CAMERON
A Schlumberger Company

All-Electric Surface Actuator

Enabling remote control and predictive, condition-based maintenance of surface valves offshore and onshore

Aligned with United Nations Sustainable Development Goals:
7—Affordable and clean energy,
12—Responsible consumption and production,
13—Climate action

Emissions Reduction:
Avoids up to 66 metric tons of CO_2e per platform per year†

Energy Consumption Reduction:
Saves 133.9 MW.h per platform per year†

Electrification:
Eliminates use of diesel or gasoline generators, enabling access to clean power

Actuator sizes:
3 1/16 in to 6 3/8 in

Pressure rating:†
Up to 10,000 psi [69 MPa]

Temperature rating:
–20 to 180 degF [–29 to 82 degC]

Valve temperature rating:
–20 to 350 degF [–29 to 177 degC]

Applications

- Offshore platforms, especially remote platforms without permanent crews
- Remote, difficult-to-reach onshore oil fields

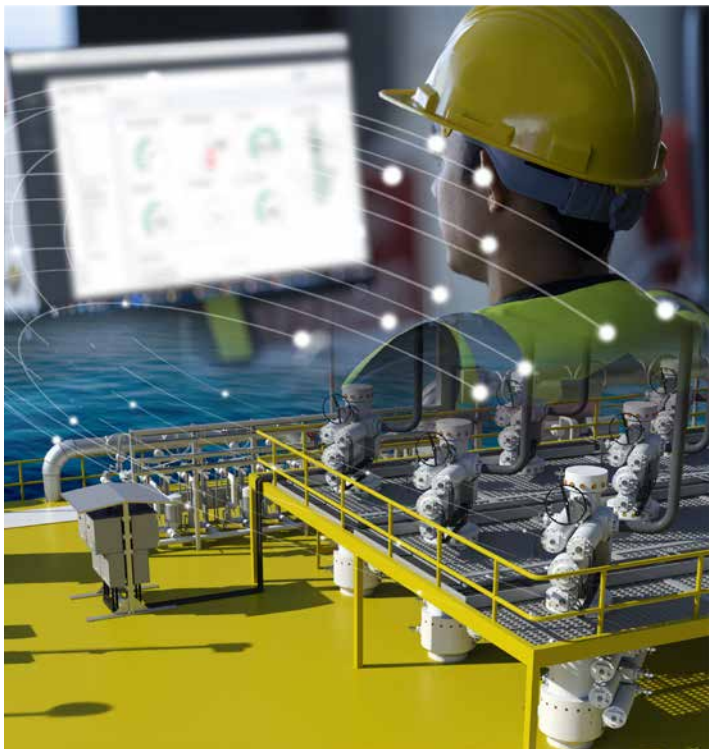
Benefits

- Lowers opex by up to 30%
- Decreases platform footprint and hence, capex
- Minimizes site visits with predictive maintenance
- Reduces HSE exposure
- Eliminates or decreases hydraulic fluid usage and waste

How it improves performance

The all-electric surface actuator reduces operator opex and capex by enabling the removal of typical hydraulic control systems and providing reliable, long-term remote control of surface valves. In addition, it enables condition-based monitoring and money-saving predictive maintenance.

By eliminating unnecessary site visits and personnel on location, these actuators enable operators to rethink platform design, potentially removing costly structures such as helidecks, living quarters, and control rooms.



The all-electric surface actuator enables remote valve operation and health monitoring, saving costs by reducing visits to offshore platforms and remote locations.

How it works

The all-electric valve actuator is the industry's first TRL-5 qualified electric actuator, with flow tests at up to 14.5 MMm^3/d. It integrates sensors to track actuator position and current in real time and during valve actuations. Smart actuator controls enable dynamic monitoring and control of parameters such as the drive motor condition, winding temperature, housing fluid pressure, motor torque, stem leakage, and other associated alarm and health conditions.

Actuator designs are fail-close, using a clutch to disengage the valve from the electrical system and enable a mechanical spring to rapidly close the valve. The largest actuator is capable of shearing monoconductor cables with diameters up to 7/16 in.

† Emissions reductions come from two sources. Decrease in travel-related emissions is based on reducing annual maintenance visits by a 3-person crew from 26 to 2, with an average round-trip distance of 200 mi. Energy and additional emissions reductions assume eliminating operation of a 282-kW hydraulic power unit (HPU) for 26 days annually. Electric actuator emissions and energy consumption are based on 60 valves operated for a total of 6 hours annually and take into account the constant-draw energy requirements to keep the actuators in the open position. All power is assumed to come from the US electrical grid. Potential emissions avoided will change depending on the source of power.

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The smart control system monitors valve operation and position (open, closed, or emergency shutdown) as well as the health of system components. It features interfaces with operator SCADA systems or distributed control systems (DCS) using industry-standard communication protocols, such as Modbus® and open platform communications (OPC). The control system also has a wireless human machine interface (HMI) for local operation and monitoring during site commissioning and intervention.

What it replaces

Hydraulic actuators require periodic control fluid replacement and disposal and are sensitive to control fluid contamination. They must be monitored for leaking control lines and set up with adequate valve closing times. Moreover, they require interval maintenance to ensure efficient operation of moving parts, such as solenoids, valves, and regulators.

How it supports industry carbon-intensity reduction goals

By eliminating hydraulic power units (HPUs) and wellhead control panels, the all-electric actuator avoids multiple energy conversions—from electric to hydraulic to mechanical—and improves energy efficiency, which leads to reduction in emissions and carbon footprint. A clean source of electricity further decreases the environmental impact.

Less system complexity results in greater reliability and lower maintenance, size, and weight. Fewer trips to the platform and the compact size reduce both opex and carbon footprint, while eliminating the risk of hydraulic fluid leaks further minimizes the environmental impact. Asset field crews can run leaner with fewer people and tools because technicians are better informed about the required maintenance and service tools and downtime is minimized.

Additional information

- The actuator can be replaced in the field without breaking the API bonnet seal connection and without pulling the whole tree, hence reducing maintenance and replacement time and costs.
- A rigorous qualification test program ensures reliability for extended use (at least 5 years without maintenance).

All-Electric Surface Actuator Specifications			
Valve models	FLS* extreme service API 6A slab-style gate valve and FL-HT* steam service API 6A slab-style high-temperature gate valve		
Valve temperature rating, degF [degC]	API temperature class P+X: –20 to 350 [–29 to 177]		
Actuator temperature rating, degF [degC]	API temperature class P+U: –20 to 180 [–29 to 82]		
Failure mode	Mechanical spring fail-safe close		
Manual override	Hydraulic override tool		
Visual position indicator	Rising stem		
Digital position indicator	Linear potentiometer		
Design life, years	30		
Maintenance schedule, years	5		
Hazardous area rating	ATEX Zone 1 IIA T3		
Actuator SIL† rating	SIL 2		
System SIL rating	SIL 3		
Control reaction time, s	~2		
Qualification testing	API Spec 6A Annex F PR2		
Additional qualification testing	Extended cycles: 5 × 20 high-temperature cycles, 5 × 20 low-temperature cycles		
Available sizes and pressure ratings	3 1/16 in, 10,000 psi	5 1/8 in, 10,000 psi	6 3/8 in, 10,000 psi
Wire-shearing capability	Not applicable	Up to 5/16-in-diameter monoconductor cable	Up to 7/16-in-diameter monoconductor cable
Operating power, kW	0.41 to 0.65	0.41 to 1.4	0.41 to 2.25
Hold-open power, W	~58	~120	~80
Controlled movement time (opening or closing), s	105	130	115
ESD‡ movement time, s	3 to 6	5 to 7	5 to 8

All specifications are subject to change without notice.
† Safety integrity level
‡ Emergency shutdown

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