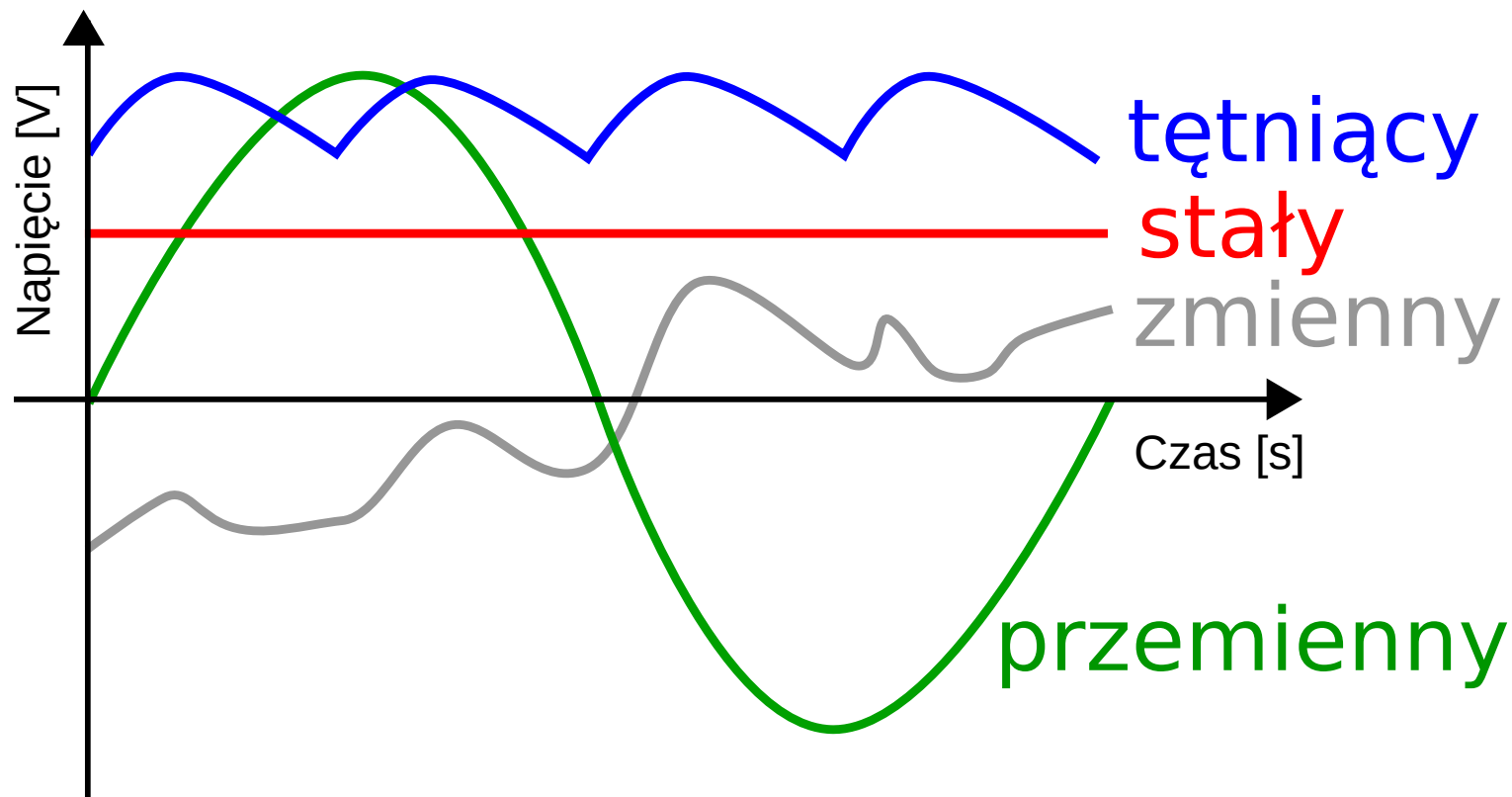


# Zasilacze





# Prąd stały i prąd zmienny

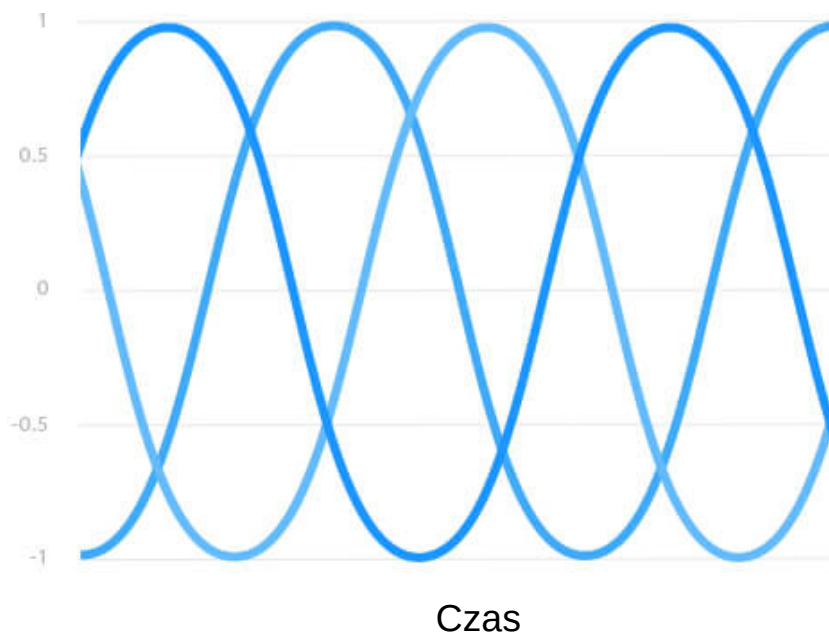


# Prąd jedno- i trójfazowy

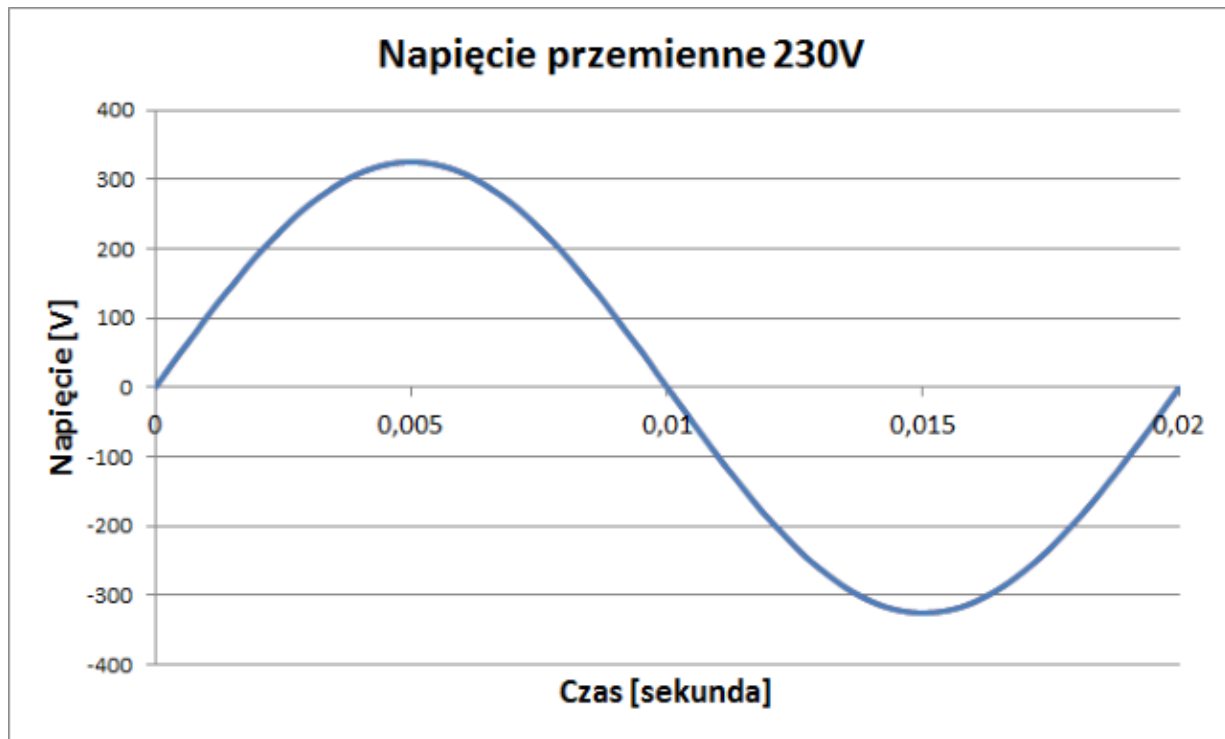
Jednofazowy



Trójfazowy



# Napięcie znamionowe a skuteczne

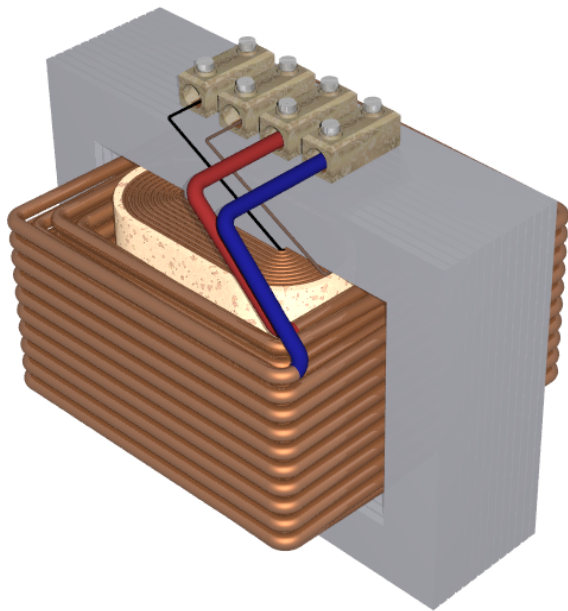


$$U_{sk} = \frac{U_o}{\sqrt{2}}$$

$U_o$  – amplituda napięcia (wartość szczytowa)

$U_{sk}$  – napięcie skuteczne

# Transformator



## Uzwojenie pierwotne

Liczba zwojów  $N_1$

Prąd pierwotny  $I_1$

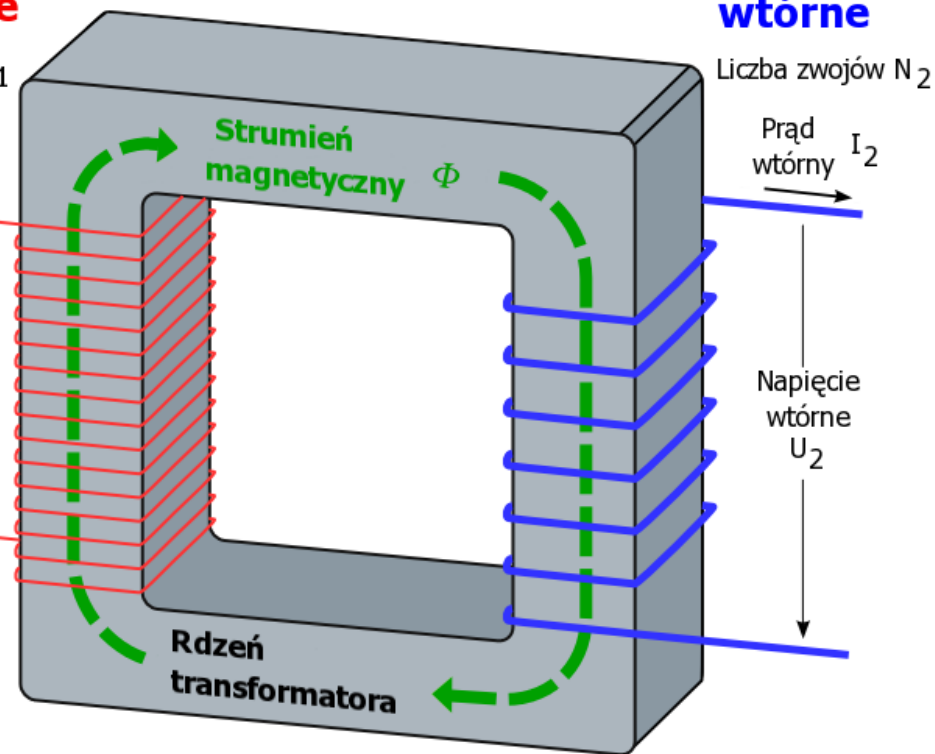
Napięcie pierwotne  $U_1$

## Uzwojenie wtórne

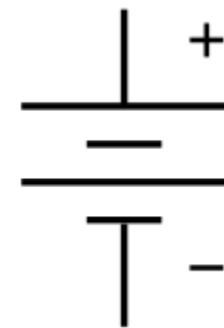
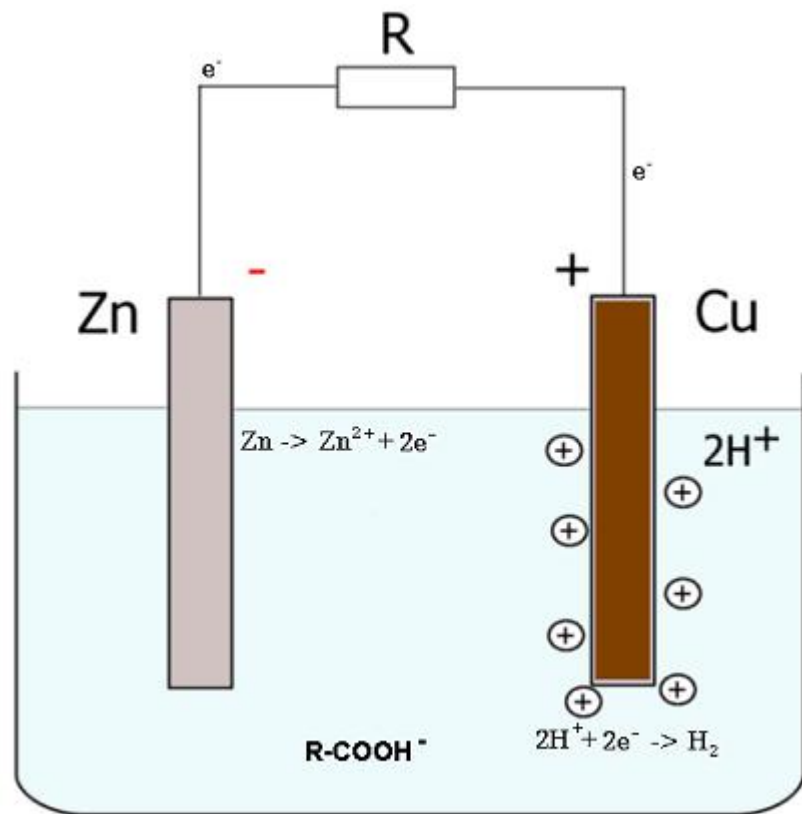
Liczba zwojów  $N_2$

Prąd wtórny  $I_2$

Napięcie wtórne  $U_2$



# Bateria





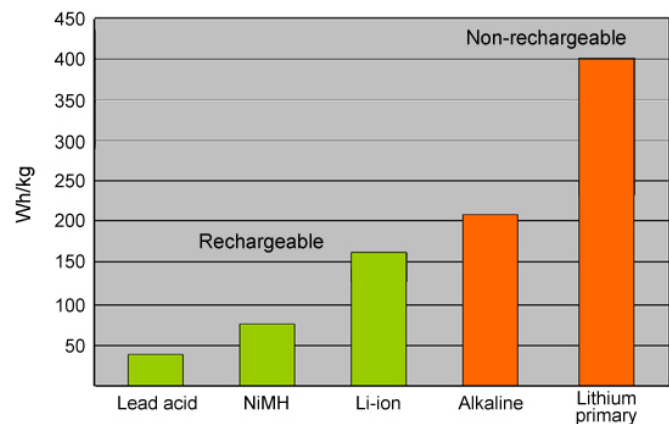
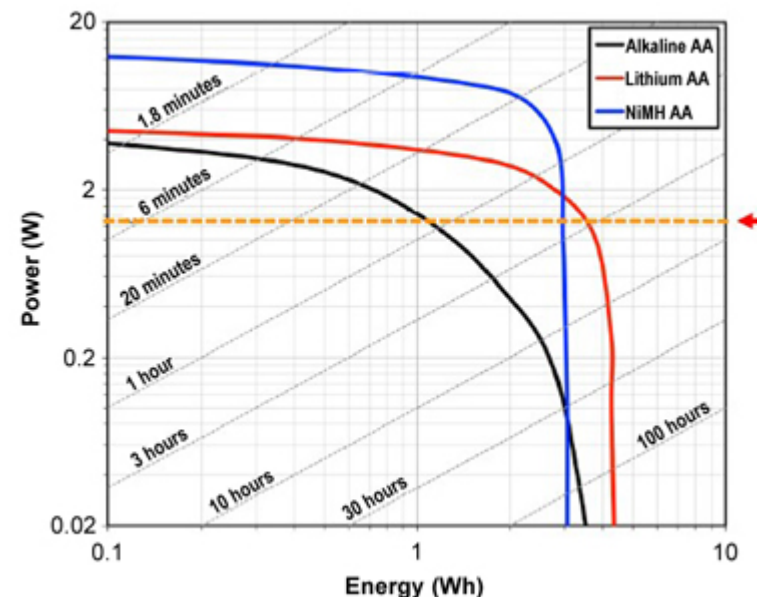
# Rodzaje baterii



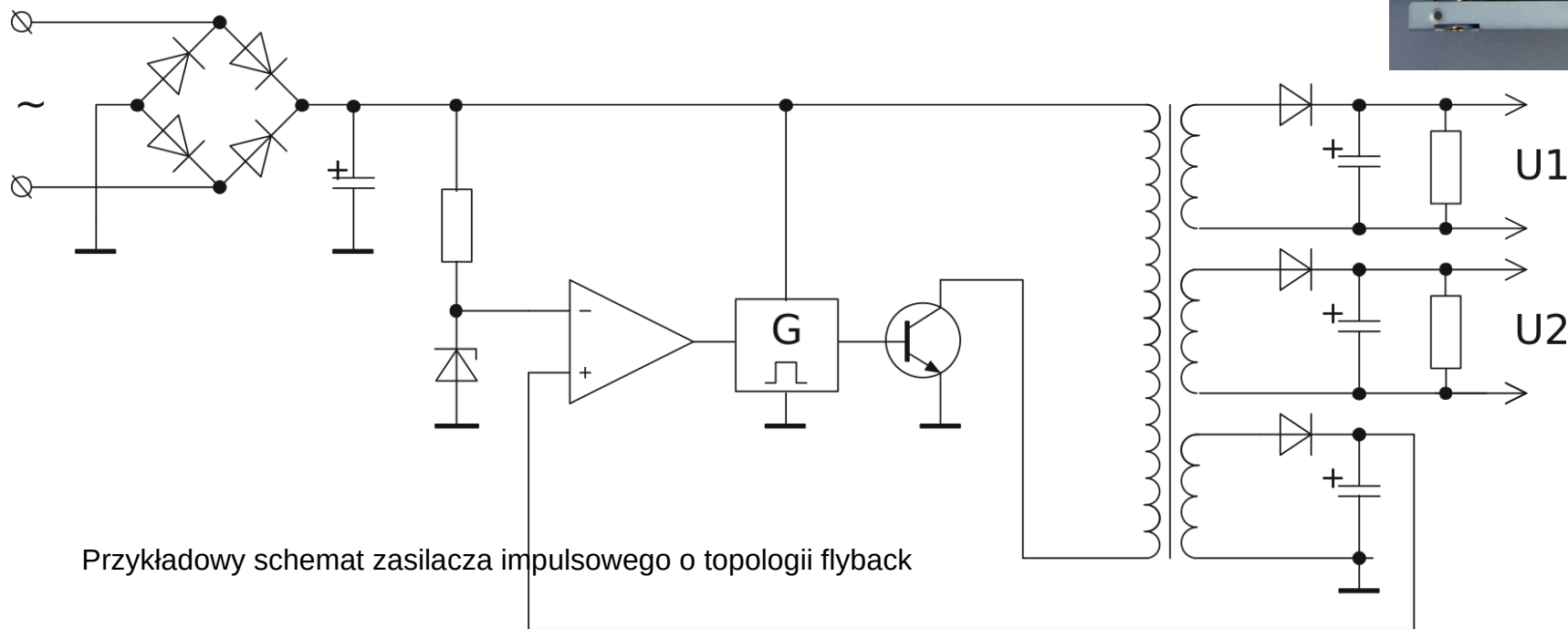
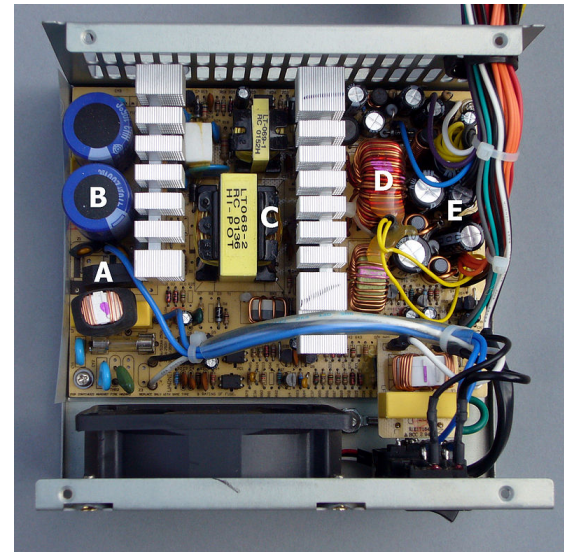
# Baterie - parametry

| Battery type | Nominal voltage | Rated capacity | Voltage cut-off | Rated load | Discharge C-rate |
|--------------|-----------------|----------------|-----------------|------------|------------------|
| 9V           | 9 volts         | 570mAh         | 4.8 volts       | 620 Ohm    | 0.025            |
| AAA          | 1.5 volts       | 1,150mAh       | 0.8 volts       | 75 Ohm     | 0.017            |
| AA           | 1.5 volts       | 2,870mAh       | 0.8 volts       | 75 Ohm     | 0.007            |
| C            | 1.5 volts       | 7,800mAh       | 0.8 volts       | 39 Ohm     | 0.005            |
| D            | 1.5 volts       | 17,000mAh      | 0.8 volts       | 39 Ohm     | 0.0022           |

|                         | Zinc-carbon       | Alkaline                 | Lithium (Li-FeS <sub>2</sub> ) | NiCd                 | NiMH                   |
|-------------------------|-------------------|--------------------------|--------------------------------|----------------------|------------------------|
| Capacity AA<br>AAA      | 400-1,700<br>~300 | 1,800-2,600<br>800-1,200 | 2,500-3,400<br>1,200           | 600-1,000<br>300-500 | 800-2,700<br>600-1,250 |
| Nominal V               | 1.50              | 1.50                     | 1.50                           | 1.20                 | 1.20                   |
| Discharge rate          | Very low          | Low                      | Medium                         | Very high            | High                   |
| Rechargeable            | No                | No                       | No                             | Yes                  | Yes                    |
| Shelf life              | 1-2 years         | 7 years                  | 10-15 years                    | 5 years              | 5 years                |
| Retail AA<br>(2015) AAA | Not in all stores | \$0.75<br>\$1.00         | \$3.00-5.00<br>\$4.00-5.00     | Not in all stores    | \$1.60-2.00<br>\$1.00  |

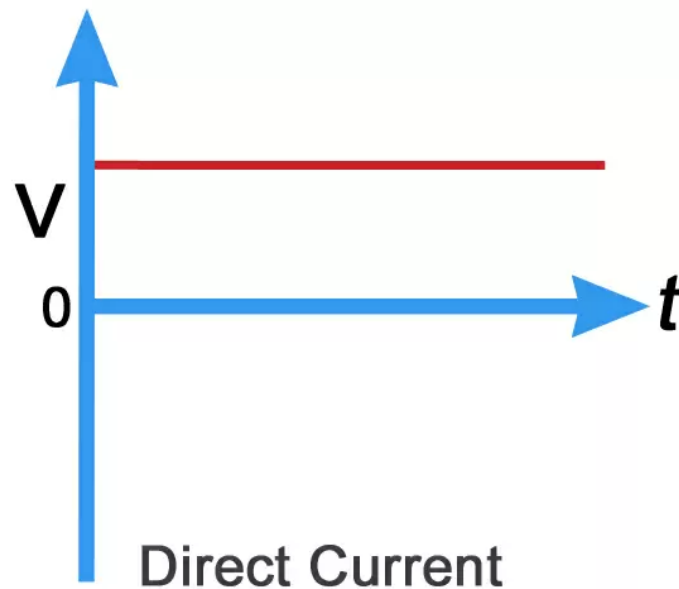
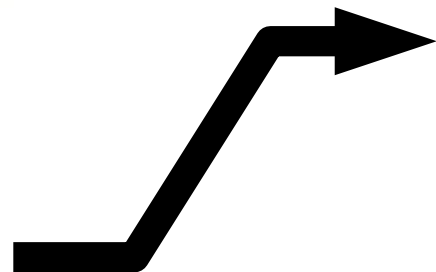
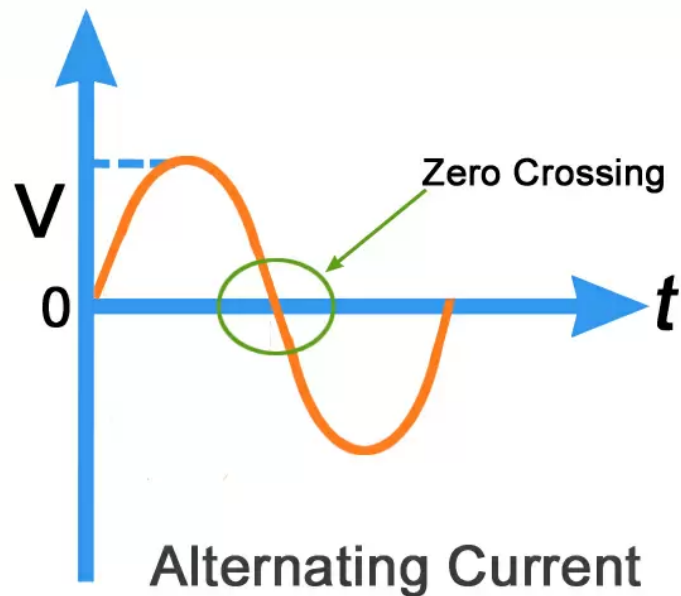


# Zasilacz impulsowy



Przykładowy schemat zasilacza impulsowego o topologii flyback

# Prostownik



Prąd przemienny

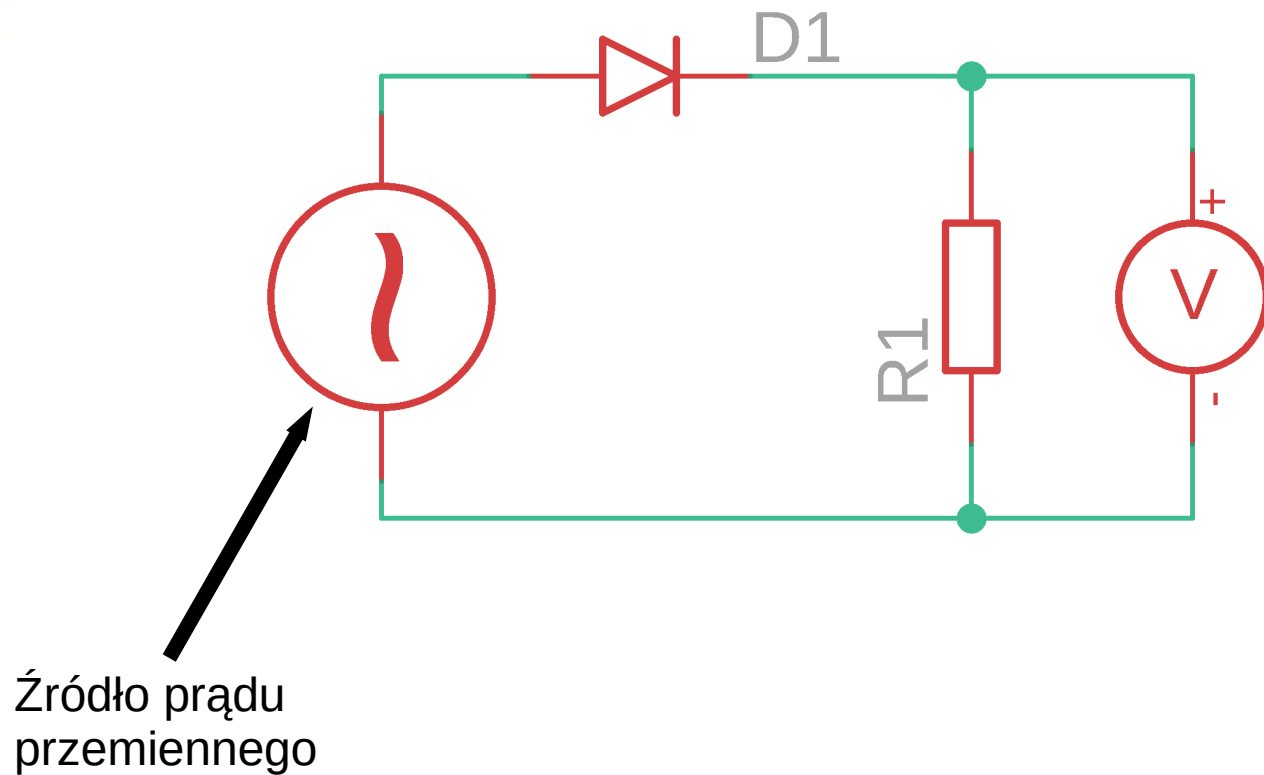
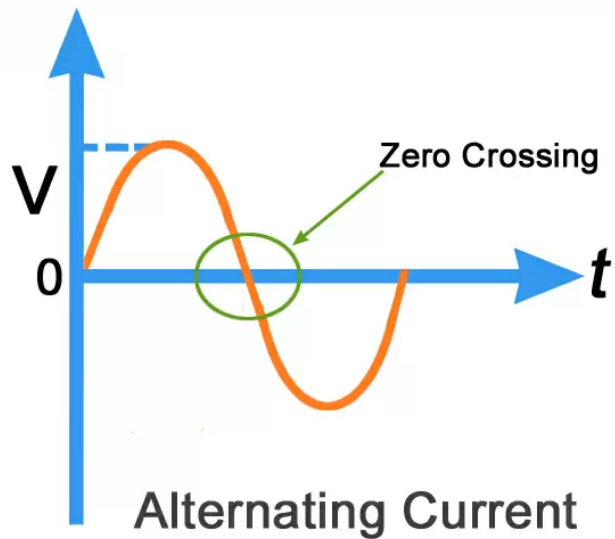


Prąd stały

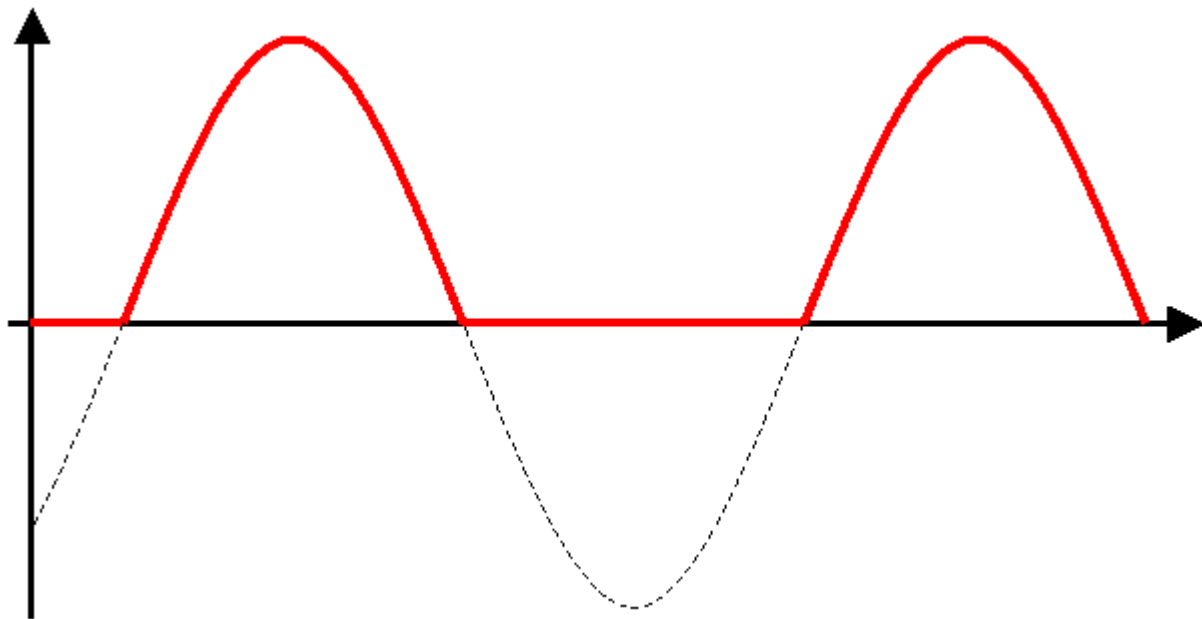
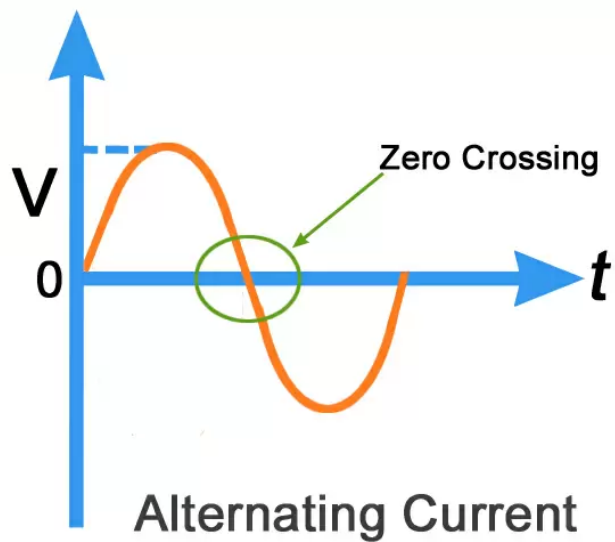




# Rodzaje prostowników - jednopółwkowy

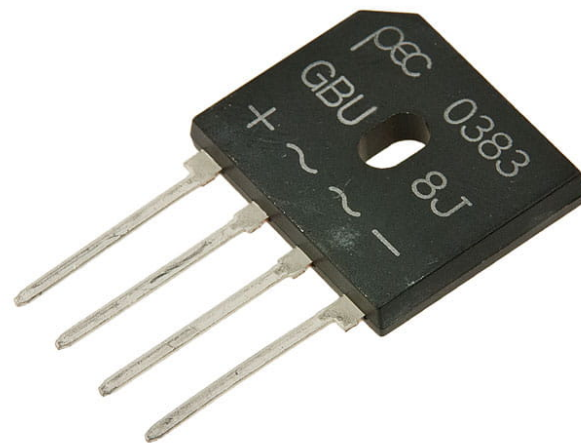
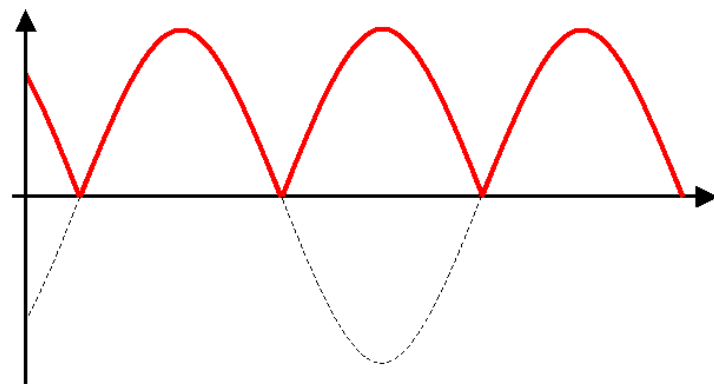
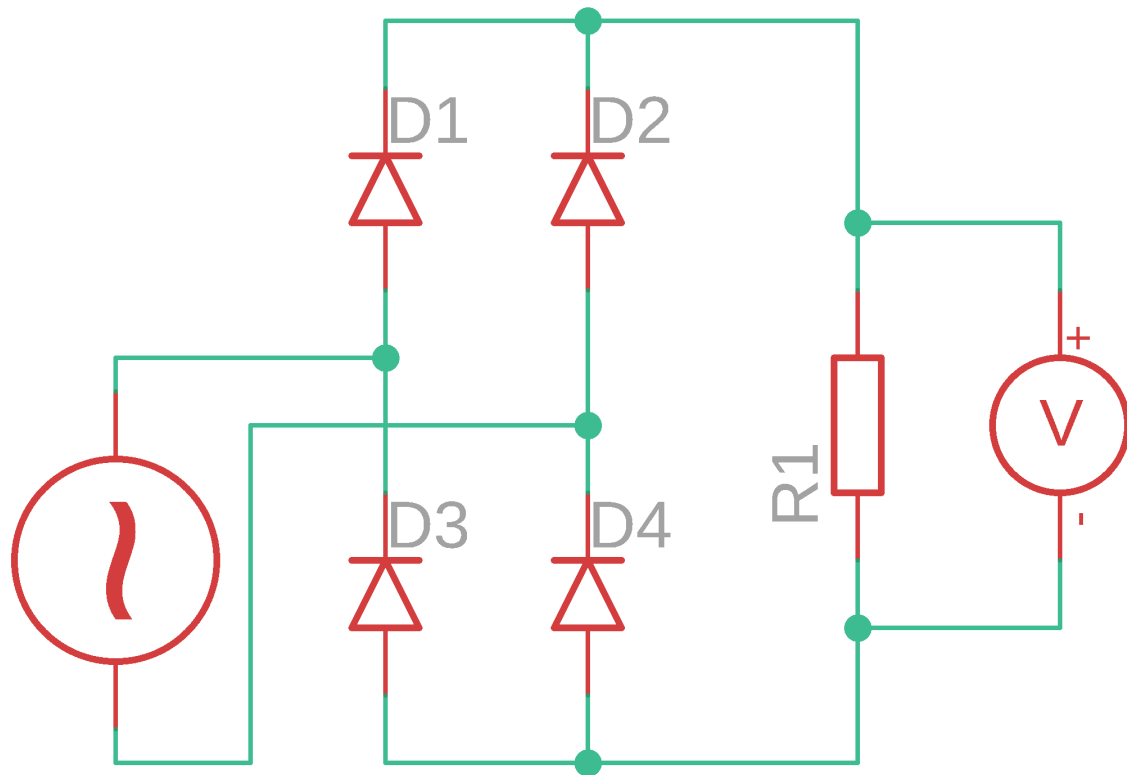


# Prostownik jednopółwkowy

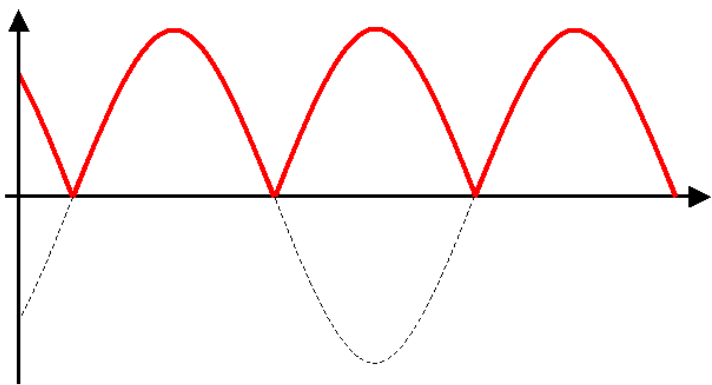




# Prostownik dwupołwkowy

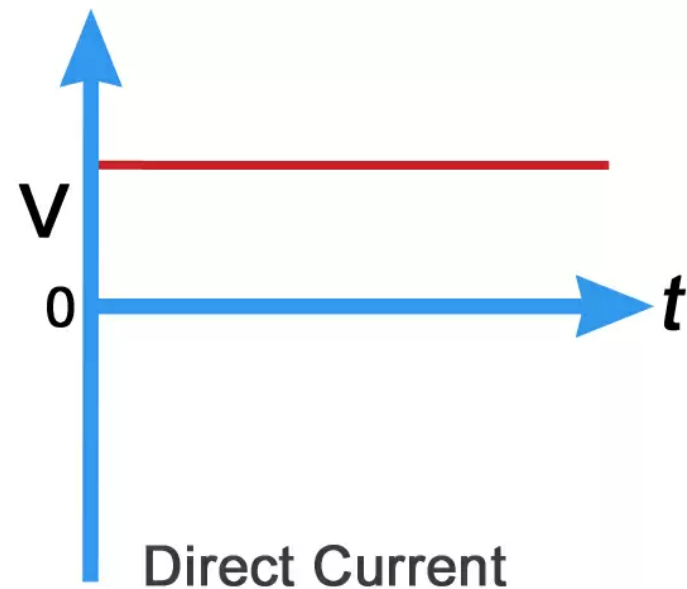


# Czy może być lepiej?

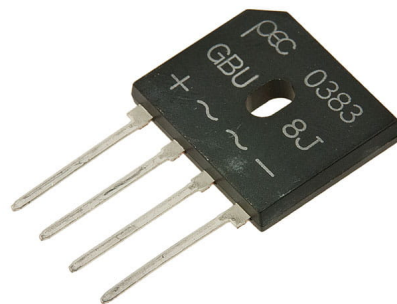
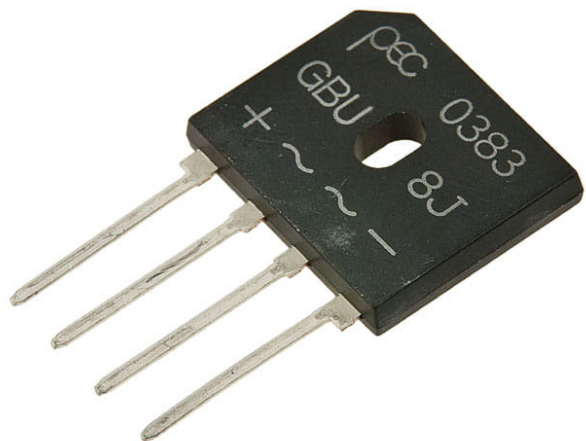


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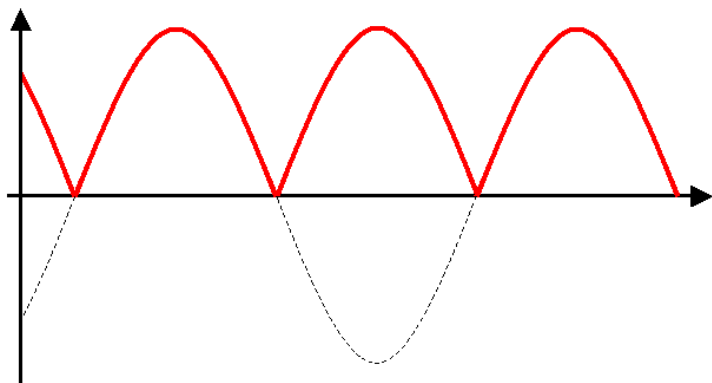
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# Kondensator + prostownik

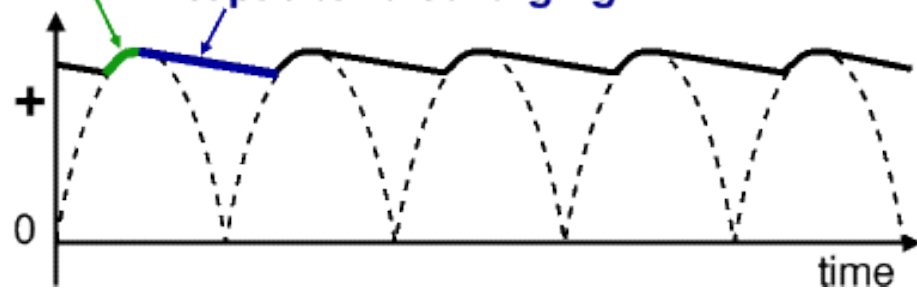


+



capacitor charging

capacitor discharging



# Elektrownie

## Nuclear power plant

