

When a photovoltaic panel powers a load, even one adapted to "full sun", but without an MPPT regulator* the energy collected by the load decreases dramatically, when the solar intensity decreases:

- **without MPPT regulator:** if the solar energy is divided by n , the electrical power collected is divided by $\approx n^2$.
- **with MPPT regulator:** if the solar energy is divided by n , the electrical power collected is only divided by $\approx n$.

* **MPPT regulator:** DC/DC converter, with very high efficiency, equipped with a **MPPT** (Maximum Power Point Tracking), optimizing the energy that the panel supplies to the load.

See examples in graph opposite; calculation methods and table below.

3 examples of "voltage / power" on a load of 3Ω , depending on sunshine ranging from 50% (0.5) to 2% (0.02):

$$V_{load} = \sqrt{P_{max} \times R_{load} \times incident\ light}$$

$$V_{load} = \sqrt{300 \times 3 \times 0.5} = 21.2V / 150W$$

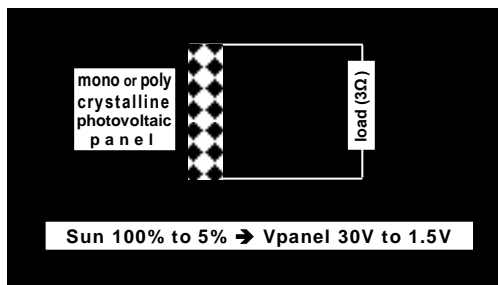
$$V_{load} = \sqrt{300 \times 3 \times 0.05} = 6.7V / 15W$$

$$V_{load} = \sqrt{300 \times 3 \times 0.02} = 4.24V / 6W$$

SUN		Without regulator			With regulator MPPT		
% (incident light)	i max generated by the panel	voltage on the load	current in the load	power in the 3Ω load	voltage on the load	current in the load	power in the 3Ω load
100% (1)	10A	30V	10A	300W	24V	12.5A	300W
50% (0.5)	5A	15V	5A	75W	21.2V	7.07A	150W
20% (0.2)	2A	6V	2A	12W	13.4V	4.47A	60W
5% (0.05)	0.5A	1.5V	0.5A	0.75W	6.7V	2.24A	15W

The comparison of these relative powers is valid for all types of mono- or poly-crystalline photovoltaic panels. The measurements were made at stabilized temperature, on a constant load of 3Ω . With only 5% sunlight (at sunrise and sunset), the energy supplied to the load (15W in one case and 0.75W in the other) proves, even in this extreme example, the efficiency of the MPPT. It is therefore particularly required during cloudy or rainy weather.

The calculations have been simplified by neglecting the DC/DC conversion losses ($\leq 3\%$) and the slight slope of the quasi-horizontal part of the voltage/current response curves.

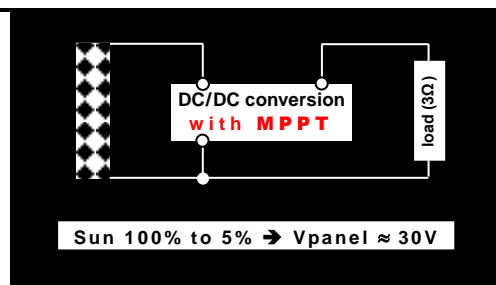


Mini MPPT regulator for solar direct drive

- adapted to panels $\leq 350W$
- efficiency $\leq 99\%$
- adjustable from 5 to 28V
- power: 300W under 24V
- mountable in series
- miniaturized: 51 x 51 x 26 mm
- waterproofing: IP67 / weight: 140g

Can be fixed directly under the panel frame

Can be equipped with regular waterproof connectors



Four examples of solar direct drive use, from sunrise to sunset:

- variable flow pump filling a water tank, hydraulic accumulator
- motorized propeller stirring, at variable speed, the quality-controlled water of a pond
- SDD air-conditioning, with efficiency proportional to the solar intensity
- electric car charger, with 15 independent panels + 15 charge regulators in series $\rightarrow \approx 400V / 5kW$

In-built switch + MC4 connectors

MPPT Regulator Controller case increased to 100 x 50 x 26 mm (instead of 51 x 51 x 26 mm)