Cable drive actuators

Pneumatic/hydraulic quarter-turn actuator
Adaptive linear torque output

VELAN
What we offer

Velan ABV is specialized in critical applications for the upstream and midstream oil and gas market, providing a fully integrated valve system for both on/off and control applications.

Velan ABV continuously seeks new technical solutions to anticipate and meet customer demands by designing and manufacturing actuators that operate quarter-turn valves (ball and butterfly) for extreme pressures, cryogenic temperatures, and corrosive and abrasive services.

The revolution of simplicity

Velan ABV’s innovative, patent-protected cable drive actuator maintains the robustness and the reliability of traditional scotch yoke actuators, while offering a revolutionary transmission system that benefits from a smart and simplified design.

Based on the principle of driving a pulley by two anchored cables, this newly designed solution ensures the development of a linear torque throughout the valve stroking cycle.

Linear characteristics, constant efficiency, and zero backlash are the main features of this unique actuator, which provides the perfect solution to accurate position controls.

Cable drive actuator and scotch yoke (SY) comparison

SY actuators are most often used for on-off rotary valves, but they are limited when they are used for:
- Accurate control services
- Fast-closing operations
- Heavy-duty cycles

The cable drive actuator’s design overcomes these limitations, guaranteeing optimal position control in the most demanding conditions.

<table>
<thead>
<tr>
<th>Features</th>
<th>Cable drive actuator</th>
<th>SY</th>
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<tr>
<td>A Torque characteristic</td>
<td>Linear</td>
<td>U curve</td>
</tr>
<tr>
<td>B Efficiency</td>
<td>Constant 97%</td>
<td>70-90%</td>
</tr>
<tr>
<td>C Zero backlash</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>D Lag</td>
<td>Small</td>
<td>Large</td>
</tr>
<tr>
<td>E Control accuracy</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>F Design complexity</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Duty cycles</td>
<td>Suitable</td>
<td>Inadequate</td>
</tr>
<tr>
<td>Reliability</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Low</td>
<td>Medium</td>
</tr>
</tbody>
</table>

A. The cable drive actuator’s torque linearity provides big advantages in terms of safety margins along the whole stroke, reaching the maximum benefit of 30% additional torque mid-stroke, compared to the SY. As a result, smaller actuators can be selected, which means less cost. Moreover, the linearity better meets the butterfly valve’s torque curve characteristic.

B. The cable drive actuator’s transmission system is extremely efficient, while the SY transmission system in not as efficient given the high internal sliding friction between the elements on the prismatic joints.

C. The cable drive actuator is designed with two preloaded cables anchored on the pulley, to ensure zero backlash, increasing precision in control service.

D. The cable drive actuator is not susceptible to lag since its design incorporates ball bearings that eliminate sliding friction. SY actuators are more prone to lag due to their sliding friction design.

E. The main features of the cable drive actuator are torque linearity, high efficiency, zero backlash, and limited lag — all essential for accurate control.

F. The cable drive actuator is suitable for heavy-duty cycles thanks to its simple design, with no sliding friction and fewer moving parts, which increases the system’s reliability and greatly reduces the need for maintenance.

Velan ABV cable drive actuator key features

- Linear torque characteristics
- High and constant efficiency
- Wide torque range
- High repeatability
- Horizontal assembly configuration
- Pneumatic and hydraulic configurations
- Spring-assisted for emergencies
- True modular design for maximum flexibility
- Full range of override options: manual, geared, and hydraulic
**Working principles**

The Velan ABV cable drive actuator’s transmission system converts the cylinder’s linear motion into a quarter-turn rotation by creating a constant transmission ratio and constant mechanical efficiency along every stroke.

**Supply mode**

The pressure of the fluid in the cylinder puts tension on the cable and produces a clockwise quarter-turn rotation of the pulley while compressing the spring.

**Fail mode**

In the case of an emergency, the fluid is released from the cylinder, which makes the spring produce a counterclockwise quarter-turn rotation of the pulley.
Velan ABV’s cable drive actuator: An innovative, simplified, and safe design

- Fewer moving parts, eliminating all sliding friction
- Electroless, nickel-plated cylinder tube ensures perfect dynamic seal, corrosion resistance, and low friction
- Two preloaded cables anchored on the pulley help avoid any backlash
- Seals suitable for different kinds of gases: instrument air, sweet gas, and sour gas
- Two externally adjustable travel stops, mounted directly on the center body, ensure correct alignment of the valve obturator in the open and closed positions
Center body with a robust and compact construction, designed for maximum rigidity and torque transfer, in addition to a mounted interface in accordance with ISO 5211.

Ball bearings are used instead of bushings, which increases efficiency.

A rotatable element controls the position of quarter-turn valves.

Two lateral ports ensure easy inspection and maintenance.

Coated spring ensures minimal binding and corrosion.

Springs guide and support, which reduces wear and ensures proper alignment for extended repeatability.
**Specification range**

**Design temperature**
- Standard range: -29°C to 100°C
- Low temperature: down to -60°C
- High temperature: up to 148°C

**Design pressure**
- Pneumatic cylinder: up to 12 barg
- Hydraulic cylinder: up to 210 barg
- Non-standard pressure ranges are available upon request

**Supply media**
- Instrument air, nitrogen, or sweet gas
  - For sour gas applications, NACE compliance is available upon request

**Torque range**
- Single acting spring return: up to 50,000 Nm
  - For higher values, please contact us.

**Certifications/approvals**
- Actuator sizing as per API 6DX
- Designed in accordance with EN15714
- Pressure components as per ASME VIII
- IP66 per EN60539 (IP68 upon request)
- Compliance with PED 97/23/EC
- Compliance with ATEX
- SIL 3 Certified (upon request)

**Cable composition**

Cables are internationally classified as 6 x 36+1 and are composed of six steel strands plus one steel core.

Each strand is formed of 36 helically twisted wires manufactured with high-tensile steel, to give resistance to fatigue and abrasion while adding flexibility.

The wires are also galvanized to protect against corrosion.
Control systems

Velan ABV’s cable drive actuators work with the latest control technology in accordance with international standards.

Velan ABV provides a selection of control packages that are fully customizable for the most critical pneumatic and hydraulic applications. They combine standard components such as:

- Air filters and filter regulators (aluminum and SS 316)
- Relief valves (SS 316)
- Check valves (SS 316)
- Solenoid valves, auto reset or manual reset (aluminum and SS 316)
- Pilot valves (aluminum and SS 316)
- Quick exhaust valves with or without flow regulators and closed loops (SS 316)
- Unidirectional and bidirectional flow regulator valves (SS 316)
- Booster (aluminum and SS 316)
- SMART positioner for regulation and PTS

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How to order a Velan ABV cable drive actuator

A typical pneumatic control system with a SMART positioner and solenoid valves for emergency close action in case of failure of energy and/or pressure.

Please do not hesitate to contact our sales team for any further information.
With innovative solutions and services, Velan ABV designs, manufactures, and supports highly reliable actuated valves and control systems in the energy market:

- Oil and gas
- Up stream, mid stream, and down stream
- Geothermal process
- Chemicals and petrochemicals
- Oil and gas transportation

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ABV-CDA-02-17