

**PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA
MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH**

MOHAMED BOUDIAF UNIVERSITY - M'SILA



**FACULTY OF SCIENCE
PHYSICS DEPARTMENT
OPTION: Energy Physics and
Renewable Energies**

**DOMAIN: Material Sciences
FIELD: Physics**

**1st Year Master
Energy Physics and Renewable Energies**

**Practical work N°: 03
Parallel installation of photovoltaic panels**

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1-Serial and parallel connections.

1.1- Basic principle

Series or parallel connection is an important concept in electricity for connecting electrical components in a circuit. Understanding these two types of connection is essential to understanding how electrical circuits work.

In a parallel connection, on the other hand, the components are connected side by side, so that each component has its own path for the current to flow. In this type of connection, the electrical voltage is the same for all the components, but the amount of current flowing through each component is different. If one component fails, the other components can continue to operate normally.

1.2- In a photovoltaic installation

Photovoltaic solar panels produce electricity from sunlight, which can be stored in batteries for later use.

In a parallel connection, the solar panels are connected in parallel with each other, so that the voltage (Volt) remains the same, but the total output current (Ampere) is increased. In the case of a parallel connection, a connector is needed to connect the male MC4s together, and the female MC4s together. We offer MC4 connectors, double connectors, triple connectors and junction boxes for connecting up to 5 solar panels in parallel.

A parallel connection is a type of assembly that adds up the current of the solar panels. This configuration is preferred for residential installation projects.

1.3- How does parallel connection work?

Parallel connection of photovoltaic solar panels is the most suitable type of connection for residential self-consumption projects on roofs. When solar photovoltaic panels are connected in parallel, the voltage remains constant, but the total electrical current is the sum of the currents from each panel.

1.4- What are the advantages of parallel connection?

A parallel connection maintains a low voltage equivalent to that of a single solar panel, a connection considered safer because it avoids the risk of electrocution.

On the other hand, when a single panel is partially shaded or obstructed, this only affects the performance of that particular panel, without influencing the energy production of the other panels. This guarantees maximum energy production for each panel, even in the event of partial shading.

1.5- What are the risks and disadvantages of parallel connection?

Compared to series connection, parallel connection generally requires more wiring, which can make installation more complex and labour-intensive.

To limit line losses and avoid overheating, the wires must have a large diameter. If the cables used have an insufficient diameter to handle this high current, they can heat up due to electrical resistance, resulting in energy losses and potentially risks of overheating.

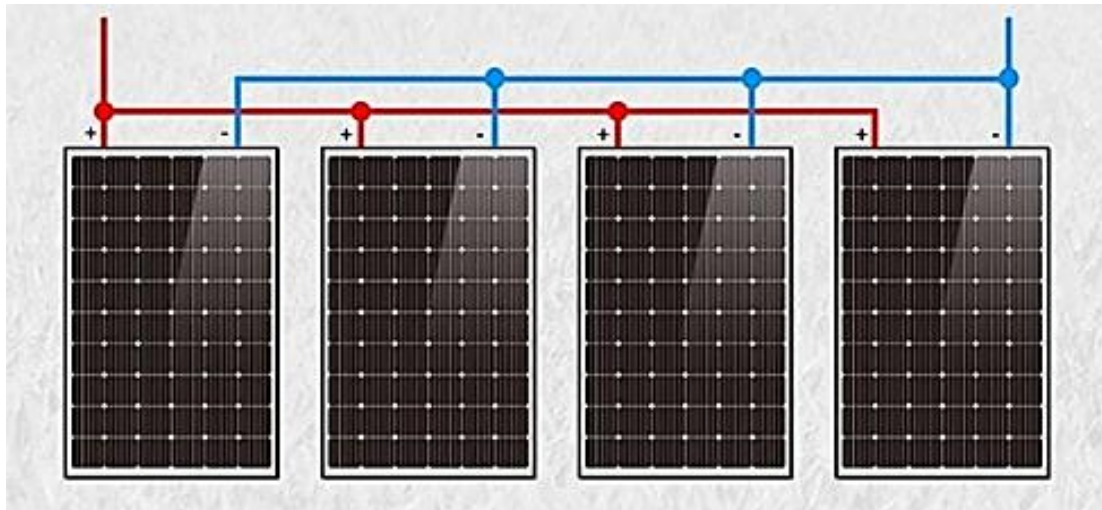


Figure 1. Parallel mounting

Draw a diagram of the 2 voltaic panels in series with the ammeter and voltmeter and fill in the following tables:

Times	Voltage (V)	Intensity (A)	Power (W)
t =mn			
t =mn			
t =mn			
t =mn			
t =mn			
t =mn			
t =mn			
t =mn			
t =mn			

Questions:

1. Draw the curve showing current versus voltage.
2. Plot the power versus voltage curve.
3. Plot the current versus time curve.
4. Plot the voltage versus time curve.
5. Interpret these curves.
6. Is series or parallel connection more efficient?
7. Is a series or parallel connection easier to install?
8. Is series or parallel connection more suitable for large solar systems?
9. Can series connection be used with solar panels of different sizes?
10. What is the conclusion?