

Site ocw mit edu power electronics inverters pdf

Handwritten lecture notes on Fourier series review, inverter structure, programmed PWM, harmonic cancellation, multi-level converters, sine-triangle PWM, and inverter current control techniques.

Depending on the loads we want to feed on the AC side, we will have to choose one power or another. It is important to note that the inverters also specify in their technical data sheet the power to be connected on the DC side, i.e. the solar panels. This power is given in Wp or kWp as the photovoltaic panels are expressed in peak power, the maximum power that the panel is capable of providing under certain circumstances of temperature and irradiation that are considered standard, although they are not very common.

Inverter input voltage (PV/Battery): In the case of the inverter voltage, we must understand what the solar installation will be like (grid/isolated/hybrid) and what loads and consumption it will be connected to.

- 12V solar inverters: usually for small installations of no more than 2000W. A low voltage (12V) implies more wiring to reduce losses, so this voltage is usually used for installations that mount batteries with low storage capacity, i.e. small installations.

- 48V solar inverters: usually for medium and large installations, up to 10000W. Although for very large installations it is usual to go to higher voltages, the standard step ends at 48V, beyond that the solutions are customised and with inverters that allow a varied range of voltages.

Maximum and output current of the inverter: It is important to know the maximum input current (DC) and output current (AC) of the inverter in order to understand how the strings/module chains should be designed on the DC side and to understand what overcurrent protections may be necessary on both the AC and DC sides.

MPPT number (if applicable): The MPPT number (Maximum Power Point tracking), also known as the number of MPPT trackers, refers to the number of solar panel string inputs that an inverter has in which the maximum power point tracking is performed, i.e. independently optimised.

Each series or string is the union of photovoltaic panels with a given current (I of the modules in the string) and a voltage given as the sum of the voltages of the panels connected in series (V). Therefore, a string will have a current and a voltage (V and I) corresponding to an inverter input. The MPPT consists of a series of electronic components capable of constantly searching for the combination of voltage and current that provides the highest possible power for each input.

Given that the production of the panels varies according to the radiation incident on them and the temperature,

a greater number of inverter MPPTs will ensure greater performance of the panels of the entire solar installation. Moreover, the solar panels can be mounted with different orientations or inclinations only if each of these groups of modules is connected to a different MPPT tracker. So, for example, if we have a gable roof where we want to mount solar panels on both sides, we will look for an inverter with at least 2 MPPT inputs.

Efficiency: It is important to look for a solar inverter with a high direct current (DC) to alternating current (AC) conversion efficiency. The higher the efficiency of the solar inverter, the lower the losses and the faster the return on investment. Solar inverters already have high efficiency levels of around 95% any case, 1% or 2% more efficiency is an important difference when we are talking about long lifetimes.

Monitoring and communication system: Opt for a solar inverter that offers a real-time monitoring system. This will allow you to monitor the performance of the solar installation and detect problems quickly. Some solar inverters offer online communication options or mobile applications to facilitate monitoring and performance.

Durability and Warranty: As we have already mentioned, it is very important to purchase an inverter from a first class manufacturer. The solar inverter is a critical piece of equipment because if it breaks down, the entire solar installation will be shut down, unlike solar panels. It is important to take into account when making any purchase of a solar inverter the years of warranty provided by the manufacturer. If appropriate in some cases inverter warranty extensions are available.

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