



# PROMATION ENGINEERING

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## About Electric Valve Actuators

Electric valve actuators mount on valves which, in response to a signal, automatically move to a desired position using an outside power source. Single-phase or three-phase AC or DC motors drive a combination of gears to generate the desired torque level. There are two basic types of electric valve actuators: rotary and linear. Each type of actuator uses special valves. Rotary electric valve actuators use ball, plug, and butterfly valves that rotate a quarter-turn or more from open to close. Linear electric valve actuators use gate, globe, diaphragm, pinch, and angle valves that feature a sliding stem that opens or closes the valve. Rotary electric valve actuators are used in the electric power industry, high-power switching gears, and packaging applications. Linear electric valve actuators are well-suited for operating in tight tolerances.

Electric rotary valve actuators drive components rotationally via electromagnetic power from a motor. They often provide control and indexing capabilities to allow multiple position stops along strokes. The rotational element can be either a circular shaft or a table. Circular shafts often include keyways while tables provide a bolt pattern for mounting other components. Specifications for rotary electric valve actuators include actuator torque and range of motion. Actuator torque, the force that rotates the axis, is determined by multiplying the applied force by the distance from the pivot point to the point where the force is applied. The full range of motion can be 90° (quarter-turn), 180° (nominal), 270° (nominal), or 360° (multi-turn).

Linear electric valve actuators provide linear motion via a motor-driven ball screw or ACME screw assembly. ACME screws typically hold loads without power but are usually less efficient than ball screws. Ball screws are power screws with a train of ball bearings riding between the screw and the nut in a re-circulating track. They exhibit lower friction and higher efficiency than lead screws. With linear electric valve actuators, the load is attached to the end of a screw or rod and is unsupported. Typically, the screw is belt or gear driven. Specifications for linear electric valve actuators include valve stem stroke length, actuating force or seating thrust, and number of turns.

General specifications for both rotary and linear electric valve actuators include control signal input, stem diameter, actuation time, and failsafe method. Electric valve actuators that use throttling valves receive control signal inputs from positioners that adjust the valve's closure position. Input control signals are measured in either milliamperes or volts. Actuation time is the time required to fully close the liner motion valve. Several failsafe methods are available. Some electric valve actuators close the valve in the event of a power failure or the loss of a control signal. Other devices open the valve when the power or control signal fails. When selecting electric valve actuators, AC or DC voltage and duty cycle are important factors.

Features for electric valve actuators include NEMA enclosures, overtorque protection, travel stops, limit switches, local position indicators, integral pushbuttons and controls, manual overrides, and motor overload protection. Type 4 and 4X NEMA enclosures are constructed for



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indoor or outdoor use. Type 7 and 9 NEMA enclosures are designed for specific types of hazardous environments.

Electric valve actuators that feature overtorque protection use a sensor to switch off the motor when a specified torque level is exceeded. Travel stops restrict the actuator's linear or rotary motion. Limit switches allow users to monitor equipment remotely. Local position indicators provide a visual display of valve position based on operation via integral pushbuttons and controls. Handwheels, levers, and hydraulic hand pumps can be used to manually override electric valve actuators in the event of an emergency. Thermostats and thermal overload protection are also available.