



SIEMENS

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Transformers for Solar Power Solutions

Transformers for solar power plants



We renew energy

Facing ever-increasing worldwide energy demand, the reliable and environmentally friendly use of natural energy sources is one of the biggest challenges of our time. Alongside wind and water, the sun – clean, CO₂-neutral and limitless – is our most valuable resource.

In order to make renewables the dominant energy source all over the world, we aim to make them as affordable as conventional sources of energy. By combining innovations in renewable power generation with our smart grid and high voltage transmission technology, we are able to be even more cost as well as energy efficient.

Siemens offers proven components along the entire solar power value chain. Our transformers – whether liquid-filled or GEAFOLE cast-resin distribution transformers or power transformers are in service all around the world for decades. We offer reliable and established technology, customized for state-of-the-art energy production.

Photovoltaic power plants

Photovoltaics (PV) use solar cells bundled in solar panels to produce DC-current. Depending on the design of the photovoltaics-plant several panels are connected to a rectifier to convert the produced DC-current into AC-current. In the next step, distribution or static converter Transformers (GEAFOLE or liquid-immersed) transmit the energy to medium voltage level up to 36 kV. Then it is bundled and a medium power transformer steps it further up to high voltage level.

Concentrated Solar Power

Concentrated Solar Power (CSP) uses lenses or mirrors to bundle the sunlight and concentrate it on a small spot. The concentrated heat runs a steam turbine connected to a generator (“thermo-electricity”).

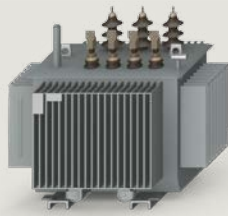
Usually the turbine generates a higher power level than photovoltaics do, so a medium power transformer is sufficient to connect the CSP-plant to the grid.

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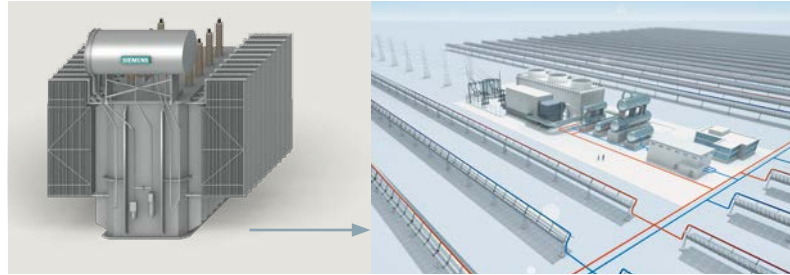
Transformer solutions for the harvest of solar energy.



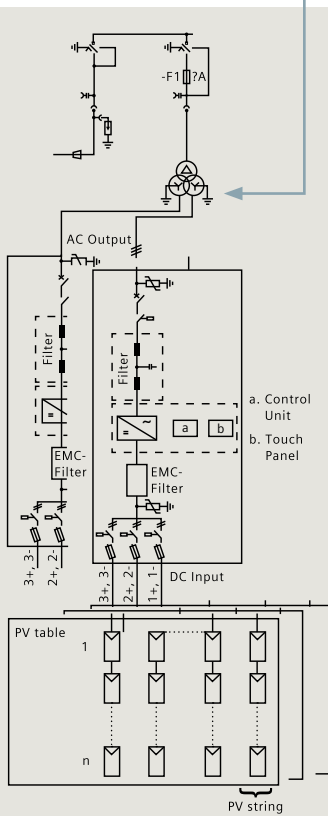
Cast Resin Transformer for PV



Liquid Immersed Distribution Transformer for PV



Power Transformer for CSP and CSP- or PV-grid connection



PV Distribution Transformers

Step-up transformers connect photovoltaic plants to the grid. As the conditions in solar power plants are rather severe, those transformers need to withstand high temperatures as harsh weather conditions. Sizing of these transformers is a crucial factor when planning a PV power plant, as too large rated power can lead to instabilities and economic disadvantages as well as too small transformer power might not exploit the whole capability of the plant erected.

Solar inverters or PV inverters for photovoltaic systems transform DC-power generated from the solar modules into AC power and feed this power into the network.

Special multiple winding design of the transformer enables to connect several PV panel strings to the grid with minor number of transformers in total.

CSP Power Transformers

Transformers in Concentrated Solar Power Plants usually belong to the group of Medium Power Transformers. As a CSP generates power by driving a steam turbine, the duty for the transformer is very close to its common task of stepping up generated power in conventional power plants.

Medium Power Transformers

Electricity generated by solar power plants has to be transmitted to the areas of consumption.

Therefore Medium Power Transformers increase the voltage level of the generated electricity to usually about 110 kV or 220 kV to bring forward the bundled energy efficiently.

Power range up to 200 MVA or even higher can come in several variations: with offload tapping switch or on-load

tap changers, with combination of the two, or with reconnect devices under the cover or in the reconnect dome. The range of possibilities includes separate winding transformers and autotransformers, as well as three-phase and single-phase designs.

The precise requirements vary from device to device and from site to site. That's why each transformer must be almost as unique as a fingerprint when it comes to voltage, power, climate efficiency, network topology, permissible noise level, and other factors.

In designing our transformers specific customer wishes as well as national and international standards (IEC, ANSI/IEEE, etc.) are taken into account.

No matter what size or type of solar power plant you are planning. Our experience in more than 100 years of transformer manufacturing proves high quality standards for all kinds of applications. Contact us for further information and consulting for your project.

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