



## SEPARATOR LEVEL CONTROL



**BACKGROUND:** In areas of the world where steam or two-phase flow are the dominant sources of geothermal energy, it is vital to remove the fluid portion of the mixture from the well. Otherwise, salts and dissolved solids will cause scaling and corrosion of the turbine and related equipment. Separators are installed to accomplish this task and are the most important component at a geothermal plant. This ensures that only dry and clean steam enters the turbine. There are two common separator designs - the vertical cyclone and the horizontal separator. Both have a 99% separation efficiency or better. A high-velocity two-phase flow enters the separator in a spiral pattern. Centrifugal force moves the fluid to the outer surface, allowing steam to be directed toward the outlet tube. The separated fluid is collected in the base of the separator or freestanding tank, with the level controlled by an external control valve. The salts and solids are then discarded and sent to a reinjection well, or vent silencer.

**KEY TO SUCCESS:** Providing the highest quality steam to the turbine requires accurate and consistent positioning of the separator level control valve. The ability to regulate a proper fluid level is critical for the separation process. The efficiency of the separator must be maintained to minimize moisture carry-over into the steam line.

**PROBLEM:** For separators to function as designed, specific fluid velocities and internal pressure drops must be maintained. The fluid level has a large impact on separation efficiency and the potential for moisture carry over into the steam. During production well operation, separator tanks fill quickly with brine and contaminants that must be constantly removed to

# ELECTRAULIC ACTUATION™

maintain a proper level. This leads to excessive cycling of the separator level control valves, which are normally operated by electro-mechanical actuation. It's common for an actuator to have 7MM starts in a year. Frequent cycling in high ambient temperatures can push electric actuators design limits. Radiant heat from the pipeline adds to the problem, effecting onboard electronics and gear lubrication. Deadtime greatly affects stability as stem movement is continually reversed, accelerating gear wear and the inevitable breakdown of electric actuators.

Modulating a full port ball or butterfly valve for level control is difficult enough, but when the fluid medium includes separated chlorides and carbonates, internal scaling builds up quickly. This results in binding of the plug or disc increasing deadtime, and electric actuator thermal overload rendering the valve inoperable.

**SOLUTION:** REXA Electraulic Actuation™ offers a responsive and dependable solution for geothermal separator level control valve applications. REXA actuators are engineered for use in critical applications in the harshest environments requiring continuous modulating duty cycle with accurate and repeatable positioning. The self-contained, closed loop, hydraulic circuit provides stiff, stable control independent of load variation. The sealed, positive pressure hydraulic system does not require filters or oil-based maintenance. A dedicated microprocessor control enclosure, with a user-friendly control interface, operates the actuator. Set-up and calibration are made simple through a membrane keypad on the enclosure door.

Performance is unmatched in the industry with adjustable deadband to 0.05% of stroke, resolution of <0.1%, and frequency response of 1.5 to 5.0 Hz. Optional fail-safe configurations include a mechanical spring, or a nitrogen charged piston accumulator system. Full stroke speeds of <2 seconds with zero overshoot are achievable.



## RESULT

REXA Electraulic Actuation™ provides better stability and control of the separator fluid level by tracking control signal with repeatable positioning and minimal deadtime. This results in minimized liquid carryover, improved steam quality, increased uptime, and lower maintenance cost. Actuator response time is not unaffected by scale build-up, moving the valve into position immediately. Actuator stalls due to thermal overload are eliminated with 100% duty cycle motors. Radiant heat concerns are alleviated with standard remote mounted electronics. The combination of high performance and reliability makes REXA Electraulic Actuation™ an ideal solution for geothermal power plant applications.

### REXA, Inc.

Headquarters & Factory  
4 Manley Street  
West Bridgewater, MA 02379  
(508) 584-1199



MADE IN USA

[www.rexa.com](http://www.rexa.com)