

Solar Cell Solutions

Critical process experience and best-in-class products to increase uptime and maximize yield

Higher efficiency PV films through reliable power delivery and precise process control

The photovoltaic (PV) industry is experiencing unprecedented growth. For such growth to be sustained, significant improvements in solar cell conversion efficiencies, reductions in manufacturing costs and high capacity production throughput will be required. As PV manufacturing technologies advance, these efficiency, cost and yield goals become more critical.

For nearly 50 years MKS Instruments has been a leading global provider of instruments and process control solutions that power, measure, control, monitor and analyze critical parameters of advanced manufacturing processes to improve productivity and yield. By leveraging our technology and process experience we are able to provide leading-edge solutions for both crystalline silicon and emerging thin film solar cell production.

Superior Film Quality

RF Power Generators provide reliable solid-state power for thin-film, solar cell processing equipment. Our generators offer the highest delivered power (from 3.5kW to 15.0kW and higher) in a compact chassis with extra headroom for process flexibility, and excellent reliability for improved tool uptime. MKS RF generators, combined with our impedance matching networks and our V/I Probe® impedance analyzers, form complete RF delivery systems for the most demanding thin film applications.



Accurate, Consistent Layer Deposition

DC and Pulsed DC Power Generators offer improved process yield with superior arc control and the best output power repeatability in the industry. Continuous DC power supplies are available in power levels from 5kW to 60kW and higher while the solar RPG pulsed DC generators are available from 5kW to 10kW in a single 3U chassis. 20kW pulsed DC is also available. MKS DC power supplies are the ideal choice for applications requiring speed, control, accuracy, and proven reliability.

Fast, Easy Chamber Clean

Remote Plasma Sources from MKS include the R*evolution® Remote RF Plasma Source designed to clean undesired deposits from interior walls of deposition process chambers. Designed for "on-wafer" applications, the R*evolution provides the highest performing and cleanest source of reactive gas species, combining MKS' field-proven, patented Low-Field Toroidal plasma technology. By generating atomic fluorine that reacts with waste deposits in the chamber, new gases are formed that are readily scrubbed to minimize the environmental impact. In addition, the remote plasma source reduces wear and tear on the process chamber compared to other cleaning methods.



Data Acquisition & Connectivity

Multivariate Analysis (MVA) Combined with Data Integration and Multi-User Connectivity provides solutions that integrate sensors to acquire data on process parameters. Umetrics, an MKS company, is the leader in software for design of experiments and MVA data analysis. This technology vastly extends the capabilities of APC monitoring systems. The SenseLink™ QM provides an entire solution for process monitoring utilizing MVA technology. Designed with high speed and multi-user connectivity, data can be integrated and shared in one self-contained unit.



Minimize Downtime & Control Contamination

Residual Gas Analysis (RGA) Products support your process from simple leak detection to accurate tool qualification to the most advanced process monitoring. MKS RGAs can monitor process gas levels, baseline conditions, contamination, and vacuum conditions as well as provide real-time alerts to get tools ready for production and keep them running. MKS provides a full scope of RGAs designed for precision, intelligence and versatility to improve tool uptime and lower overall production costs per cell produced.

Improve Process Performance & Reduce Cost of Ownership

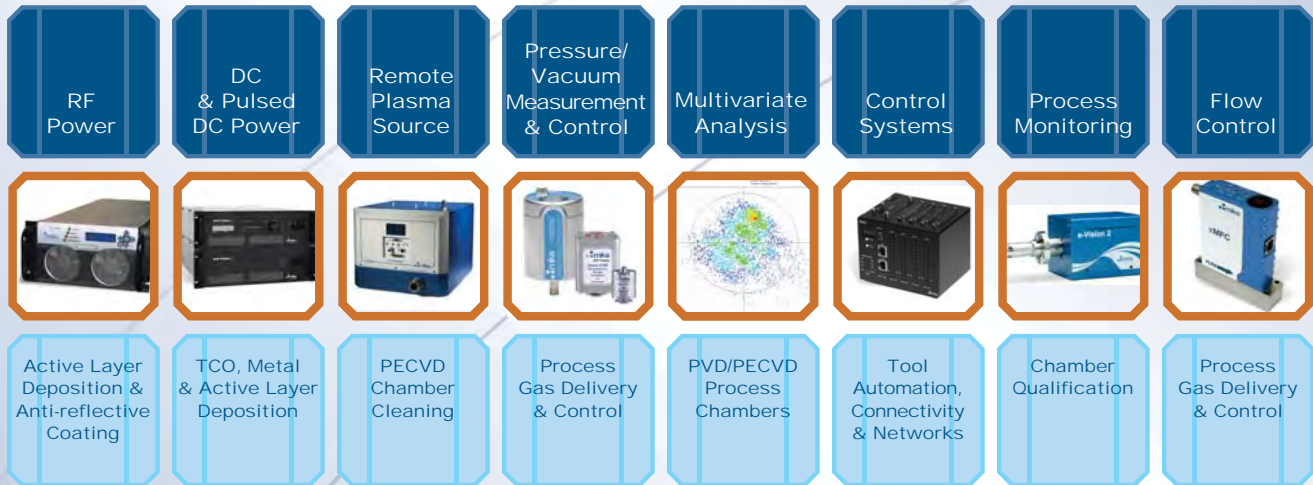
Pressure & Vacuum Measurement & Control Products include market leading Baratron® capacitance manometers, analog and digital automatic pressure control instruments, and vacuum components, valves, and vacuum gauges to monitor and control your process system environment. MKS provides complete solutions for your process measurement and control requirements.

Mass Flow Controllers measure and control the flow of critical gases in photovoltaic (PV) manufacturing. With features and functionality to meet virtually any need, customers can expect reduced cost of ownership and better tool and process performance.



**MKS Instruments—
a trusted global supplier
to leading solar cell manufacturers.**

MKS Solar Cell Solutions



Silicon Cell Manufacturing:

- Antireflective coating
- Quality analysis
- Plasma etching (edge removal)
- Process gas delivery & control

Thin-film Panel Manufacturing:

- Forming p-i-n type regions
- Metal contact
- TCO
- Quality analysis



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With our global presence and capacity to supply advanced process technology for PV production, we offer a competitive advantage and reduced COO.