



RENEWABLE ENERGY

Innovation in SOLAR POWER – Worldwide

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



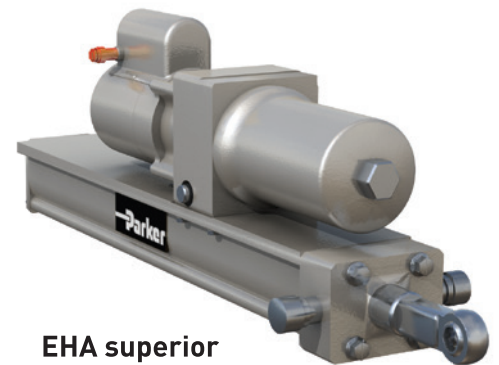
ENGINEERING YOUR SUCCESS.



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Advanced systems for photovoltaic (PV) and concentrated solar power (CSP) methodologies

Solar power is the most plentiful source of energy on the planet. Light from the sun can be directly converted to electricity via PV cells or by using mirrors or lenses to concentrate sunlight to a central receiver (CSP). Parker provides advanced systems that can be used in both methods of solar power. Our solutions include megawatt scale solar inverters and hydraulic motion systems for both PV and CSP, as well as engineered sealing solutions, thermal management solutions, and the most complete line of fluid connectors in the world. In addition, we offer established manufacturing and supply chain expertise to support large projects like solar fields. If you are designing or planning to build a solar field, Parker can provide customized solutions that will help you optimize your return on investment.



EHA superior for pitch control

Parker has developed a robust, self-contained electrohydraulic actuator (EHA) system that provides utility scale PV developers with an ideal solution for adding PV pitch control into large solar field installations. The compact EHA system is a completely self-contained unit combining a double-acting actuator, pump, and electric motor that eliminates nearly all leak paths into or out of the package. It offers clear advantages over comparable electromechanical actuator (EMA) systems because all the internal wear items are permanently lubricated for extended life and the power density of an EHA is typically three times that of a comparable EMA. Designing an EHA into a pitch system allows designers to move more PV panels with fewer actuators and controls, resulting in lower installation costs and longer service over the life of the solar field.

INNOVATION IN ACTION

Outdoor-rated, utility scale solar power inverters are best-in-class

Long a trusted supplier of advanced electrical power conversion systems and a pioneer in utility scale energy storage systems, Parker has developed an advanced, megawatt-class PV solar inverter utilizing the company's cutting-edge precision cooling system (PCS) technology. The marriage of advanced cooling and sophisticated electronic design results in best-in-class efficiency, a smaller physical envelope than that of our competitors, and a completely sealed system ideal for desert environments. Parker solar inverters also incorporate maximum power-point tracking (MPPT) and fault handling capabilities to maximize availability and minimize service interruptions.



Power Source: SOLAR

Robust solutions that result in maximum power generation utilization

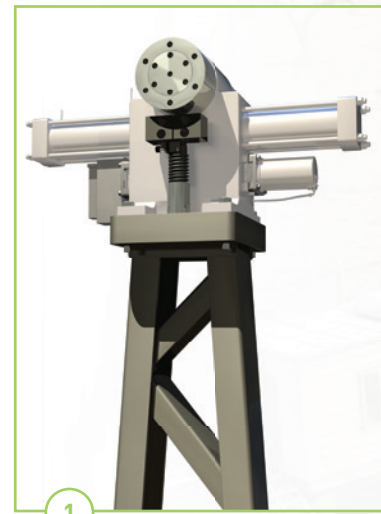
Look to Parker for:

Concentrated Solar Power (CSP) Solutions

- 1 Hydraulic rotary tracker for CSP
- 2 Engineered HPU and hydraulic cylinders for CSP tracking systems
- 3 Portable hydraulic oil purification system

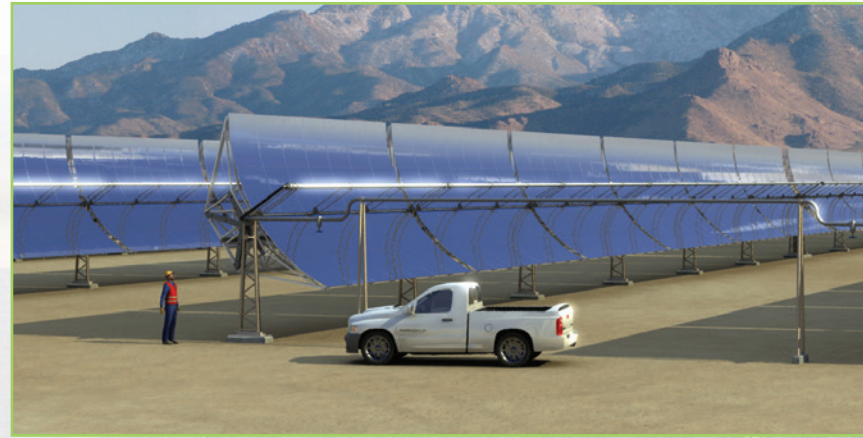
Photovoltaic (PV) Solutions

- 4 Thermal management for PV electronics
- 5 Electrohydraulic linear positioner for PV pitch control
- 6 Utility scale central inverter for PV



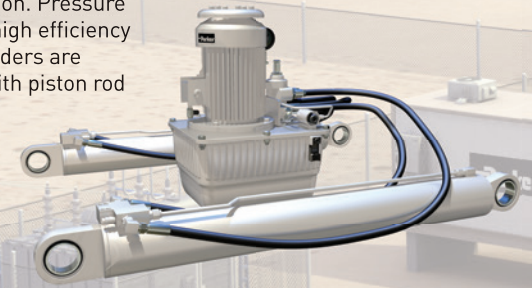
Hydraulic rotary tracker for CSP
A turnkey solution that eliminates the need for on-site assembly of the drive pylon. Ships directly to the construction site and can be installed in less than one hour. Our direct drive tracker is factory built and 100% tested, ensuring an efficient build out of the solar field.

CSP SOLUTIONS



2 Engineered HPUs and hydraulic cylinders for CSP tracking systems

Specially designed HPUs for CSP are engineered to resist water and sand ingestion. Pressure balanced gear pumps combine high efficiency with dirt tolerance. Custom cylinders are designed for CSP applications with piston rod treatments rated for up to 500 hours of salt spray protection and paint systems developed for high ultraviolet (UV) exposure. Integrated hydraulic counterbalance valves and spherical bearings are also standard.



3 Portable hydraulic oil purification system

Hydraulic systems operating outdoors often suffer from premature failures due to dirt and water contamination. Our portable fluid conditioning systems can be deployed in remote locations. Oil reconditioning can be scheduled and the oil from multiple units can be collected and cleaned at the same time. Portable fluid conditioning units can also remove water from hydraulic fluid, which is especially damaging.

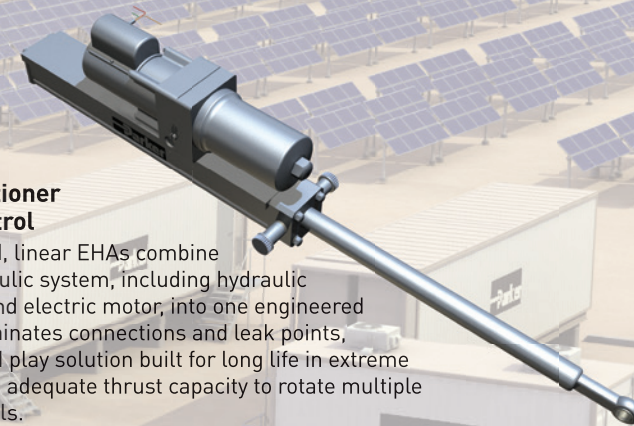


PV SOLUTIONS



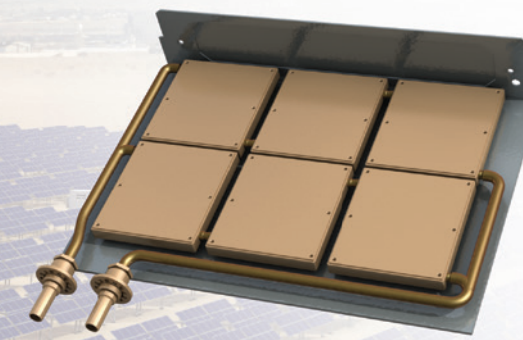
5 EHA linear positioner for PV pitch control

Our self-contained, linear EHAs combine a traditional hydraulic system, including hydraulic pump, reservoir and electric motor, into one engineered package. This eliminates connections and leak points, offering a plug and play solution built for long life in extreme environments with adequate thrust capacity to rotate multiple rows of solar panels.



4 Thermal management for PV electronics

Advanced two-phase PCS can be integrated into power electronics to provide the highest density of heat removal capability currently available. Closed-loop system does not rely on water so there is no danger of corrosion or contamination of the coolant.



6 Utility scale central inverter for PV

Parker's unique, two-phase refrigerant cooling system results in a megawatt class central inverter in a compact outdoor duty enclosure. The high efficiency design integrates proven insulated gate bipolar transistor power conversion and magnetics with Parker's groundbreaking cooling technology. No air conditioner is required; power semiconductors, inductor, and internal ambient are all cooled by the integral two-phase system. Multiple access panels make installation and scheduled maintenance quick and easy.



SOLAR ENGINEERED SOLUTIONS



>> icount bottle sampler for cleanliness monitoring

Situation: Thousands of liters of hydraulic fluid are often subject to harsh environmental conditions at a large solar field. Contamination from sand and water can result in expensive maintenance.

Solution: Parker's icount bottle sampler offers continuous oil monitoring with visual and electrical notification of oil cleanliness levels.

Customer Advantage: Units are compact and programmable with ISO cleanliness levels; moisture-sensing technology is also available.



>> AC drives for variable speed solar tracking

Situation: Most trackers sacrifice performance by operating at only one speed. Tracking too quickly results in lost efficiency. If stowing speed is too slow, it exposes mirrors and frames to unsafe conditions during high winds.

Solution: Parker variable speed drives can be integrated into solar tracking controls to provide infinite speed control of tracking systems.

Customer Advantage: Parker variable speed drives are easy to configure and available with common fieldbus protocols to communicate with LOCs and field controllers.



>> Hydraulic accumulators for CSP and CPV tracking

Situation: Thermal solar fields and CPV installations require supplemental power to re-position arrays during high wind loads.

Solution: Hydraulic accumulators can be incorporated into solar tracking systems to reduce load demand on electric motors and provide stored hydraulic power for safe stowing of arrays.

Customer Advantage: Parker is the global leader in accumulators, offering global engineering and manufacturing support. Integration of a Parker accumulator results in less wear and tear on hydraulic components, a reduction in parasitic electrical power loss, and an economical fail-safe capability.



>> Multi-tube solar trace for solar heating

Situation: Residential solar heating requires inlet and outlet connections from the pumping system to the solar receiver. It is advantageous to combine electrical signal wires along with the copper tube and wrap the entire tube assembly inside an insulated jacket.

Solution: Parker solar trace integrates copper tubing with electrical wiring and wraps the assembly in a UV-resistant insulator.

Customer Advantage: Installers need to attach only one integrated tube assembly, simplifying installation time and costs. Parker quality ensures that property owners are protected from potential leaks.



>> Fluid connectors

Situation: Solar fields can be subjected to extreme environmental conditions, including extreme UV, condensation, rainy seasons, and sand abrasion for a service life greater than 25 years.

Solution: Parker's advanced plating technology on tube fittings and hose connections provides extended corrosion protection in harsh environments.

Customer Advantage: Eliminating fitting corrosion reduces the potential of hydraulic leaks and provides the corrosion-free environment that is expected in a solar field.



>> Guardian® portable filter system

Situation: Thousands of hydraulic systems installed in a solar field require service and periodic oil replacement.

Solution: Guardian® portable filter system incorporates a transfer pump and hydraulic filter into one compact, easy-to-use assembly.

Customer Advantage: Ideal for service technicians. Can be driven out to the solar field and carried by hand. Minimal power requirements and can operate directly from 12 VDC truck power using a small AC inverter.



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