

# Unit 1 – What are Inverters?

In this module, we will explore the critical role of inverters in photovoltaic systems.



Figure 1 – Inverter

<https://www.cnet.com/home/energy-and-utilities/best-solar-inverters/>

Inverters are devices that convert **Direct Current (DC)**, which flows in one direction, into **Alternating Current (AC)**, which periodically reverses direction. This process bridges the gap between energy generation and consumption by converting power into a form compatible with everyday needs.

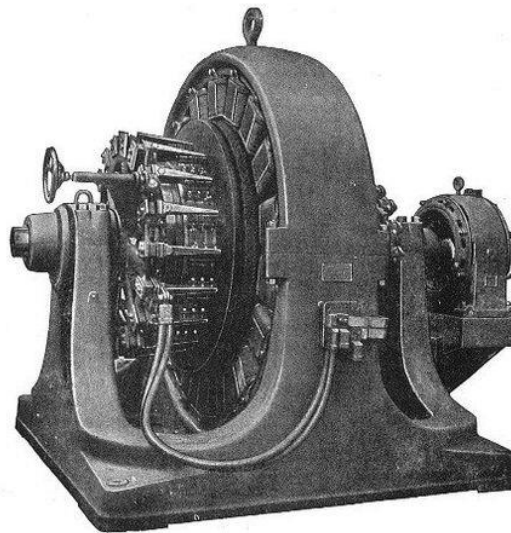


Figure 2 - Early type of inverter

<https://www.energy.gov/eere/solar/solar-integration-inverters-and-grid-services-basics>

Inverters trace their origins back to the early **20th century**. Initially, they were mechanical devices, with the first versions appearing in the **1920s** to support early DC-to-AC conversion needs. These

early inverters used motor-generator setups or vibrators to mechanically switch DC power on and off, creating an alternating waveform.

The transition to electronic inverters began in the **1950s and 1960s** thanks to advancements in semiconductor technology, which allowed for the development of transistor-based inverters. These innovations made inverters smaller, more efficient, and reliable, paving the way for their use in modern applications.

Without inverters, systems like **solar panel installations, electric vehicles and backup power supplies** would be limited, as they depend on DC sources to supply usable AC power. Inverters thus play a vital role in modern power systems, enabling the use of renewable energy and supporting cleaner and more efficient power solutions.

By the end of this module, you'll have a deeper understanding of the types of inverters, their functionalities, and how they are integrated into various energy systems.

We will cover:

- How inverters work.
- Key applications of inverters.
- Real-world systems where inverters are crucial.

Let's get started!