

Scotch-Yoke LEDEEN Actuators

Gas-over-oil and direct-gas actuators

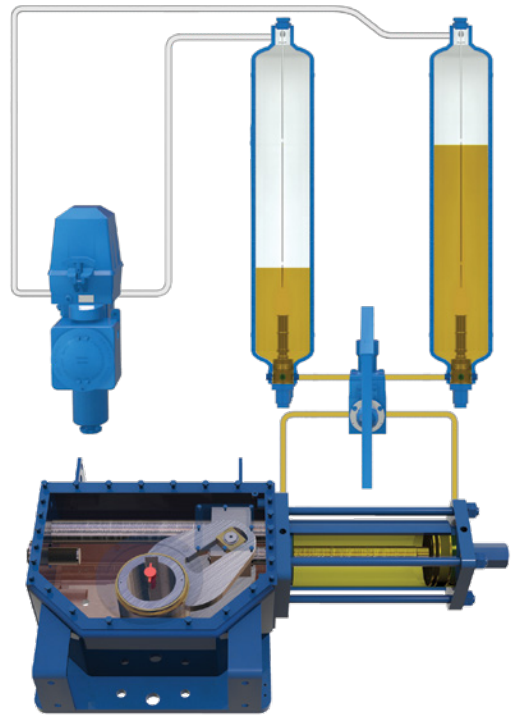
Scotch-Yoke Gas-Over-Oil LEDEEN Actuators

Typical application

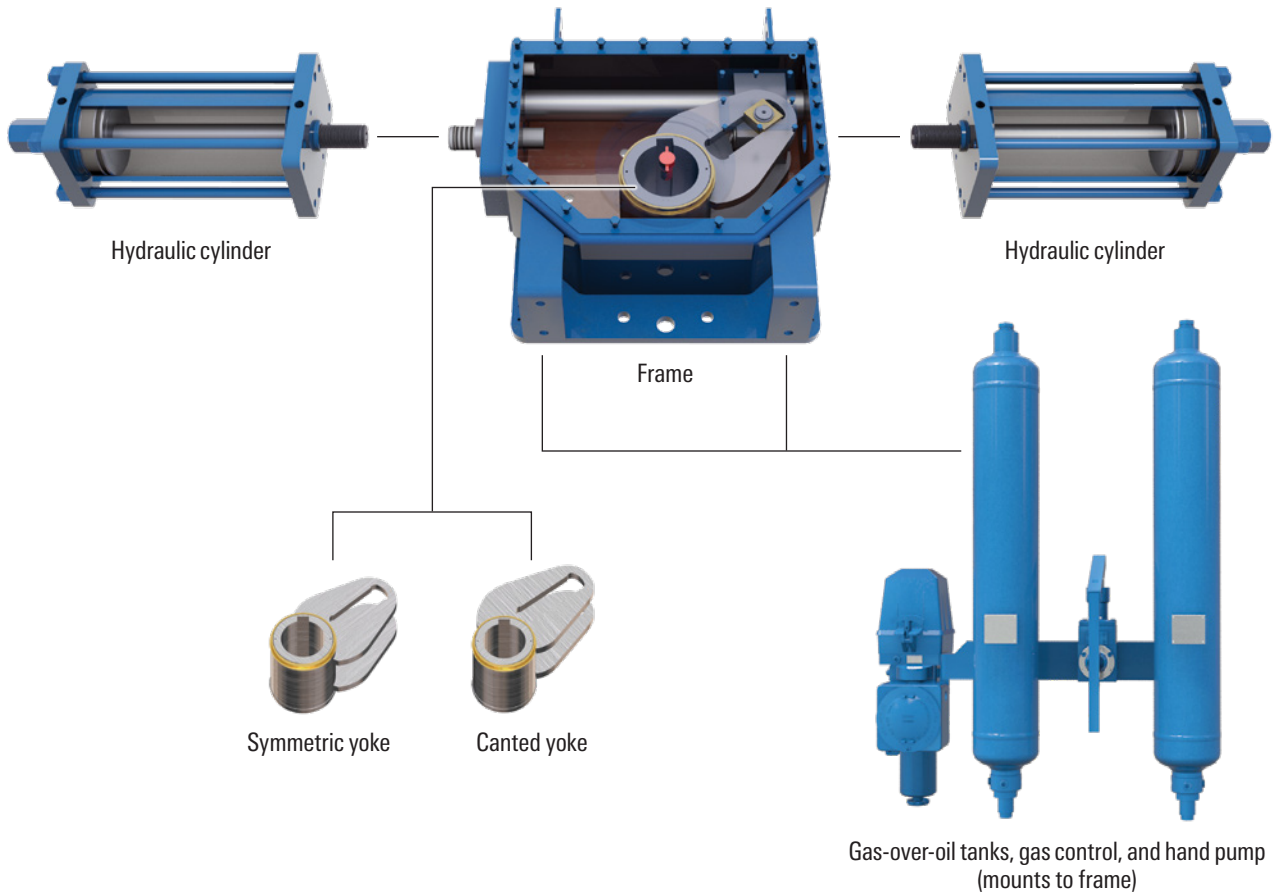
For on-off control of any natural gas transmission ball or plug valve using the high-pressure natural gas from the pipeline with a gas-over-oil configuration

Modular assembly

Scotch-yoke gas-over-oil LEDEEN* actuators provide increased flexibility through consistent engineering design and efficient modularity. Double-acting, single-cylinder, and dual-cylinder options are available to meet specific pipeline application requirements.



Quarter-turn gas-over-oil actuator.



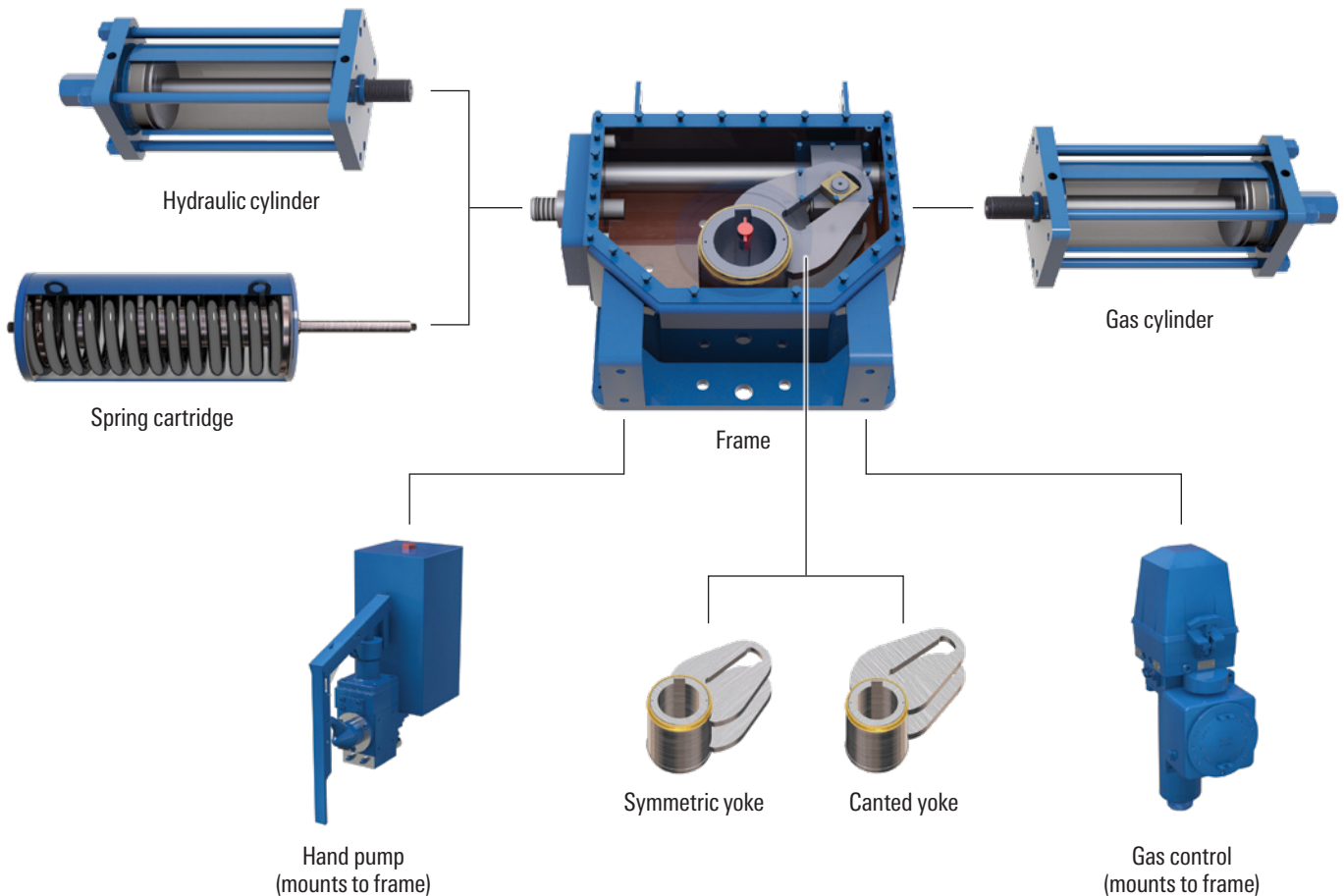
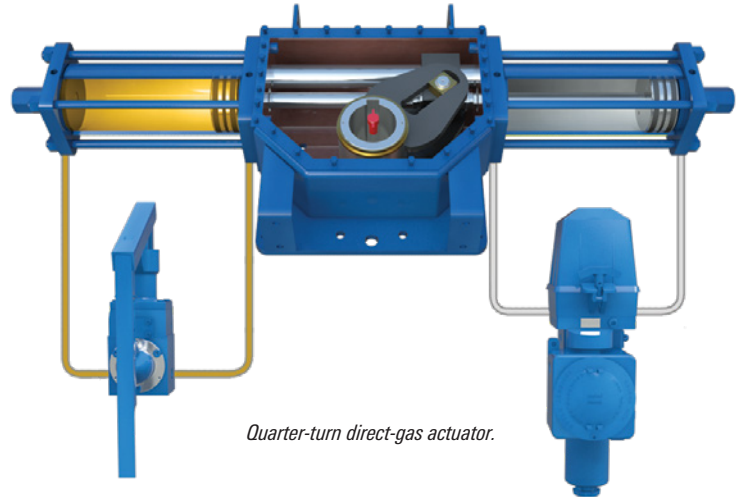
Scotch-Yoke Direct-Gas LEDEEN Actuators

Typical application

For on-off control of any natural gas transmission ball or plug valve utilizing the high-pressure natural gas from the pipeline with a direct-gas configuration

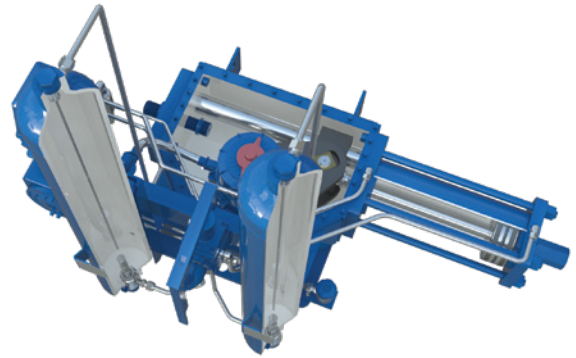
Modular assembly

Consistent engineering design and efficient modular assembly enable increased flexibility. Double-acting, dual-cylinder, and spring-return options are available to meet specific pipeline application requirements.

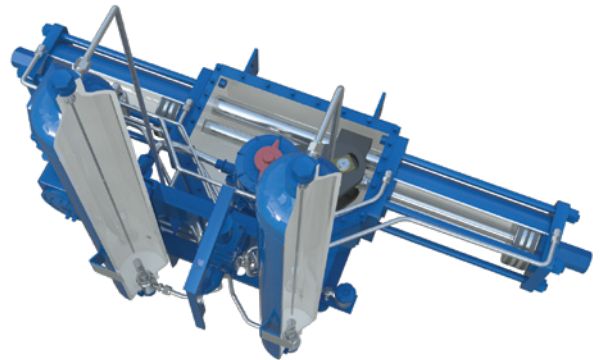


Quarter-Turn Gas-Over-Oil Standard Features

- Single- or dual-cylinder models
- Torque outputs to 5,700,000 lbf.in [644,000 N.m]
- Open and close travel stops that provide $\pm 3^\circ$ minimum
- Scotch yoke mechanism that generates powerful opening and closing torque outputs
- Steel-fabricated frame that provides rugged foundation of modular assemblies
- Chrome-plated side-load bar with guide block for effective elimination of piston rod deflection and stem side loading
- Bronze bushing interfaces that provide low-friction support of sliding and rotating components
- Aluminum bronze sliding blocks for a low-friction, low-stress pin connection
- Steel cylinder assembly that provides robust pressure containment for all conditions
- Plated cylinder ID to ensure excellent sealing surface with enhanced corrosion resistance
- Nitrile rubber piston seal configurations designed specifically for gas-over-oil applications
- Composite guide band on piston to provide low-friction guidance and support
- ASME and PED gas-over-oil pressure vessels with dipstick, hydraulic filter, and adjustable speed controls
- High-pressure-rated gas controls for local, remote, and automatic operations
- Hydraulic manual override with four-position selector valve, purging port, and breakdown-style pump lever



Single cylinder.



Dual cylinder.

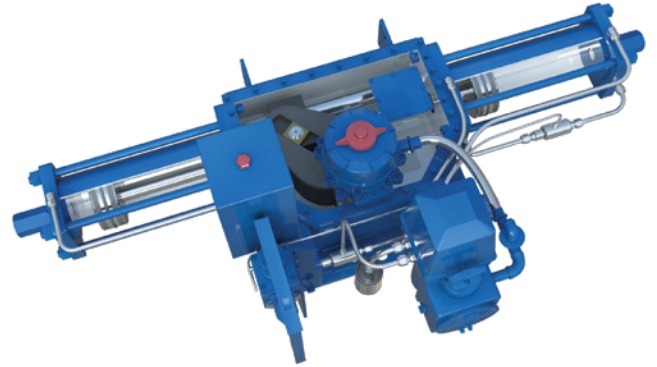
Standard Product Characteristics

Actuator Type	Temperature Range, degF [degC]	Gauge Pressure Range, psi [bar]
Gas over oil	-20 to 176 [-29 to 80] [†]	145 to 1,500 [10 to 104]

[†] Lower-temperature material available upon request

Quarter-Turn Direct-Gas Standard Features

- Dual cylinders for all double-acting models
- Gas cylinder dedicated to generating torque and hydraulic cylinder dedicated to smooth speed control and manual override with hand pump
- Torque outputs to 5,700,000 lbf.in [644,000 N.m]
- Open and close travel stops that provide $\pm 3^\circ$ minimum
- Scotch yoke mechanism that generates powerful opening and closing torque outputs
- Steel-fabricated frame that provides rugged foundation of modular assemblies
- Chrome-plated side-load bar with guide block for effective elimination of piston rod deflection and stem side loading
- Bronze bushing interfaces that provide low-friction support of sliding and rotating components
- Aluminum bronze sliding blocks for a low-friction, low-stress pin connection
- Steel cylinder assembly that provides robust pressure containment for all conditions
- Plated cylinder ID to ensure excellent sealing surface with excellent corrosion resistance
- Nitrile rubber piston seal configurations designed specifically for direct-gas applications
- Composite guide band on piston to provide low-friction guidance and support
- Seal-welded, steel-spring cartridge that provides maximum personnel safety and resistance to environmental conditions
- Epoxy-coated, prestressed springs that provide consistent performance with corrosion protection
- High-pressure-rated gas controls for local, remote, and automatic operations
- Hydraulic manual override with three-position selector valve, dual-speed controls, purging port, and breakdown-style pump lever



Double acting.

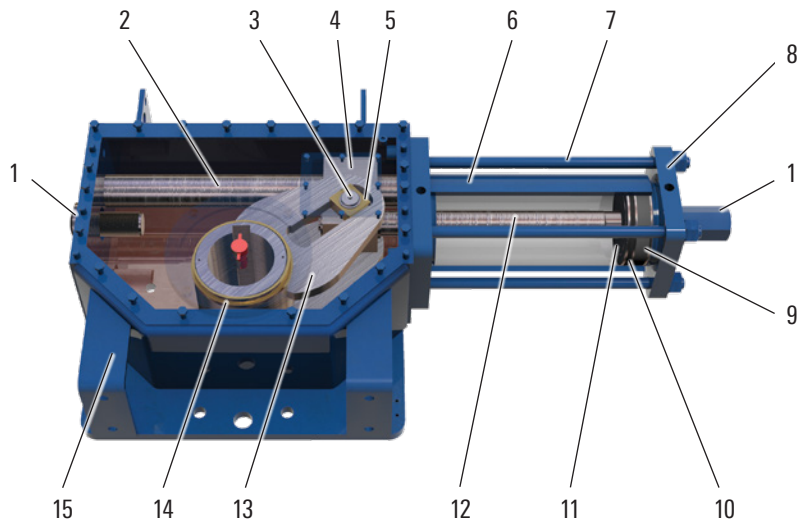


Spring return.

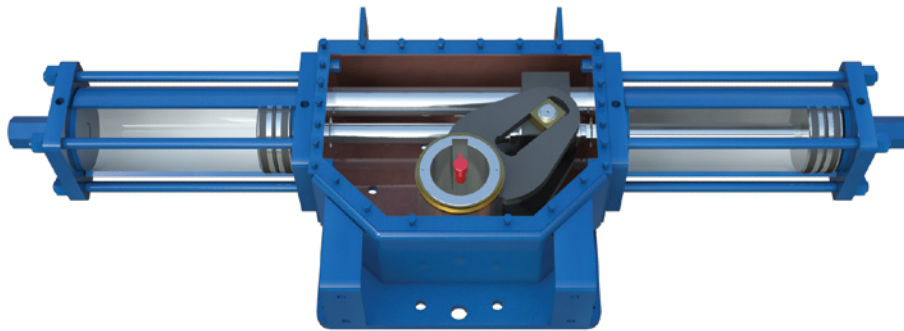
Standard Product Characteristics

Actuator Type	Temperature Range, degF [degC]	Gauge Pressure Range, psi [bar]
Direct gas	-20 to 176 [-29 to 80]	145 to 1,500 [10 to 104]

Gas-Over-Oil Standard Construction



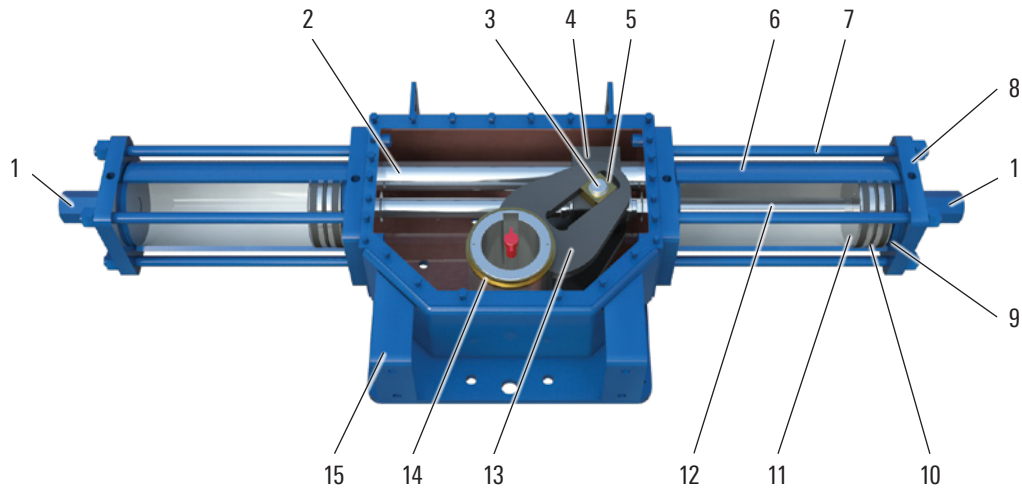
Single-cylinder assembly.



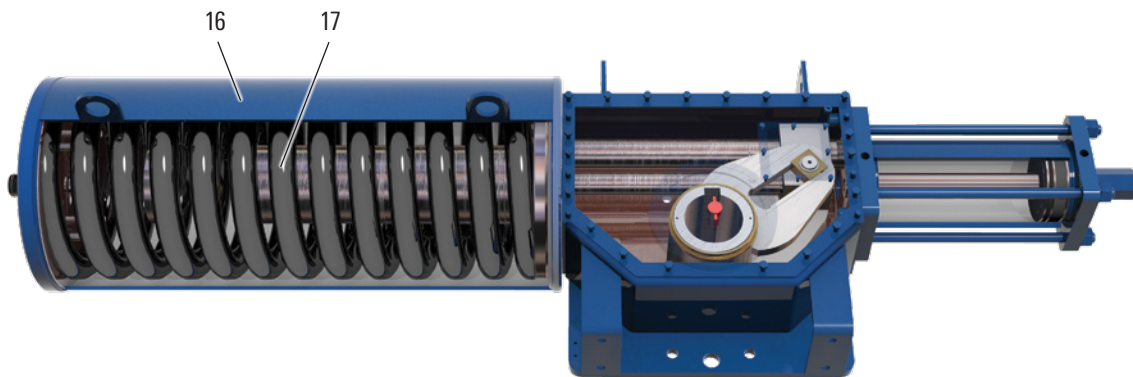
Dual-cylinder assembly.

Item	Description	Material
1	Travel stop	Alloy steel
2	Guide bar	Alloy steel
3	Pin	Alloy steel
4	Guide block	Carbon steel
5	Sliding block	Aluminum bronze
6	Cylinder	Carbon steel
7	Tie rod	Alloy steel
8	Flange	Carbon steel
9	Guide band	PTFE and graphite
10	Seal	Nitrile rubber quad ring
11	Piston	Carbon steel
12	Piston rod	Alloy steel
13	Scotch yoke	Alloy steel
14	Bushing	Bronze
15	Frame	Carbon steel

Direct-Gas Standard Construction



Double-acting assembly.



Spring-return assembly.

Item	Description	Material
1	Travel stop	Alloy steel
2	Guide bar	Alloy steel
3	Pin	Alloy steel
4	Guide block	Carbon steel
5	Sliding block	Aluminum bronze
6	Cylinder	Carbon steel
7	Tie rod	Alloy steel
8	Flange	Carbon steel
9	Guide band	PTFE and graphite
10	Seal	Nitrile rubber quad ring
11	Piston	Carbon steel
12	Piston rod	Alloy steel
13	Scotch yoke	Alloy steel
14	Bushing	Bronze
15	Frame	Carbon steel
16	Spring cartridge	Carbon steel
17	Spring	Alloy steel

Standard Accessories

High-pressure gas control assembly

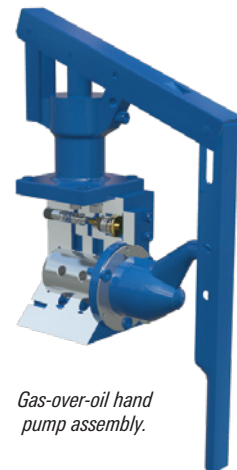
- Compact design with weather-resistant enclosure
- Controls of hard anodized marine-grade aluminum material
- Stainless steel filter with molecular sieve to condition supply gas
- All control configurations rated for high pressure
- Compact, easy-to-operate thumb levers for local operation
- Conversion from local to remote with integrated explosion-proof solenoids
- Extensive combination of automatic features available for meeting specific requirements of emergency shutdown

Hand pump assembly

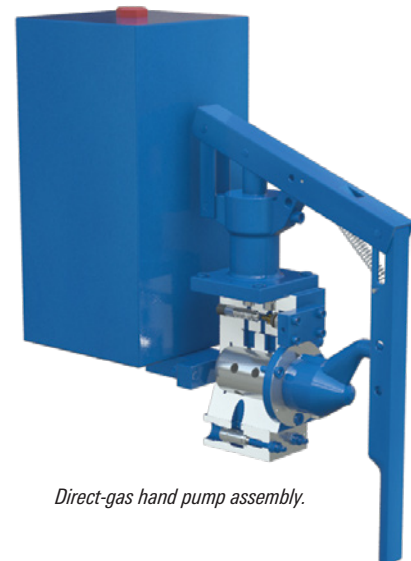
- Easy generation of a high-pressure hydraulic output to the actuator
- Multiposition selector valve for open, close, and remote functions (bypass position included on gas-over-oil model)
- Integrated pilot feature that assures selector valve position does not inhibit power operation of actuator during remote or automatic functions
- Lockable, breakdown-style pump lever that secures selector valve in remote position
- Purging feature that allows hydraulic circuit to expel trapped air



Control assembly.



Gas-over-oil hand pump assembly.



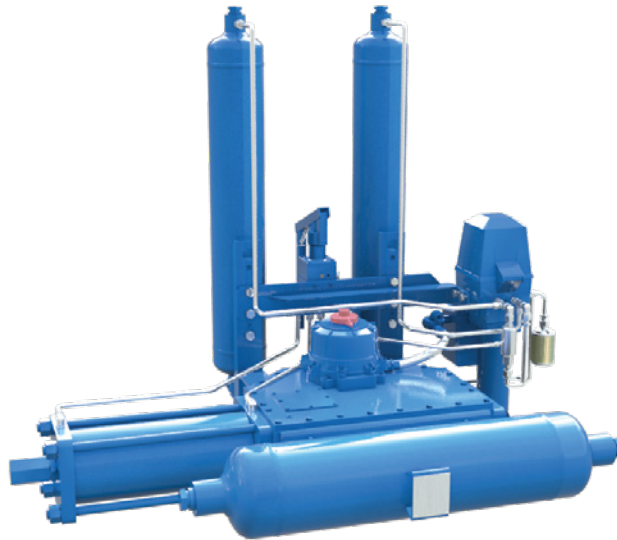
Direct-gas hand pump assembly.

Standard Options

- ASME and Pressure Equipment Directive (PED) emergency storage vessels
- Materials of construction for service conditions down to -50 degF [-45 degC]
- Special seals for low-temperature applications to -76 degF [-60 degC] and for high-temperature applications to 392 degF [200 degC]
- Spring-return direct-gas configurations with hydraulic dampening



Direct-gas assembly with emergency storage vessel.



Single-cylinder gas-over-oil assembly with emergency storage vessel.

Certifications

Our scotch-yoke LEDEEN actuators comply with many industry standards.

- ISO 9001:2000
- PED 97/23/EC
- SI 825
- IEC 61508:2000 (TÜV SIL 3)
- Technical Regulations Customs Union (TR CU)



ISO 9001:2008

ISO 9001:2008 quality management system.



PED 97/23/EC

European PED—Pressure Equipment Directive.



IEC 61508-7:2010

SIL 3 capability.

Model Number Designation

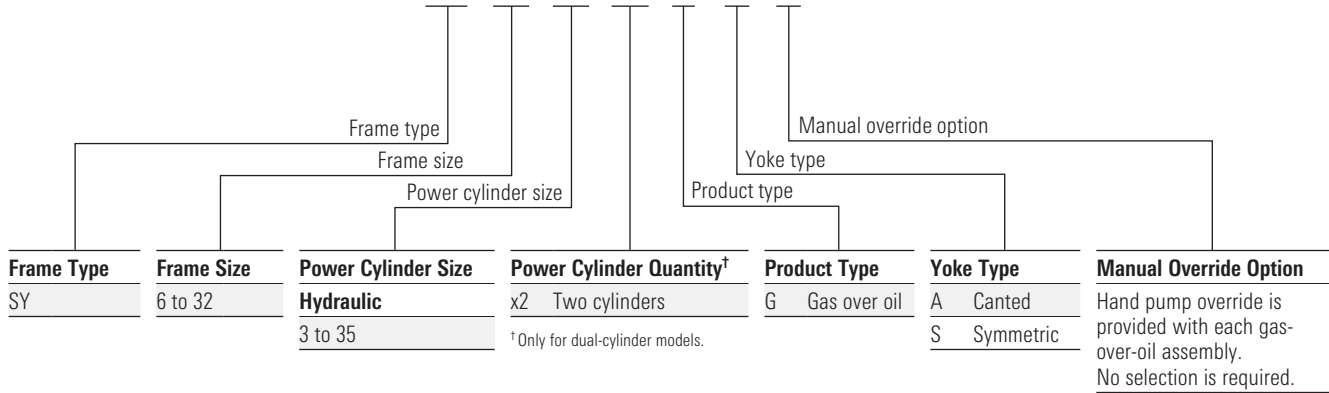
Cameron offers customizable assemblies for scotch-yoke gas-over-oil and direct-gas LEDEEN actuators. An example model number for each actuator configuration is shown. By sequentially proceeding through each variable, the specific subassemblies of either actuator type can be clearly identified.

Gas over oil

SY1613x2G-A

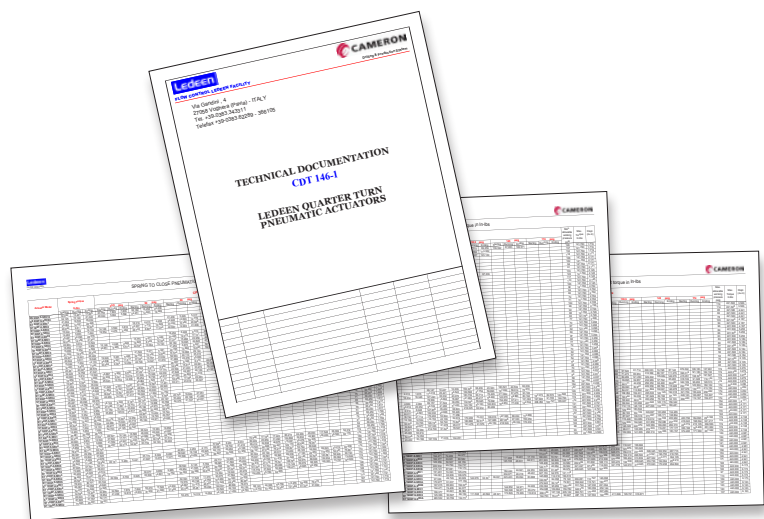
Example

SY 16 13 x2 G - A



Technical data

For additional technical data such as torque charts or dimensional drawings, refer to the scotch-yoke gas-over-oil LEDEEN actuators technical data package or contact Schlumberger.



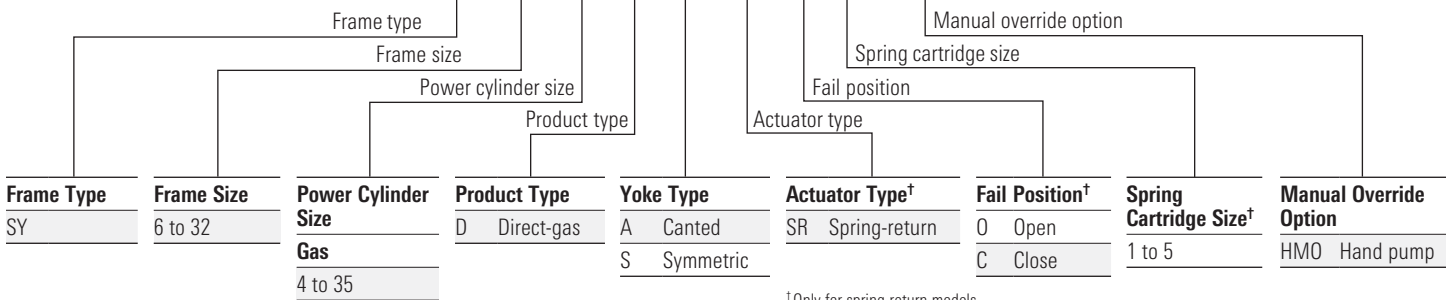
Direct gas

SY1613D-A-HMO
(Double-acting example)

SY1613D-A-SRC2-HMO
(Spring-return example)

Example

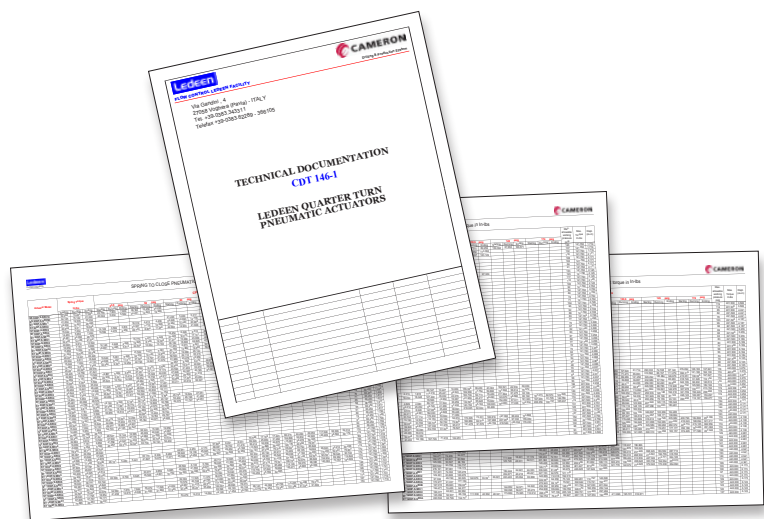
SY 16 13 D - A - SR C 2 - HMO



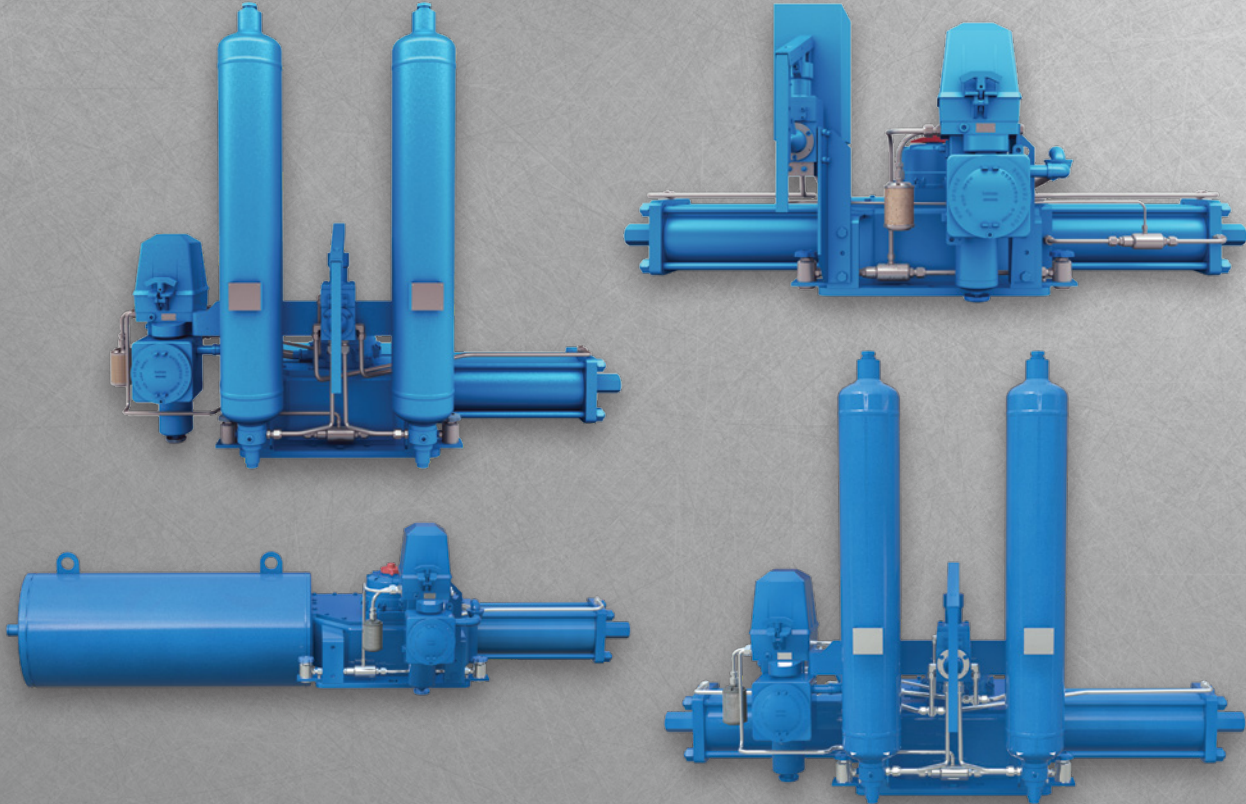
[†] Only for spring-return models

Technical data

For additional technical data such as torque charts or dimensional drawings, refer to the scotch-yoke direct-gas LEDEEN actuators technical data package or contact Schlumberger.



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