

THERMOMECHANICAL MEASUREMENTS FOR ENERGY SYSTEMS

MENR (A.A. 2017-2018)

Laboratory n. 8

Photovoltaic Panel

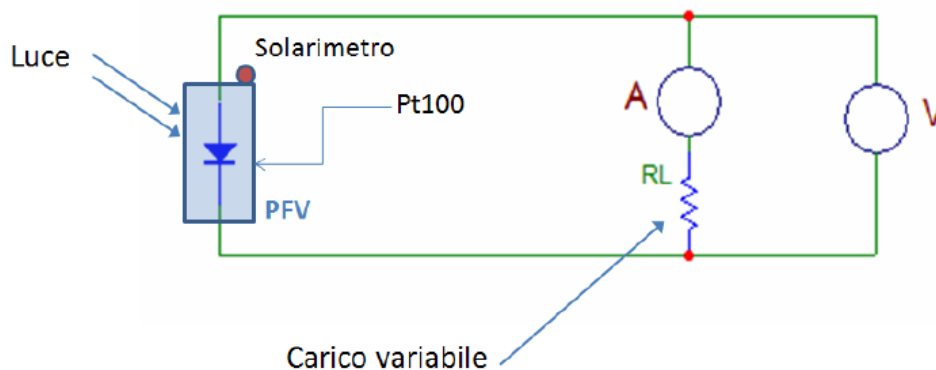
An industrial-type photovoltaic (PV) panel "ATERSA" A-240P is made up of 6x10 cells serially connected. The characteristics are listed in the brochure.

The photovoltaic panel is oriented to the south with a tilt of about 45° respect to horizontal plane.

There are:

- two 6½ digits digital multimeters for the measurement of the voltage and current
- a variable load (0-100 Ω)
- a temperature sensor (Pt100 or k-thermocouple with electronic cold junction)
- a Pyranometer "Delta OHM" LP PYRA 03 AV with a sensitivity of $15,2 \text{ mV/kW}\cdot\text{m}^{-2}$ for the solar radiation measurement.

The instruments are connected to the PFV module as shown in the figure:



1. Define the **open circuit voltage** V_{OC} and the **short-circuit current** I_{SC} supplied by the panel under the test conditions (atmospheric), and indicate the percent deviation with respect to the STC values.
2. Obtain the characteristic curve VI of the panel, by varying the R_L load. Define the W_{CC-MAX} and verify if the panel meets the requirements for the acceptance certificate ($W_{CC} > 0,85 \cdot W_{STC} \cdot G_P/G_{STC}$). G_P is the measured solar radiation.
3. Define the **optimal load** R_{OPT} , the **I_{MAX-W} current** and the **V_{MAX-W} voltage** delivered in the maximum power condition during the experimental conditions (atmospheric). Indicate the percentage deviation with respect to the STC conditions.
4. Verify if the calculated **module efficiency** $\eta_{PV} > 0,75 \eta_{STC}$.

Caratteristiche elettriche (STC: 1kW/m², 25°C±2°C e AM 1,5)^{*}

	A-230P	A-235P	A-240P
Potenza Nominale (P ₀ ±5 W)	230 W	235 W	240 W
Efficienza del modulo	14,12%	14,43%	14,74%
Corrente Punto di Massima Potenza (Imp)	7,99 A	8,10 A	8,21 A
Tensione Punto di Massima Potenza (Vmp)	28,87 V	29,04 V	29,21 V
Corrente in Cortocircuito (Isc)	8,55 A	8,64 A	8,73 A
Tensione di Circuito Aperto (Voc)	36,72 V	36,94 V	37,16 V

Parametri termici

Coefficiente di Temperatura di Isc (α)	0,04% /°C
Coefficiente di Temperatura di Voc (β)	-0,32% /°C
Coefficiente di Temperatura di P (γ)	-0,43% /°C

Caratteristiche fisiche

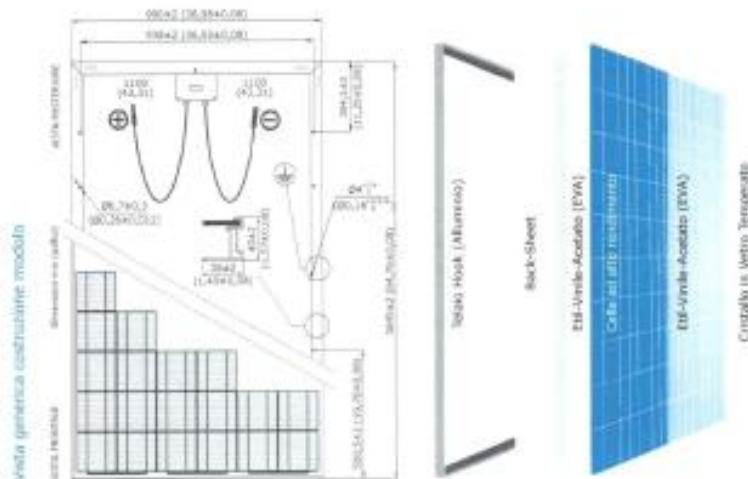
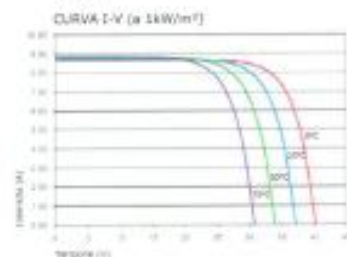
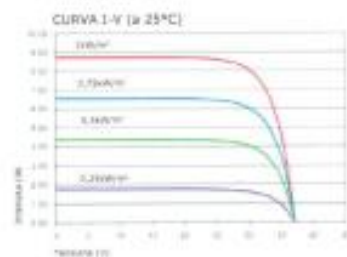
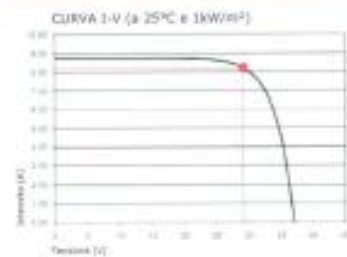
Dimensioni (mm ± 2 mm)	1645x990x40
Peso (kg)	21,5
Superficie (m ²)	1,63
Tipo di celle	Policristallina 156x156 mm (6 pollici)
Celle in serie	60 (6x10)
Vetro anteriore	Vetro temperato ultra chiaro da 4 mm
Telaio	Lega di alluminio verniciato in poliestere
Scatola di derivazione / Opzionale	QUAD IP54 / QUAD IP65
Cavi	Cavo Solare 4 mm ² 1100 mm
Connettori	MC4 o combinato MC4

Range di funzionamento

Temperatura	-40°C e +85°C
Massima Tensione del Sistema / Protezione	1000 V / CLASS II
Carica Massima Vento / Neve	2400 Pa (130 km/h) / 5400 Pa (551 kg/m ²)
Massima Corrente Inversa (IR)	15,1 A

^{*} Specifiche elettriche misurate in STC, NOCT: 47±2°C.
Tolleranza misure STC: ±2% (Pot); ±10% (Isc, Voc, Imp, Vmp).

Curve modello A-240P



- Moduli contenuti in una cassa: 25 unità
- Peso del pannello: 560 kg
- Un container da 40 piedi può contenere fino a 26 casse: 650 moduli
- Un container da 20 piedi può contenere fino a 12 casse: 300 moduli
- Un camion Trailiner può contenere fino a 30 casse: 750 moduli

NOTA: I dati contenuti nella presente documentazione sono soggetti a modifiche senza preavviso.

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