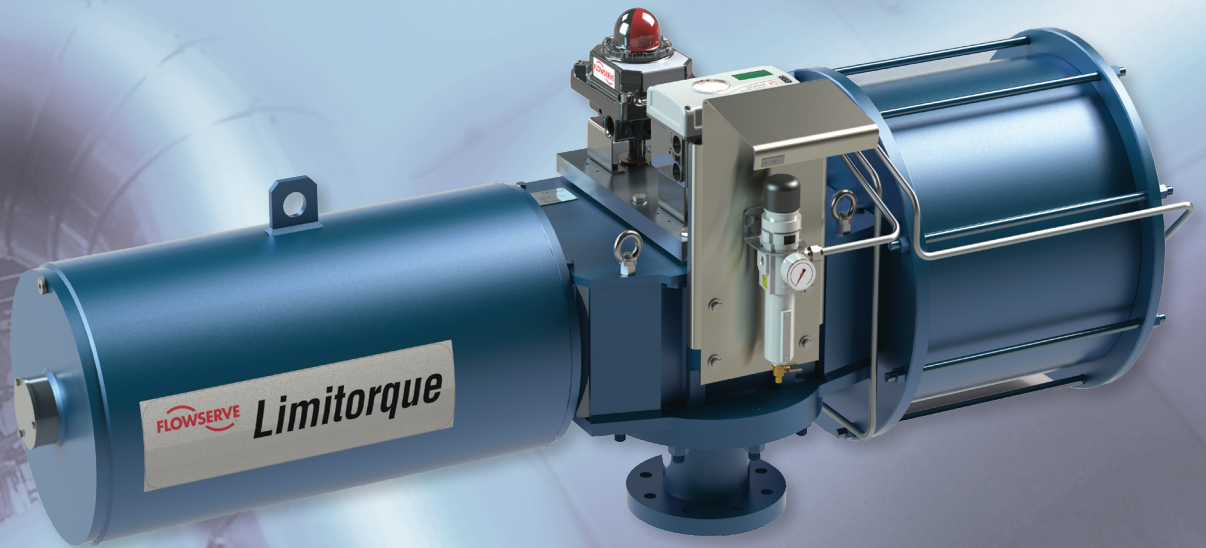




Limitorque™ LPS

Heavy-Duty Pneumatic Scotch Yoke Actuator



Experience In Motion

Quality, reliability and efficiency

The Limitorque LPS pneumatic Scotch yoke actuator is designed to meet the oil and gas industry's most recent and stringent safety and performance standards. Its heavy-duty design features robust construction in a compact dimensional footprint, guaranteeing high torque output with reduced air consumption over the lifespan of the actuator. The range of LPS actuators is able to provide up to 550 kNm (405 659 ft-lb) of precisely controlled torque in double-acting and spring-return configurations, suitable to operate quarter-turn valves in all oil and gas applications, including high-integrity pressure protection systems (HIPPS).

Exceeding requirements

Today's industry requirements are more rigorous than ever before. Nowhere is this more evident than in the oil and gas industry, where new requirements are incorporated into project specifications almost every day. The LPS actuator addresses these demanding requirements. It is the most technically advanced and market-compliant actuator available anywhere in the world.

Advanced control systems

Available in a wide range of materials suitable for use in the most demanding conditions, LPS actuators are complemented by a comprehensive range of control systems, including ESD, PST, line-break and quick-closing options. A suite of standard controls systems is available for short delivery, but the Limitorque engineering team can design custom solutions for the largest and most complex customer requirements.

Industry-leading design life

The LPS actuator features a 25-year design life, depending on service conditions, proper installation, operation and maintenance. In order to achieve this industry-leading design life, in-field maintenance is prescribed to be performed every six years of operation. For high-cycle applications, such as control valve operation, more frequent maintenance of the replaceable wear surfaces, as outlined in EN 15714, may be required.

A complete actuation solution

To complete the automation package, LPS actuators are available with accessories such as lockout modules and gear overrides. Limitorque provides engineering design services for mounting hardware, ensuring that your actuation solution is ready to handle the toughest challenges.



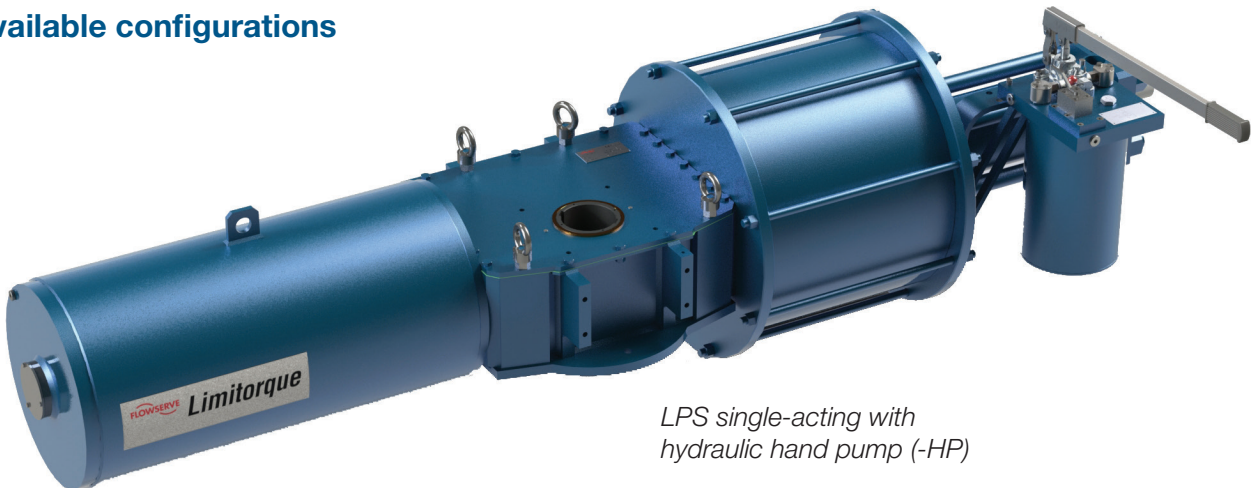
Heavy-duty performance

LPS actuators provide up to 550 kNm (405 659 ft-lb) of heavy-duty torque. Enhanced performance is achieved by using a superior Scotch yoke support design that significantly reduces transverse loads. LPS actuators feature modular construction to minimize repair time and initial cost while maximizing process availability.

Features and benefits

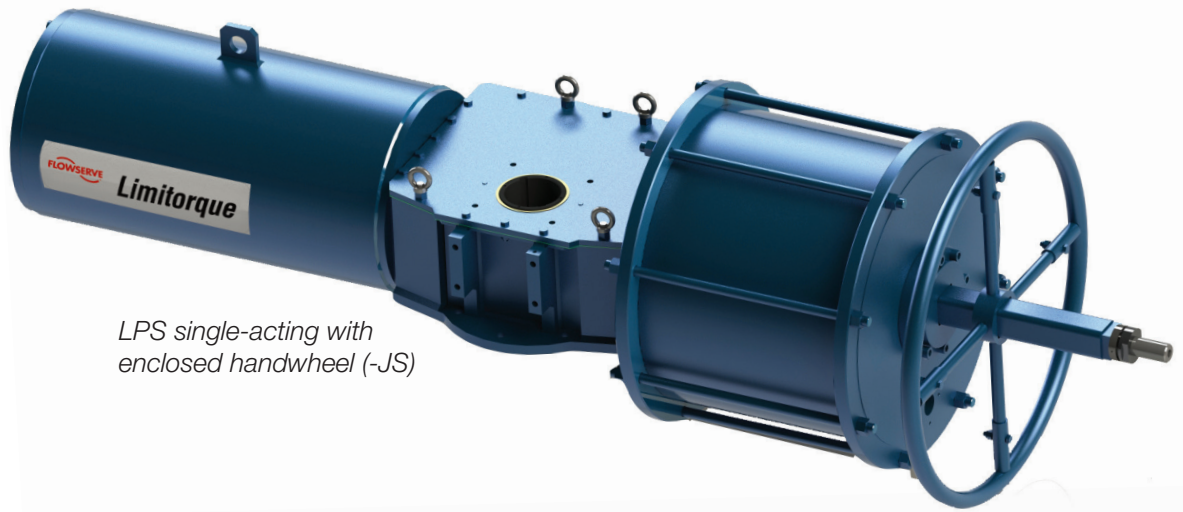
- Spring return single-acting (fail close CW and fail open CCW) and double-acting (fail last/fail as is) executions
- True modular design for flexible and easy field conversion from fail close CW to fail open CCW configuration or vice versa
- Scotch yoke housing design optimized to facilitate field maintenance and provide extended design life
- Symmetrical and canted Scotch yoke types to perfectly fit valve torque requirement
- Fabricated carbon steel Scotch yoke housing, pneumatic cylinder and spring can, providing the most rugged actuator available; different materials of construction for polar or offshore applications upon request
- ENP-lined cylinders with chrome-plated piston rod; stainless steel cylinders, tie rods and spool pieces available upon request
- Increased maximum valve stem acceptability to allow direct coupling with valves
- Suitable for use in on/off, modulating and control valve applications in general service, protective service and safety applications such as ESD or HIPPS
- Full range of accessories: switchboxes, positioners; ESD and PST functionalities; custom control panels; fire protection; quick exhaust and dampers; manual and hydraulic overrides*

Available configurations

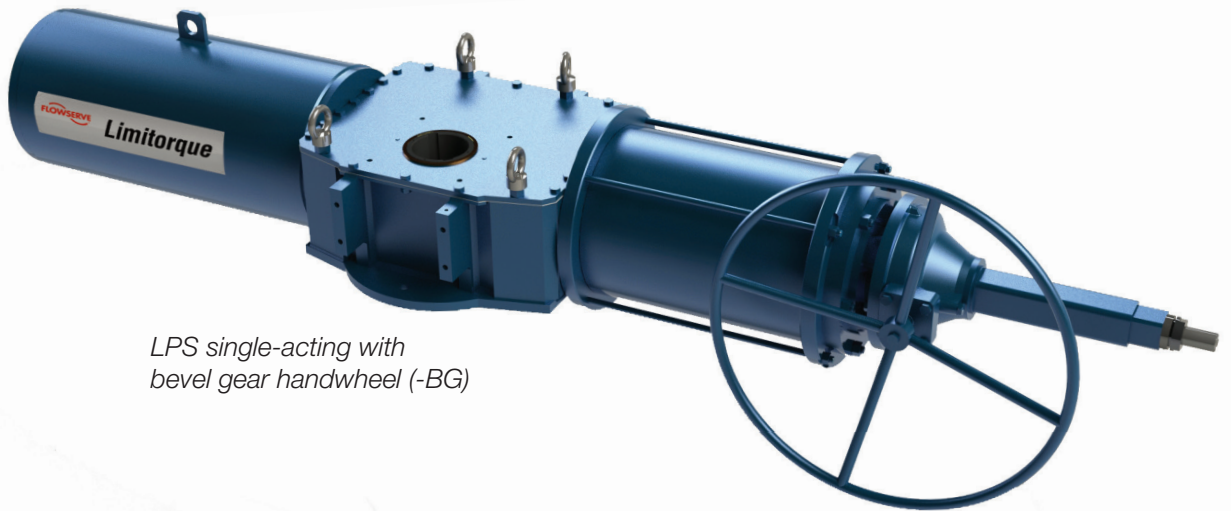


LPS single-acting with hydraulic hand pump (-HP)

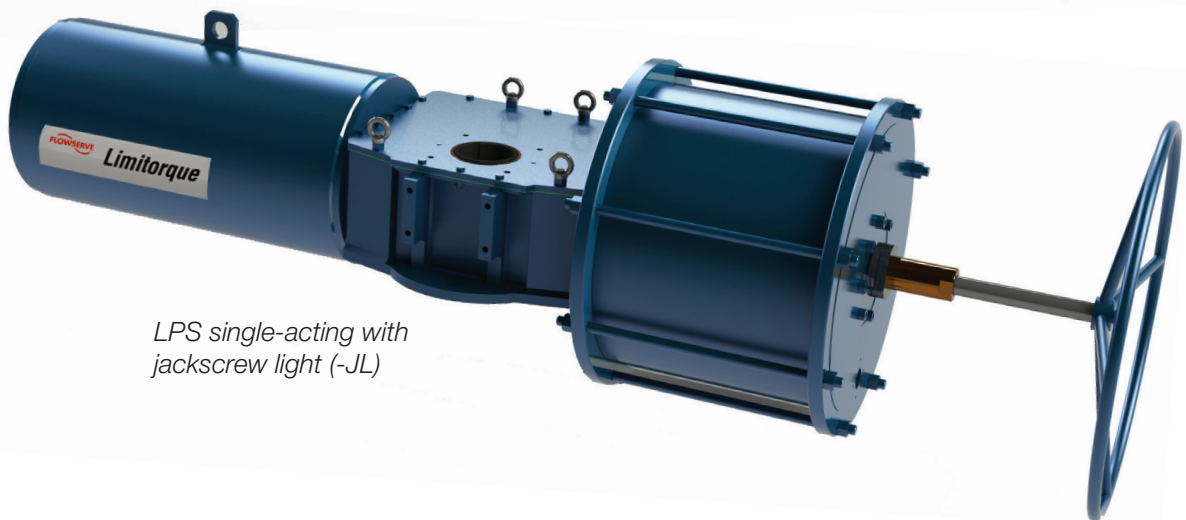
* Sandwich de-clutchable worm gear manual override available as option upon request



LPS single-acting with enclosed handwheel (-JS)



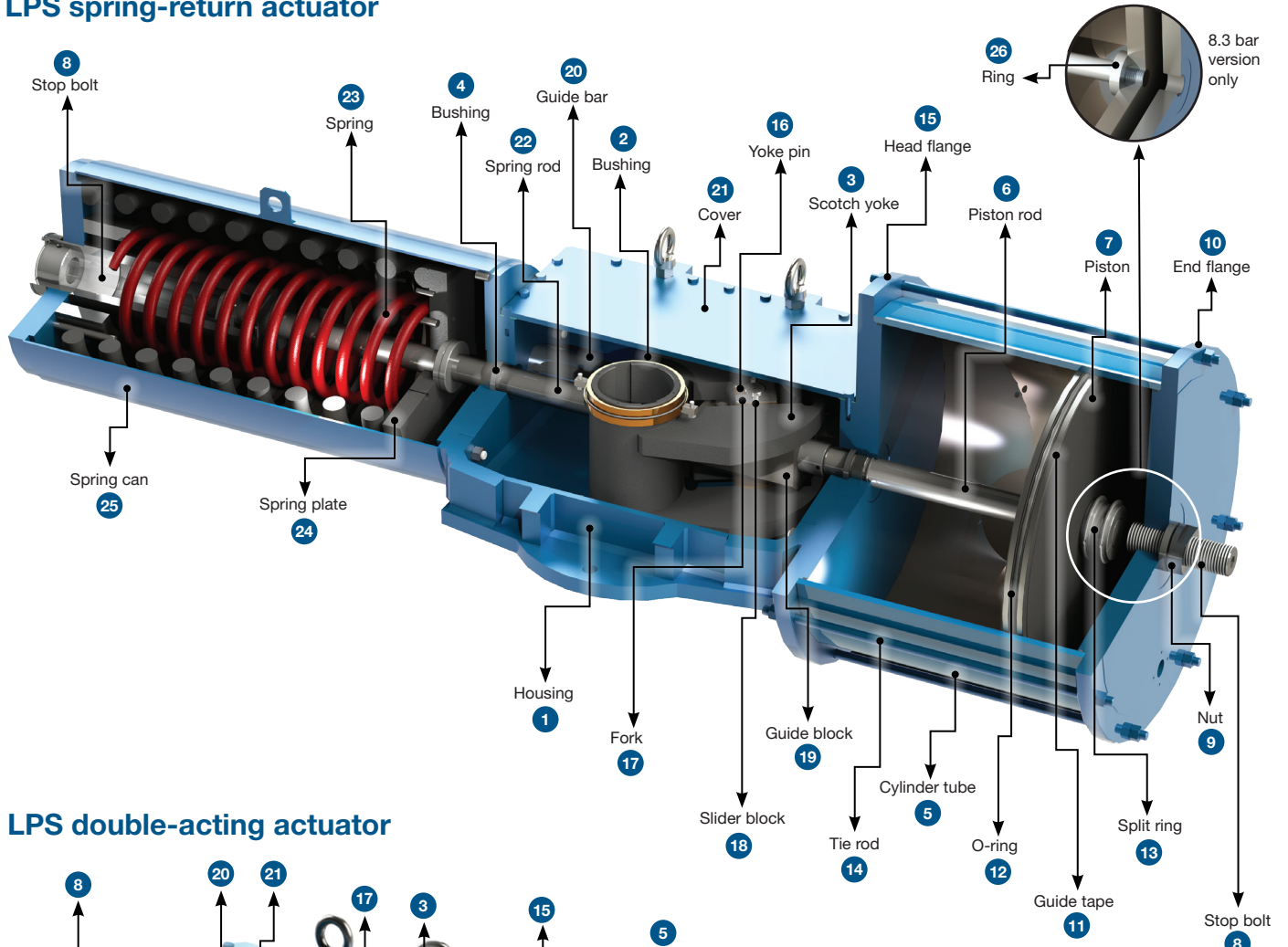
LPS single-acting with bevel gear handwheel (-BG)



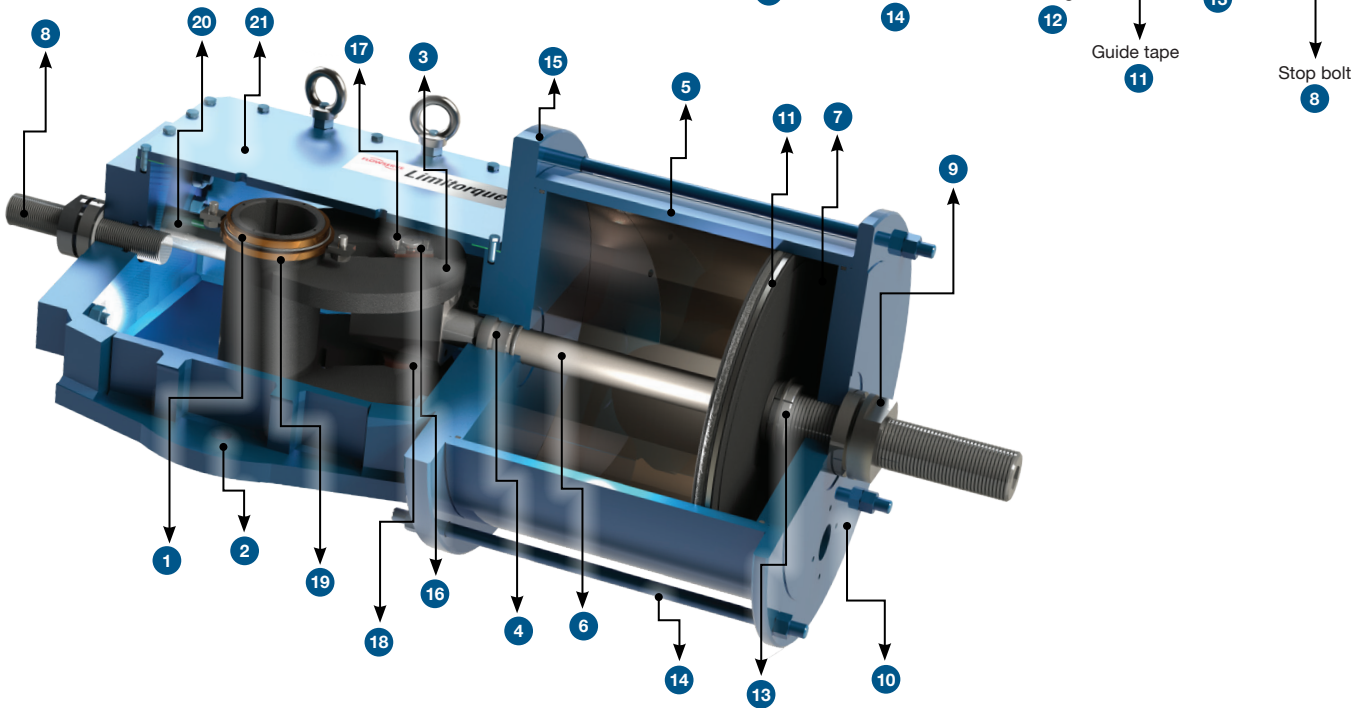
LPS single-acting with jackscrew light (-JL)

Heavy-duty construction

LPS spring-return actuator



LPS double-acting actuator



Standard materials of construction*

Item	Description	Material	Item	Description	Material
1	Housing	Carbon steel	14	Tie rod	Alloy steel (with treatment)
2	Scotch yoke bushing	Carbon steel	15	Head flange	Carbon steel
3	Scotch yoke	Carbon steel	16	Yoke pin	Alloy steel
4	Bushing	PTFE + steel	17	Fork	Carbon steel
5	Cylinder tube	Carbon steel (with treatment)	18	Slider block	Bronze
6	Piston rod	Alloy steel (chrome plated)	19	Guide block	Carbon steel
7	Piston	Carbon steel (with treatment)	20	Guide bar	Alloy steel (chrome plated)
8	Stop bolt	Carbon steel (with treatment)	21	Cover	Carbon steel
9	Nut	Carbon steel	22	Spring rod	Alloy steel
10	End flange	Carbon steel	23	Spring	Spring steel
11	Guide tape	PTFE + graphite	24	Spring plate	Carbon steel
12	O-ring	NBR	25	Spring can	Carbon steel
13	Split ring	Alloy steel	26	Ring (8.3 version)	Alloy steel

*Special or different materials available upon request

Technical data

Specifications

- Available in standard single-acting spring-return and double-acting configurations, in torque ranges up to 550 kNm (405 659 ft-lb); contact factory for larger sizes
- Standard cylinder maximum allowable working pressure (MAWP): 12 barg (174 psig). Alternative 8.3 version with MAWP: 8.3 barg (120 psig)
- Suitable supply medium: instrument air, nitrogen or sweet gas; contact factory for sour gas applications
- -29°C to 100°C (-20°F to 212°F) standard operating temperature range; -20°C to 100°C (-4°F to 212°F) standard PED operating temperature range; lowest temperature -60°C (-76°F) and highest temperature 160°C (320°F) ranges available upon request (polar, cold, arid and tropical temperature requirements in accordance with IEC 60721)
- End-mounted adjustable travel stops $\pm 5^\circ$; available also in an enclosed protected version upon request



Key certifications and standards compliance

- Certified according to ATEX 2014/34/EU Ex II 2GD c IIC T6
- IP66/IP66M and IP67/IP67M configurations per EN 60529
- SIL 3 certified in accordance with IEC 61508
- Available in compliance with PED 2014/68/EU, ASME BPVC Sec. VIII Div. 1, EN 13445-3 Part 2 for Unfired Pressure Vessels
- NEMA4 and NEMA4X per NEMA 250
- Available valve interface in compliance with ISO 5211
- Actuator spring design in compliance with EN 13906
- Corrosion protection in compliance with ISO 12944-2 and EN 15714-3; optionally available up to and including C5-M
- Available in compliance with NACE specification MR0175 for sour gas applications
- Manufactured and tested in compliance with ISO 9001 and EN 15714-3
- Certified according to CU TR and GOST-R

General selection table

	Series	Body size	Yoke	Cylinder	Temp. range	Fail action	Spring comb.	Options
Example model code →	LPS	20	A	535	B	FC	4-1	JL
<p>LPS - Limitorque pneumatic Scotch yoke actuators LHS - Limitorque hydraulic Scotch yoke actuators LHH - Limitorque hydraulic high-pressure Scotch yoke actuators LDG - Limitorque direct gas Scotch yoke actuators</p>								
<p>15, 20, 25, 30, 35, 40, 50, 60</p>								
<p>A - Symmetric Scotch yoke B - Custom Scotch yoke C - Canted Scotch yoke</p>								
<p>50, 55, 60, 65 [...] 485, 535, 585, 635 [...] 1500, 1600, 1700, 1800</p>								
<p>Pneumatic 12 barg (175 psig) Direct gas 105 barg (1500 psig) and Hydraulic 207 barg (3000 psig) or 350 barg (5000 psig) cylinders</p> <p>B - Buna seals Temp range: -20°C; 100°C (-4°F; 212°F)</p> <p>S - Fluorosilicone seals Temp range: -40°C; 100°C (-40°F; 212°F)</p> <p>F - Fluorosilicone seals Temp range: -40°C; 100°C (-40°F; 212°F) Required: EN-10204 3.1</p> <p>L - Fluorosilicone seals Temp range: -50°C; 100°C (-58°F; 212°F)</p> <p>Z - Fluorosilicone seals Temp range: -60°C; 100°C (-76°F; 212°F)</p> <p>V - Viton® seals Temp range: -29°C; 160°C (-20°F; 320°F)</p>								
<p>Pneumatic 8.3 barg (120 psig) cylinders</p> <p>A - Buna seals Temp range: -20°C; 100°C (-4°F; 212°F)</p> <p>R - Fluorosilicone seals Temp range: -40°C; 100°C (-40°F; 212°F)</p> <p>E - Fluorosilicone seals Temp range: -40°C; 100°C (-40°F; 212°F) Required: EN-10204 3.1</p> <p>K - Fluorosilicone seals Temp range: -50°C; 100°C (-58°F; 212°F)</p> <p>Y - Fluorosilicone seals Temp range: -60°C; 100°C (-76°F; 212°F)</p> <p>U - Viton seals Temp range: -29°C; 160°C (-20°F; 320°F)</p>								
<p>D1 - Double-acting, single cylinder (STD) D2 - Double-acting double cylinders DD - Double-acting, tandem cylinders FC - Spring fail close FO - Spring fail open</p>								
<p>1-1, 1-2, 1-3 [...] 2-1, 2-2, 2-3, 2-4 [...] 3-1, 3-2, 3-3 [...] 4-1, 4-2, 4-3, 4-4 [...] 5-1, 5-2, 5-3, 5-4 [...]</p>								
<p>JL - Jackscrew light handwheel JS - Enclosed jackscrew handwheel BG - Bevel gear handwheel HP - Hydraulic manual hand pump [...]</p>								

Manual overrides

Every Limitorque actuator can be provided with the optimal solution for manual operation. Limitorque handwheel, geared and hydraulic pump overrides are calculated and designed to maximize performance and ease of use.

Suffix	Description	LPS actuator models							
		LPS-15	LPS-20	LPS-25	LPS-30	LPS-35	LPS-40	LPS-50	LPS-60
-JL	Jackscrew light handwheel	•	•						
-JS	Enclosed jackscrew handwheel	•	•						
-BG	Bevel gear handwheel			•	•				
-HP	Hydraulic manual hand pump	•	•	•	•	•	•	•	•

Torque and pneumatic pressure table

Model	Maximum operating torque, Nm (ft-lb)	Maximum operating pressure, barg (psig)	Maximum allowable working pressure, barg (psig)	8.3 VERSION CYLINDERS— Maximum allowable working pressure, barg (psig)
LPS-15	6000 (4425)	Variable for every cylinder size	12 barg (174 psig)	8.3 barg (120 psig)
LPS-20	12 000 (8851)			
LPS-25	21 000 (15 489)			
LPS-30	40 500 (29 871)			
LPS-35	75 000 (55 317)			
LPS-40	150 000 (110 634)			
LPS-50	300 000 (221 268)			
LPS-60	550 000 (405 659)			Consult factory

Options

Limatorque offers a wide range of control packages and configuration options, with a solution for every application.

- Pneumatic control panels, with standard or customer-specified components and functionalities
- Valve mounting adaptors, including open, closed or sealed spool types
- Complete range of handwheel, geared or hydraulic manual overrides
- Limit switch boxes
- Pneumatic, electro-pneumatic and smart positioners
- Mechanical, electro-mechanical or electronically controlled partial stroke testing
- Fast-acting actuators, including integral quick exhaust valves and damping solutions
- High-cycle actuators
- Regulating or modulating duty actuators
- Custom actuators for any application requirement

Other Limatorque fluid power actuators

- **LPC** series compact pneumatic Scotch yoke actuators
- **LHC** series compact hydraulic Scotch yoke actuators
- **LHS/LHH** series hydraulic actuators and relevant controls
- **LDG** gas-powered actuators and relevant controls
- **LRP** pneumatic rack and pinion actuators
- **LPL** (pneumatic) and **LHL** (hydraulic) linear actuators
- **LEH** electro-hydraulic actuators
- On-board or stand-alone hydraulic power units

Extended product range offerings

Electric actuators and controls

MX, QX - Non-intrusive electronic actuators

Master Station and multiple bus network protocols available

L120, SMB - Electro-mechanical actuators (L120) for nuclear and severe duty service

Other products and accessories

V, WG, SR - Gearboxes for manual or motorized operation

PMV™ - Limit switch boxes and digital positioners

Logix™ - Digital positioners

Flowserve solutions

In addition to providing actuators and controls, Flowserve and Limatorque lead the industry with all the solutions that our customers need to maintain efficiency and productivity.

- Aftermarket parts and services
- Field and application assessments
- Actuator inspection, maintenance and repair
- Engineering and technical services, including application engineering support
- Education and training, including on-site and online





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