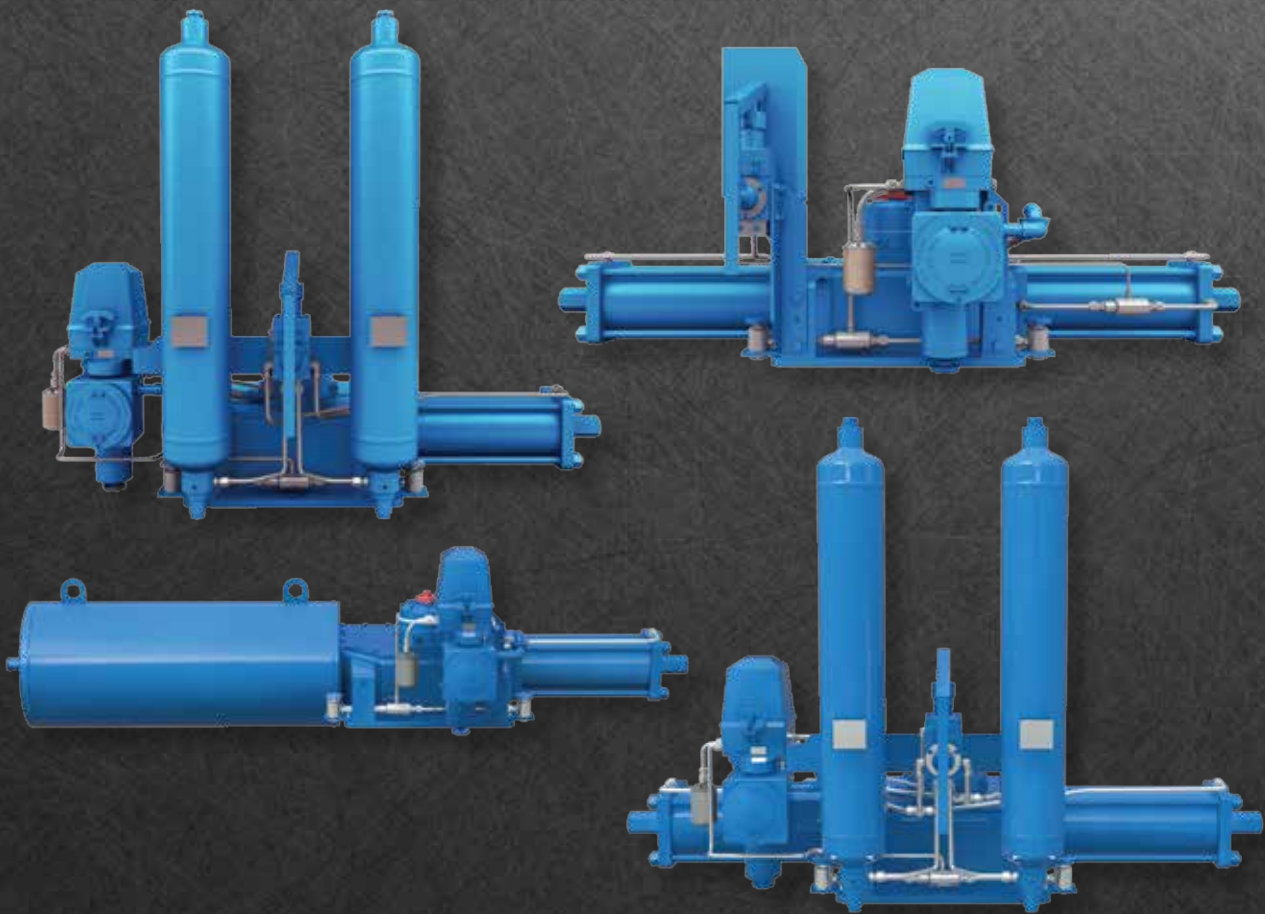


LEDEEN SY Series Gas-Over-Oil and Direct Gas Actuators

TECHNOLOGY



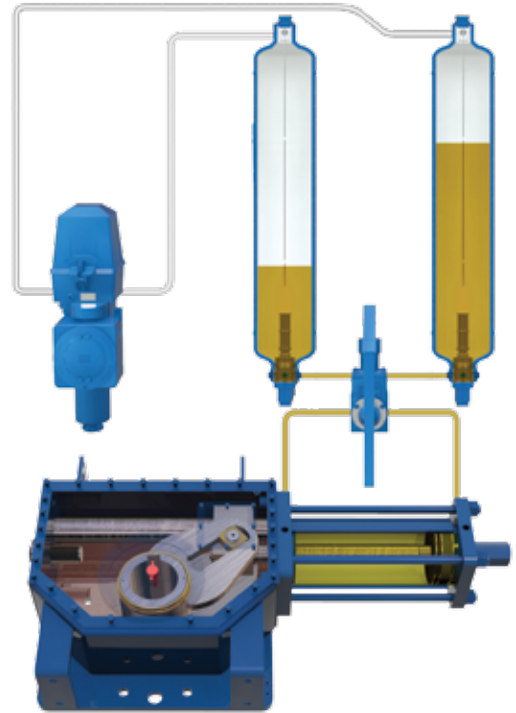
Gas-Over-Oil

TYPICAL APPLICATION

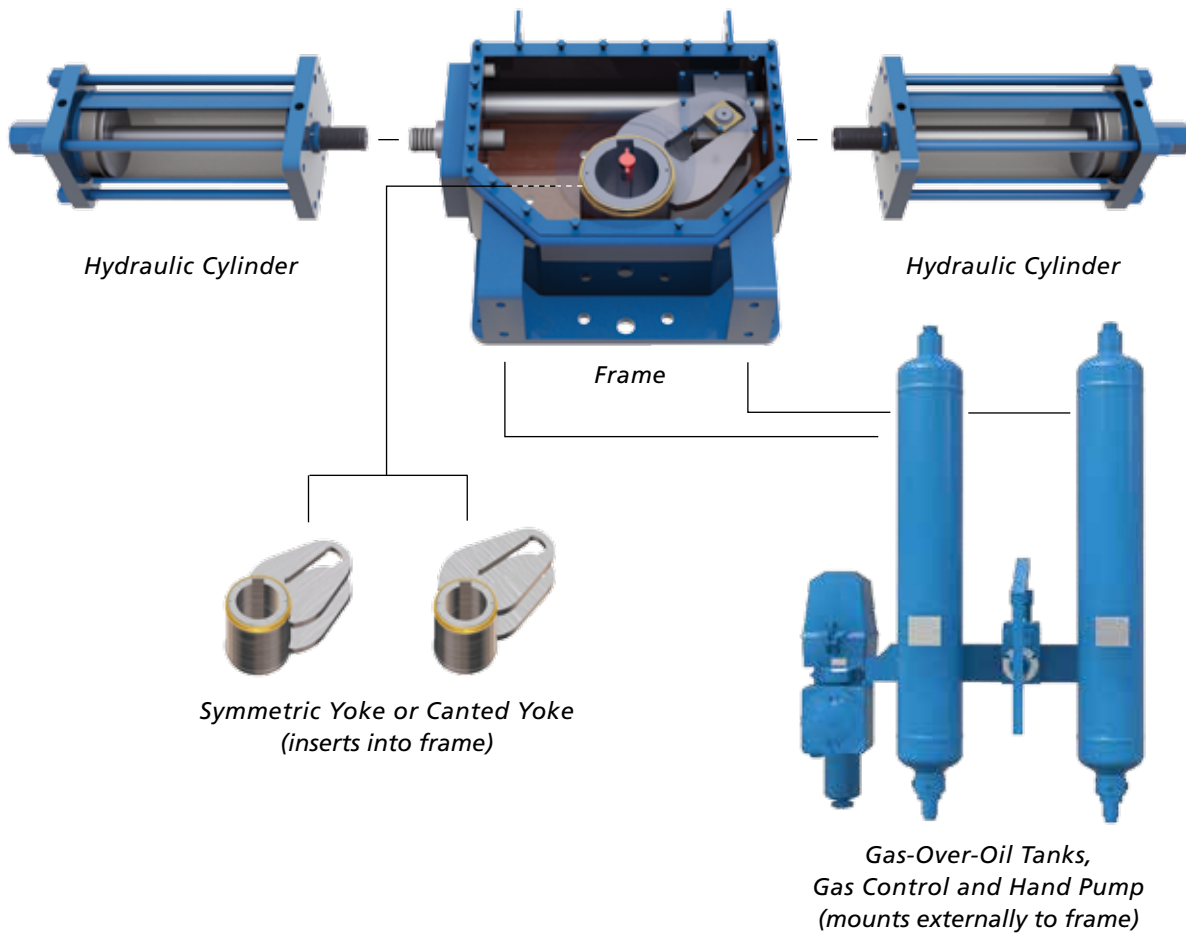
For on/off control of any natural gas transmission ball or plug valve utilizing the high-pressure natural gas from the pipeline with a gas-over-oil configuration.

MODULAR ASSEMBLY

Consistent engineering design and efficient modular assembly allows increased flexibility to be achieved. Double acting, single cylinder or dual cylinder are combinations readily available to meet specific pipeline application requirements.



Quarter-Turn Gas-Over-Oil Actuator



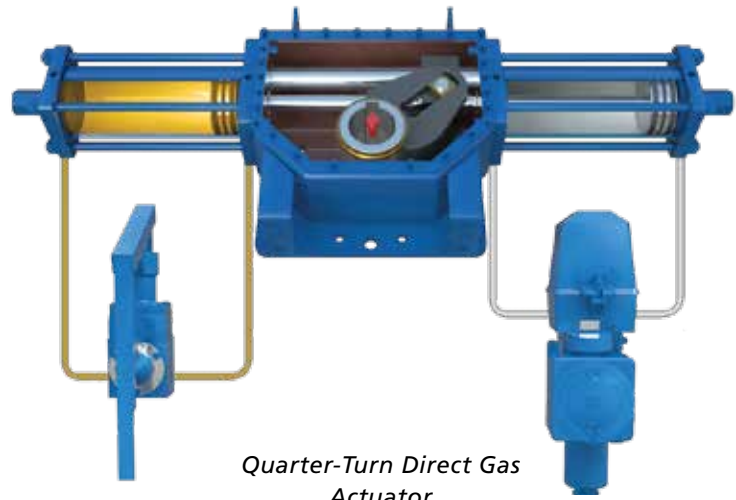
Direct Gas

TYPICAL APPLICATION

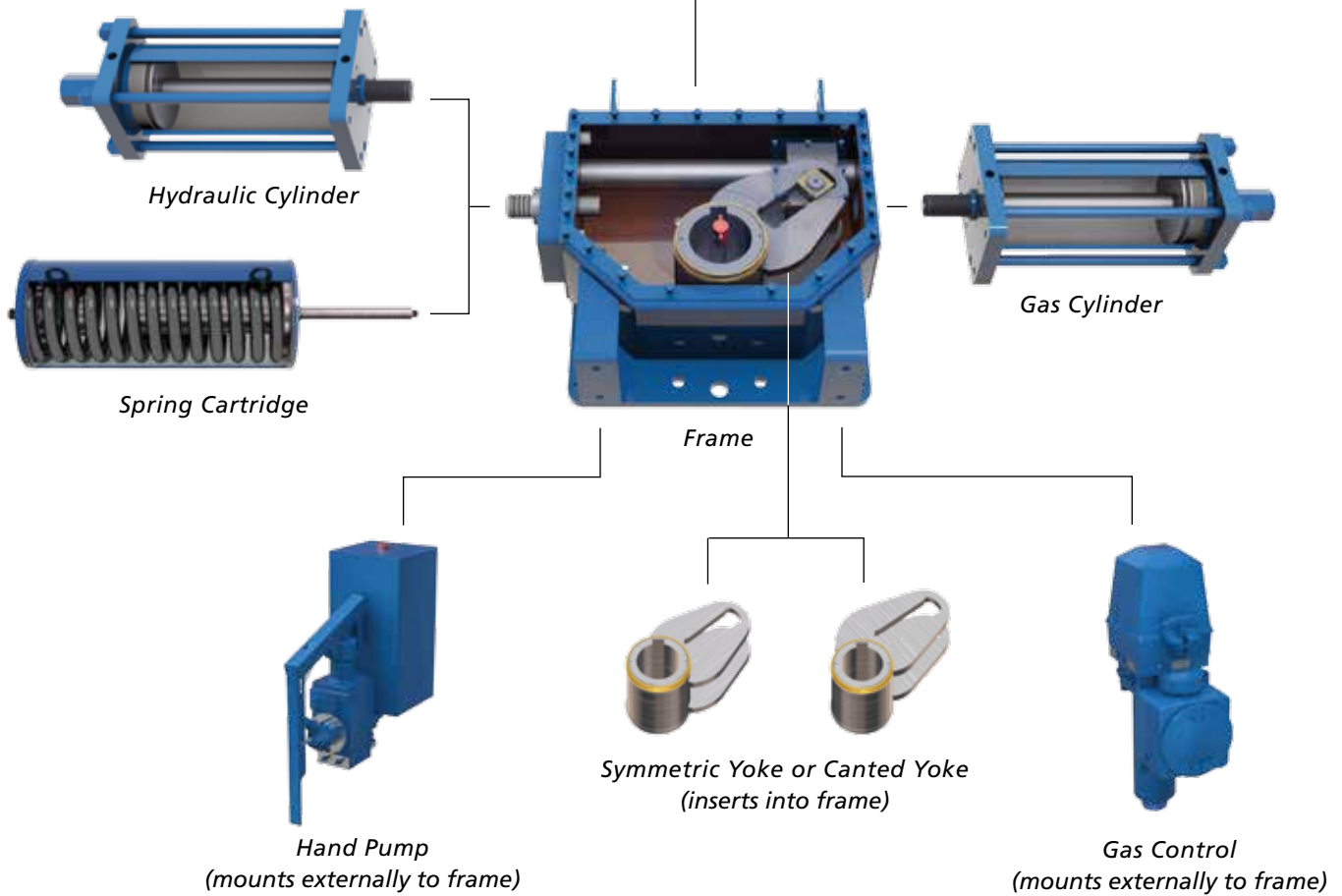
For on/off control of any natural gas transmission ball or plug valve utilizing the high-pressure natural gas from the pipeline with a direct gas configuration.

MODULAR ASSEMBLY

Consistent engineering design and efficient modular assembly allows increased flexibility to be achieved. Double acting, dual cylinder and spring return are combinations readily available to meet specific pipeline application requirements.



Quarter-Turn Direct Gas Actuator



Quarter-Turn Gas-Over-Oil

STANDARD FEATURES

- Single or dual-cylinder models available
- Torque outputs to 5,700,000 in-lb (644,000 N·m)
- Open and close travel stops provide ± 3 degrees minimum
- Scotch yoke mechanism generates powerful opening and closing torque outputs
- Steel fabricated frame provides rugged foundation of modular assemblies
- Nickel-plated side load bar with guide block for effective elimination of piston rod deflection and stem side loading
- Bronze bushing interfaces provide low-friction support of sliding and rotating components
- Aluminum bronze sliding blocks for a low-friction, low-stress pin connection
- Steel cylinder assembly provides robust pressure containment for all conditions
- Electroless nickel-plated cylinder ID ensures excellent sealing surface with excellent corrosion resistance
- Buna piston seal configurations specifically designed for gas-over-oil applications
- Composite guide band on piston provides low-friction guidance and support
- ASME/PED gas-over-oil pressure vessels complete with dipstick, hydraulic filter and adjustable speed controls
- High-pressure rated gas controls for local, remote and automatic operations (refer to page 8)
- Hydraulic manual override with four-position selector valve, purging port and breakdown-style pump lever (refer to page 8)



Single Cylinder



Dual Cylinder

STANDARD PRODUCT CHARACTERISTICS

TYPE	TEMPERATURE RANGE	PRESSURE RANGE
Gas-Over-Oil	-22° F to 212° F (-30° C to 100° C)	145 to 1500 psig (10 to 104 barg)

Quarter-Turn Direct Gas

STANDARD FEATURES

- All double acting models are dual cylinder
- 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 in-lb (644,000 N-m)
- Open and close travel stops provide ± 3 degrees minimum
- Scotch yoke mechanism generates powerful opening and closing torque outputs
- Steel fabricated frame provides rugged foundation of modular assemblies
- Nickel-plated side load bar with guide block for effective elimination of piston rod deflection and stem side loading
- Bronze bushing interfaces provide low-friction support of sliding and rotating components
- Aluminum bronze sliding blocks for a low-friction, low-stress pin connection
- Steel cylinder assembly provides robust pressure containment for all conditions
- Electroless nickel-plated cylinder ID ensures excellent sealing surface with excellent corrosion resistance
- Buna piston seal configurations specifically designed for direct gas applications
- Composite guide band on piston provides low-friction guidance and support
- Seal welded, steel spring cartridge provides maximum personnel safety and resistance to environmental conditions
- Epoxy coated, prestressed springs provide consistent performance with corrosion protection
- High-pressure rated gas controls for local, remote and automatic operations (refer to page 8)
- Hydraulic manual override with three-position selector valve, dual speed controls purging port and breakdown-style pump lever (refer to page 8)



Double Acting

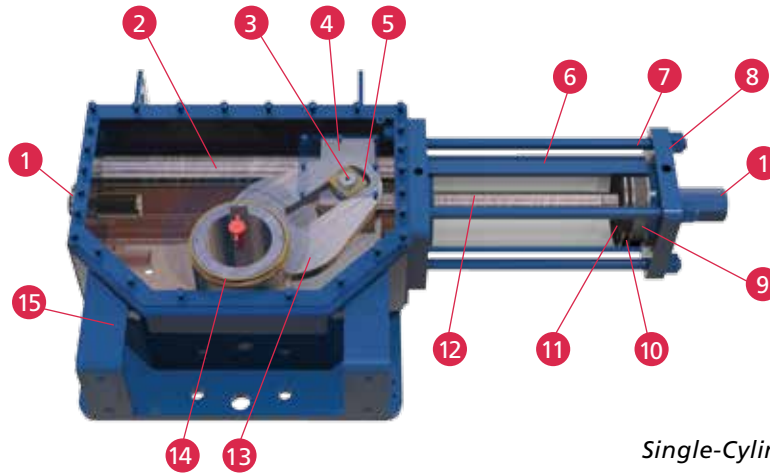


Spring Return

STANDARD PRODUCT CHARACTERISTICS

TYPE	TEMPERATURE RANGE	PRESSURE RANGE
Direct Gas	-22° F to 212° F (-30° C to 100° C)	145 to 1500 psig (10 to 104 barg)

GAS-OVER-OIL STANDARD CONSTRUCTION



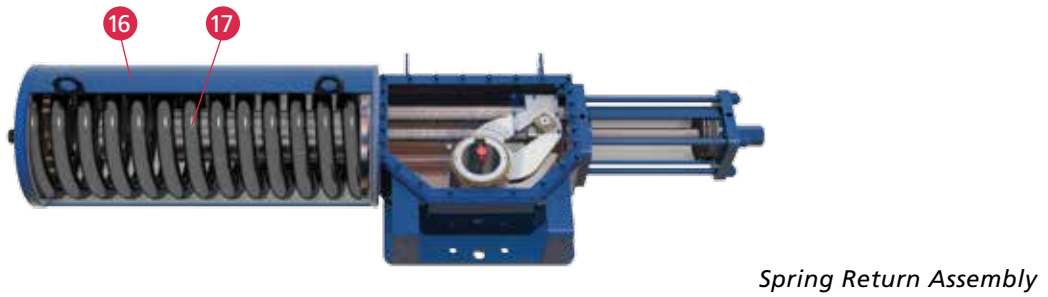
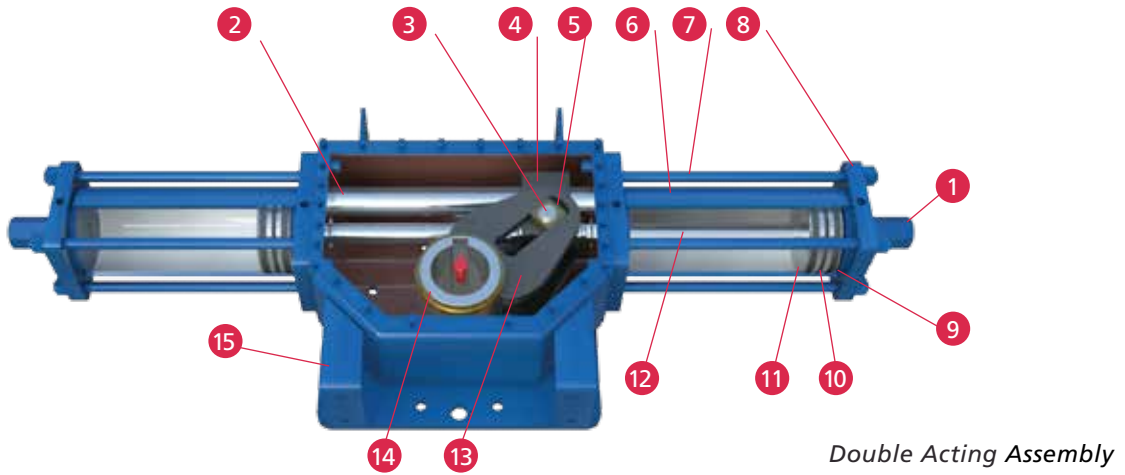
Single-Cylinder Assembly



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	Teflon and Graphite
10	Seal	Buna 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



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	Teflon and Graphite
10	Seal	Buna 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 are high-pressure rated
- Compact, easy to operate thumb levers for local operation
- Converts 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:

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

Limit Switch Assembly:

- Robust, explosion-proof rated cast aluminum housing certified in accordance with ATEX, CSA and FM
- Direct mounts to actuator frame providing weather resistant seal
- Readily accepts multiple proximity or mechanical micro switches
- Two-piece shaft allows easy dome removal for full access cam adjustment
- Highly visible indicator for local verification of valve position



Control Assembly

Hand Pump Assembly



Gas-Over-Oil



Direct Gas



Limit Switch Assembly

STANDARD OPTIONS

- ASME/PED emergency storage vessels
- Materials of construction for -50° F (-45° C) and low-temperature service conditions
- Fluorosilicone seals rated to -76° F (-60° C) for low-temperature applications
- Viton seals rated to 392° F (200° C) for high-temperature applications
- Spring return direct gas configurations with hydraulic dampening



*Direct Gas Assembly with
Emergency Storage Vessel*

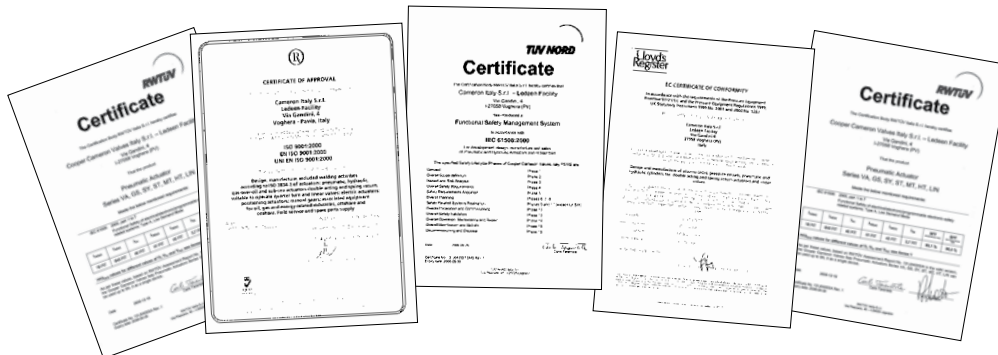
CERTIFICATIONS

Cameron's LEDEEN SY series of actuators comply with many industry standards.

- ISO 9001:2008, Quality
- PED 97/23/EC, Design
- SI 825, Safety
- IEC 61508:2000, Integrity (TUV/SIL3)



*Single-Cylinder Gas-Over-Oil Assembly
with Emergency Storage Vessel*



MODEL NUMBER DESIGNATION

Cameron offers customizable assemblies for the gas-over-oil and direct gas actuators. An example model number for each actuator configuration is shown below and on page 11.

By sequentially proceeding through each variable, the specific sub-assemblies of either actuator type can be clearly identified.

Gas-Over-Oil



1

2

3

4

5

6

7

SY

16

13

x2

G

A

1

Frame Type
SY

2

Frame Size
6 to 32

3

Power Cylinder Size
3 to 35: Hydraulic

4

Power Cylinder Quantity
(only for dual-cylinder models)
x2: Two cylinders

5

Product Type
G: Gas-over-oil

6

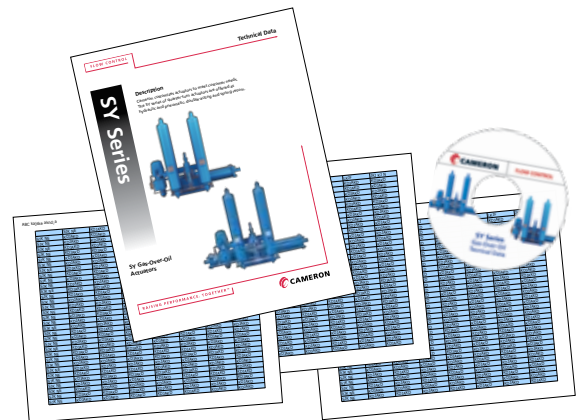
Yoke Type
A: Canted
S: Symmetric

7

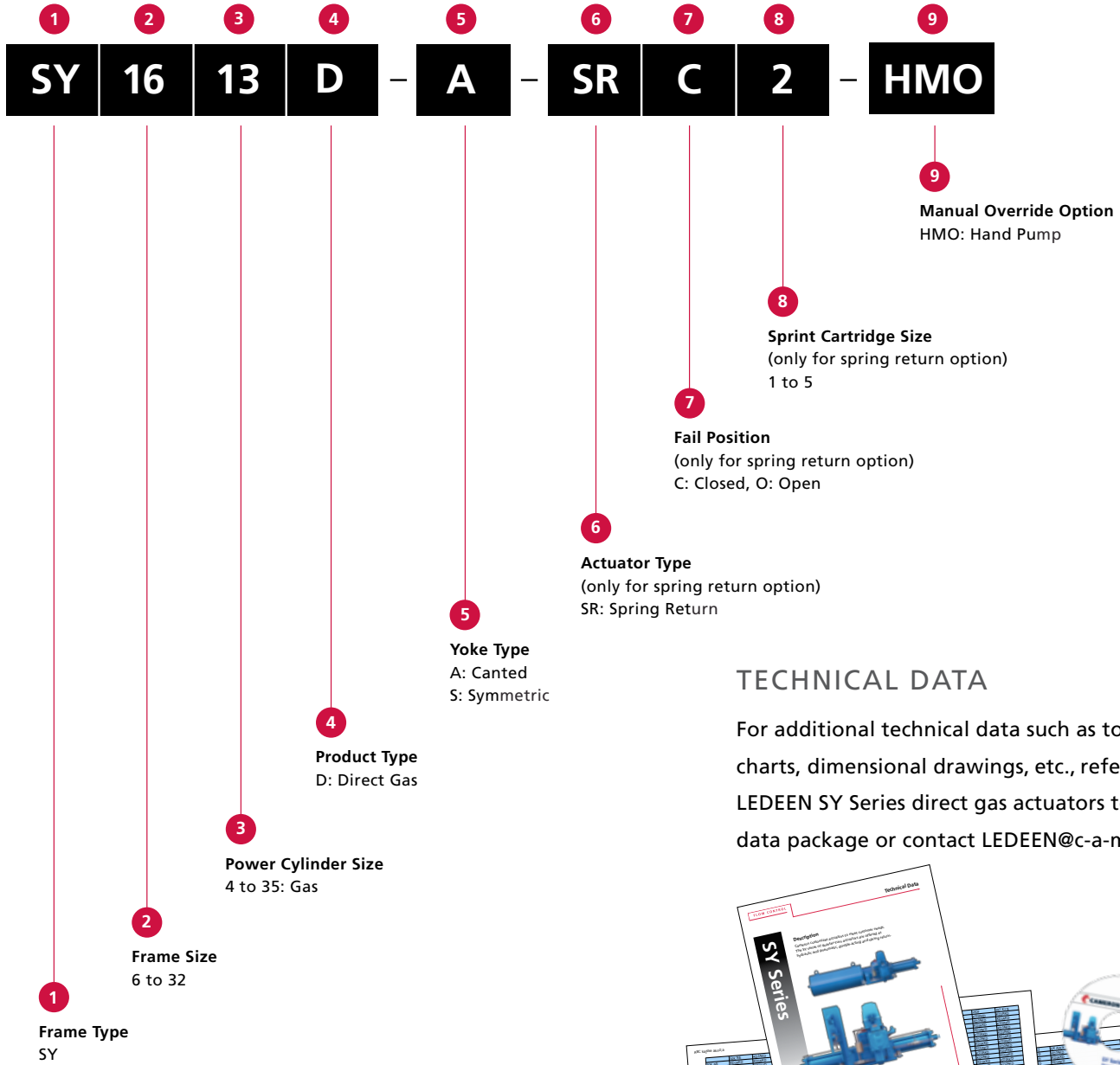
Manual Override Option
Hand Pump override is provided with each gas-over-oil assembly. No selection is required.

TECHNICAL DATA

For additional technical data such as torque charts, dimensional drawings, etc., refer to the LEDEEN SY Series gas-over-oil actuators technical data package or contact LEDEEN@c-a-m.com



Direct Gas



TECHNICAL DATA

For additional technical data such as torque charts, dimensional drawings, etc., refer to the LEDEEN SY Series direct gas actuators technical data package or contact LEDEEN@c-a-m.com



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email valveautomation@c-a-m.com



HSE Policy Statement

At Cameron, we are committed ethically, financially and personally to a working environment where no one gets hurt and nothing gets harmed.