

Measurement of Efficiency η of a Solar Panel

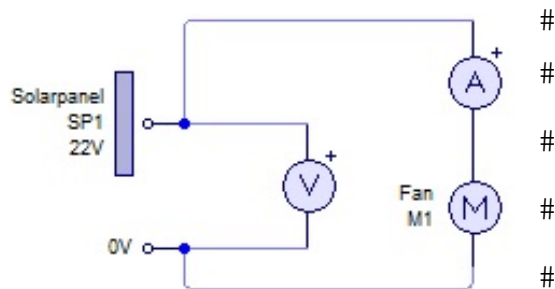
The following data sheet values for the solar panel Phaesun SW10 are given: Being irradiated by the sun at optimal conditions (intensity $S=1000 \text{ W/m}^2$) you find the short circuit current $I_{sc} = 0,66 \text{ A}$ and the open circuit voltage $U_{oc} = 22 \text{ V}$. The area of the panel is $A = 0,0555 \text{ m}^2$, so $P_{inp} = 1000 \text{ W/m}^2 * 0,0555 \text{ m}^2 = 55,5 \text{ W}$

At the **best operating point** with maximal output power you find

$I_N = 0,59 \text{ A}$ and $U_N = 17,0 \text{ V}$, so $P_{out} = 0,59 \text{ A} * 17,0 \text{ V} = 10 \text{ W}$.

Thus the best efficiency will be $\eta = P_{out} / P_{inp} = 10 \text{ W} / 55,5 \text{ W}$, also $\eta = 18\%$

Real condition at April, 29th., 15:20, sunny:



Output power, using a fan as load:

$I = 0,0464 \text{ A}$; $U = 21,2 \text{ V}$, so $P_{out} = 0,98 \text{ W}$

Input power, measured with pyranometer and data logger:

$S = 1000 \text{ W/m}^2$, so $P_{inp} = S * A = 55,5 \text{ W}$

so $\eta = 0,98 \text{ W} / 55,5 \text{ W}$, also $\eta = 1,8 \%$

