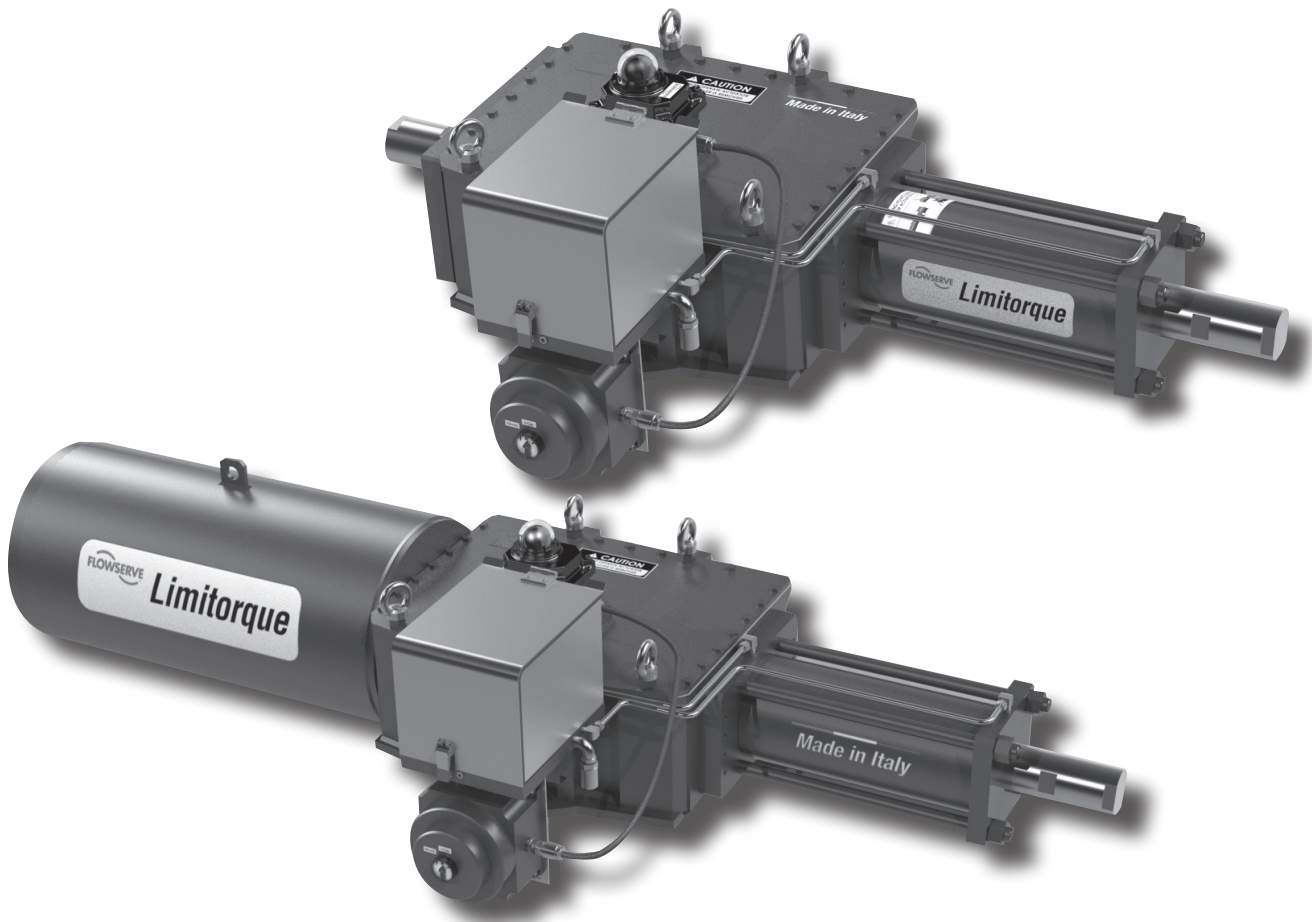




# TECHNICAL BULLETIN

## **Limitorque™ LDG Direct Gas Heavy-Duty Actuator Series**

FCD LFENTB0005-00-A4 - 06/16





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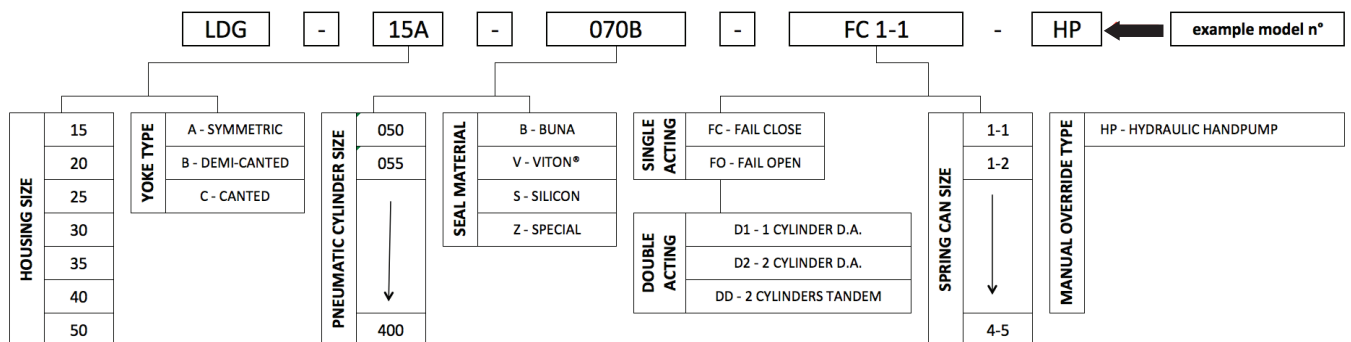
## LDG Series Direct Gas Heavy-Duty Actuator Specifications

1. The LDG range of Limitorque Direct Gas Actuators is a robust, modular scotch yoke design, available in both spring return and double acting configurations. It is suitable for actuating ball, butterfly and plug valves or any other quarter-turn application.
2. LDG Direct Gas actuators deliver up to 300 kNm\* (221 000 ft-lb) of precisely controlled torque. LDG Limitorque Direct Gas Actuator is part of Limitorque Fluid Power Systems family of heavy-duty scotch yoke actuators. The same design philosophy introduced on heavy-duty LPS actuators has been adopted for the LDG range, bringing enhanced performance and reliability.
3. To complete the actuation package, LDG actuators are supplied with the on board Medium-High Pressure Control Group (MHPC) including both local and remote operation configurations and multiple optional functionalities are available to meet all pipeline applications. The Limitorque engineering team can also design custom solutions for the most complex customer requirements.
4. Limitorque provides engineering design services for mounting hardware, ensuring that your actuation solution is ready to handle the toughest challenges.
5. The LDG actuator is designed to provide 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 6 years of operation. For high-cycle applications, more frequent maintenance of replaceable wear surfaces, as outlined in EN 15714, may be required.
6. Suitable for use in on/off, modulating and isolating valve application in general service, protective service and safety applications such as ESD or HIPPS.
7. Available valve interface in compliance with **ISO 5211** or **MSS SP-101**, upon request as an option.
8. Manufactured and tested in compliance with **EN 15714-3** and **ISO 12490**.
9. Spring components are designed in compliance with **EN 13906-1**.
10. Surface coating and corrosion protection in compliance with **ISO 12944-2** up to and including **C5-M** if requested.
11. Environmental resistance has been certified to meet or exceed the requirements of **IEC 60529** up to and including **IP66/66M and IP67/67M**.
12. The LDG actuator is suitable for use in Safety Integrated Systems in accordance with **IEC 61508** up to and including **SIL Level 3**.
13. The actuators in the LDG series meet the requirements of **ISO 5599-2**.
14. LDG actuators are available in accordance with **ATEX 94/9/EC Ex II 2GD c IIC T6**, as it relates to mechanical actuators.
15. Actuators are available in compliance with **NACE** specification **MR0175** for sour gas applications
16. Shaft-driven accessories/devices are directly mounted to **VDE VDI 3845 NAMUR** compliant mounting locations.
17. The actuator is manufactured and tested in compliance with an **ISO 9001** Quality Assurance Program.
18. Integral travel stops provide **90°±5°** of stroke adjustment and are designed for the MAWP of the actuator, up to 105 barg (1500 psig)
19. The materials of construction and seals of the LDG family of actuators are available for a wide range of service temperatures, including **Tropical, Arid, Temperate, Cold and Polar** regions in accordance with **IEC 60721**.
20. The high pressure pneumatic cylinder design features proven and reliable external tie rods suitable for continuous duty service at the maximum rated pressure. Wear and corrosion protection of all components is ensured with suitable treatments and coatings. **ENP** (electro less nickel plating) is the standard for the internal surface of the high pressure pneumatic cylinder to ensure complete sealing and superior corrosion resistance. Other coatings for the internal surface of the cylinder are available upon request.
21. Pressure modules are available in compliance with:
  - a. **Pressure Equipment Directive 97/23/EC**
  - b. **ASME BPVC Sec. VIII, Div. 1**
  - c. **EN 13445-3, Part 3 for Unfired Pressure Vessels**
22. All actuators and modules meet acceptance criteria defined by Flowserve test specifications. High pressure pneumatic cylinder cylinders can be tested as stand-alone modules prior to assembly or in case of stocking or retrofitting.

\* Contact factory for larger sizes and higher output torques.

23. The actuator is provided with two full-length key slots in the yoke suitable for mounting in alternate orientations (horizontally or vertically – parallel or perpendicular to the piping system).
24. The LDG is available with either a symmetric or canted scotch yoke. Scotch yoke cants are available from 1° to 15° upon request, pending on application.
25. All modules align and mate with close-tolerance machined flanges with no exposed threaded connections.
26. The high-strength, heat-treated alloy steel guide bar is hard chrome plated for wear and corrosion protection.
27. Piston rods are designed to handle lateral loads to effectively minimize deflection. The piston rod is detachable from the torque module without special tools and does not require module disassembly.
28. Pressure seals utilize O-rings, quad-rings or V-rings as appropriate to eliminate environmental ingress. No gaskets are used in pressurized regions of the actuator.
29. The push-to-compress springs are safely enclosed and welded and are positively retained on the torque module under all load conditions. No external tie rods/braces are required to contain the springs. Springs are designed in accordance with **EN 13906-1** and combined and positioned to eliminate potential contact with the container or each other in the case of multiple springs. Springs are shot peened for maximum life and are painted and permanently lubricated coated prior to assembly to eliminate corrosion.
30. The spring and spring guide are self-centered and bearing guided within the spring module. The spring rod is guided in a self-lubricating bearing and connected to the torque module through a large pinned connection designed for safe operation at all load conditions. Installation and removal of the spring module does not require special tools.
31. Maintenance-free, self-lubricating bearings are used to minimize friction of the yoke, yoke-pins and slider blocks in the yoke slots for low friction and to minimize contact stresses in order to provide the longest possible service life.
32. Retention of the yoke pin is by a single plate to permit easy removal of the yoke pin and slider blocks while the actuator is mounted in the valve. No specialized tools are required.
33. LDG Medium-High Pressure Control group (MHPC) is mounted on-board the actuator within a dedicated enclosure in 316 stainless steel.
34. MHPC group includes an integral terminal board and piping manifold simplifying piping and wiring assembly and minimising leak paths in gas control circuit.
35. Main control components, terminal box and manifold build is anodized aluminium
36. Control components include solenoid and/or manually operated valves (depending on specific customer requirement) for on-off local or remote operation, shuttle valve allowing pressure uptake upstream or downstream of valve, and compact LFPS design dehydrating filter.
37. Control components are all rated for full system pressure of up to 105 barg/1500 psig. Full pressure rating of controls and actuator power cylinder eliminates need for pressure reducer, reducing system complexity, eliminating risks of gas condensation and freezing, allowing higher torque output with smaller overall dimensions and reducing gas use and exhaust
38. Control group is certified IP66, Atex II GD, Ex-d-IIC T6, IECex.

# Actuator Selection Table



## Seals Material

Code	Material	Temperature Range	Climate Classification according to IEC60721
B	Buna	Std Temp: -29°C to +100°C (-20°F to 212°F)	Tropical & Arid
V	Viton®	Hi Temp: up to +160°C (320°F)	
S	Silicon	Low Temp: down to -40°C (-40°F)	Temperate
Z	Other	Special Applications: Consult Factory	Cold & Polar

# Actuator Selection Guidance

## 1. Scope

This section provides guidance for the selection of the proper LDG actuator to suit specific operational requirements. A basic understanding of scotch yoke actuators and the typical applications in which they are used is provided in order to assist in selection of the most suitable actuator. While the selection procedures and product data contained herein cover many applications, due to the

wide range of applications in which the LDG actuators can be used, this information will not cover every set of operational requirements. The Limitorque applications team is always available to assess specific applications and help with selection of the appropriate LDG actuators. Please contact your local office for assistance.

## 2. General Definitions/Terms Used

<b>Quarter-turn</b>	A device that rotates by a nominal 90°. LDG series actuators rotate $\pm 5^\circ$ more than the nominal 90°.
<b>Position</b>	The degree of rotation describing an actuator's current location, the zero being referred from complete counter-clockwise position of the yoke. The mid-position of the actuator is at 45° and 90° being the end of clockwise stroke.
<b>CW</b>	Clockwise rotation.
<b>CCW</b>	Counter-clockwise rotation.
<b>Stroke</b>	A continuous, 90° rotation of a quarter-turn actuator.
<b>Cycle</b>	Two strokes, one clockwise (CW) rotation and other counter-clockwise (CCW) rotation, constitute one cycle of operation of the actuator.

\*Viton is a registered trademark of E. I. du Pont de Nemours.

<b>Safety Factor</b>	A factor multiplied by the valve’s basic required torque value to increase the amount of torque required to meet safety requirements in a given application. When the valve’s torque requirements are not known with certainty, or due to other application demands, use of a safety factor is required in the selection process in order to meet the worst-case torque requirements.
<b>Pneumatic Break Torque</b>	Output torque when the actuator is in the position to start the pressure stroke. [The torque required to initiate the pressure stroke.]
<b>Pneumatic End Torque</b>	Output torque at the end limit of the pressure stroke. [The torque required to seat the valve at the end of the pressure stroke.]
<b>Run Torque</b>	The output torque recorded while the actuator is in the mid-position of the pressure stroke (45°). For symmetrical yoke double-acting actuators, this is the minimum torque output obtained during the complete stroke.
<b>Spring Break Torque</b>	The output torque when the actuator is in the position to start the spring stroke. [The torque required to initiate the spring stroke.] The spring is fully compressed at this position and generates the maximum spring force.
<b>Spring End Torque</b>	The output torque when the actuator has reached the end limit of spring stroke. [The torque required to seat the valve at the end of the spring stroke.] The spring is fully extended at this position and generates the minimum spring force.
<b>Minimum Torque</b>	The output torque at an intermediate position of the spring stroke, where the output torque of the actuator is at its lowest value.
<b>MOP</b>	Maximum operating pressure of an actuator

### 3. Inputs for Sizing Gas Powered Scotch Yoke Actuators

Due to the scotch yoke mechanism, LDG actuators have a particular U-shaped output torque curve whether powered by a fixed supply pressure or the spring.

In sizing of actuators powered directly by pipeline gas, care must be taken to evaluate the valve torque requirements against the actuator output torques at the varying pressures in the actual pipeline.

For a proper actuator model selection, the safety factors between actuator output torque and valve torque requirement shall be calculated at least in six points along the valve stroke, and as minimum, at the minimum and maximum pipeline normal operating pressures.

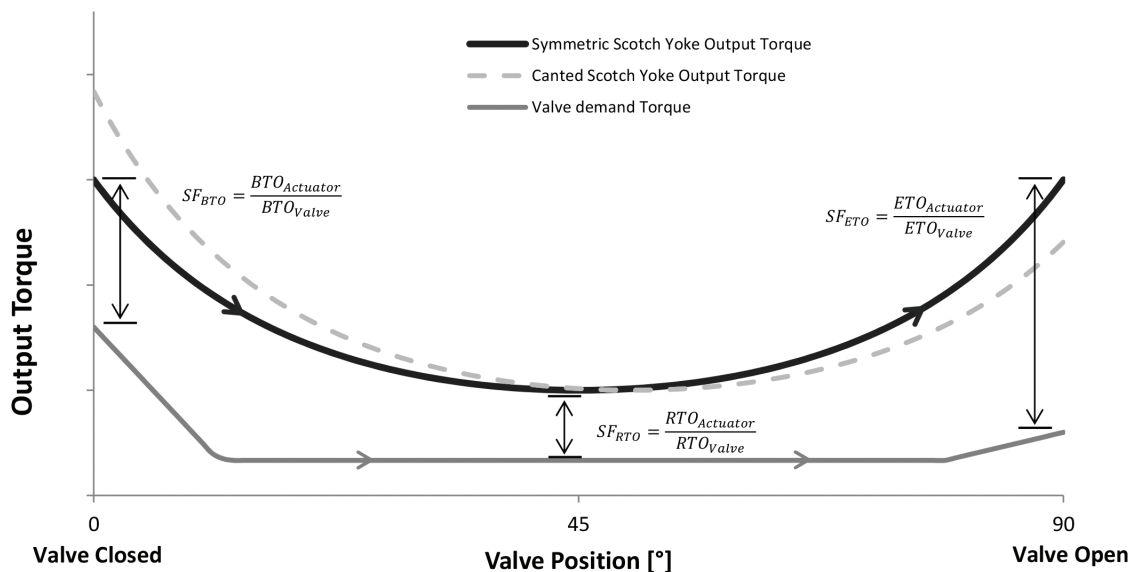


Figure 1: Actuator OPEN (by fluid) Torque Curve: Single Acting Spring Return – Fail Close (CW)

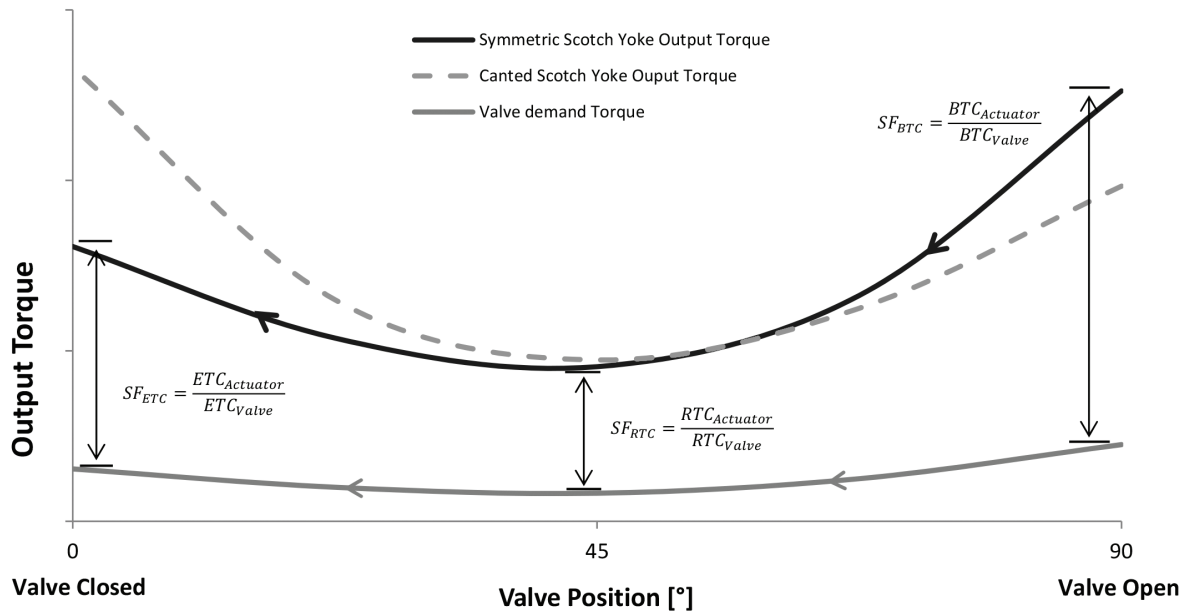


Figure 2: Actuator CLOSE (by spring) Torque Curve: Single Acting Spring Return – Fail Close (CW)

The minimum set of parameters and features necessary for an optimal actuator selection:

- Valve torques at minimum and maximum pipeline pressure, including MAST
- Type of actuator:
  - Single Acting/Spring Return: Fail Safe Close (CW) or Fail Safe Open (CCW)
  - Double Acting configuration for Fail Last or Fail As Is
- Minimum and Maximum gas supply pressure to the actuator
- Gas composition (H2S content) in case of sour gas applications
- Safety Factors requested by the project or by a specific application
- Working Temperature range
- Open/Close stroking times
- Additional options (manual override, limit switches, specific functional requirements such as line-break, low or high pressure trip, etc, others as applicable)

**Definitions:**

- BTO = Break to Open torque
- BTC = Break to Close torque
- RTO = Running to Open torque
- RTC = Running to Close torque
- ETO = End to Open torque
- ETC = End to Close torque
- MAST = Maximum Allowable Stem Torque
- SF = Safety Factor

## 4. LDG Manual Overrides

Manual overrides are necessary to allow operation of the valve actuators whenever motive pressure and/or electrical power are not available. All LDG models can be fitted with an optional manual override system through a hydraulic handpump. Limitorque hydraulic manual overrides are designed in accordance with EN 12570 and are available for both single acting (spring-return) and double acting actuator versions.

The hydraulic chamber of the handpump is completely segregated from the gas cylinder of the actuator to avoid any possibility of fluid contamination and frothing phenomenon

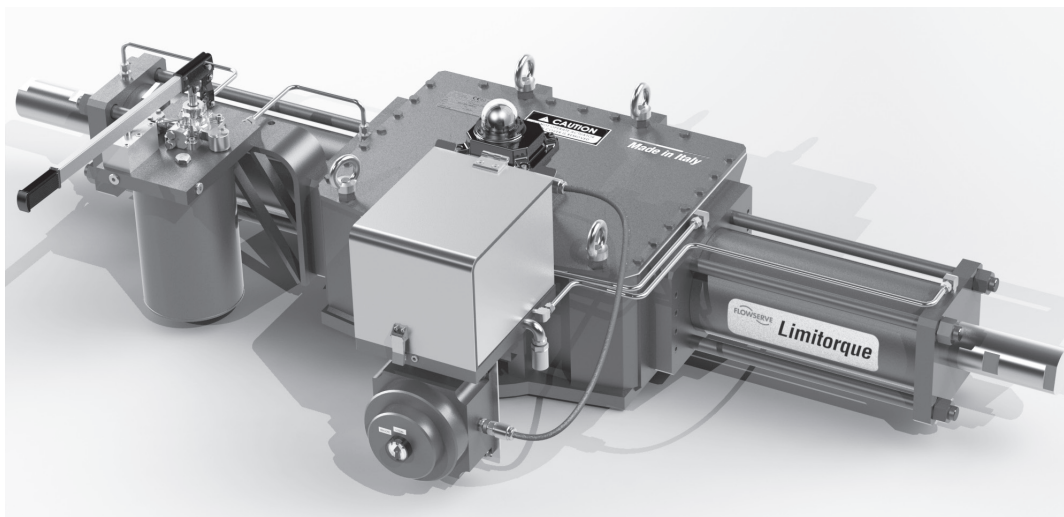


Figure 3: Manual Overrides



## 5. Single Action and Double Action Configurations

The LDG actuator is designed for work in both single acting (fail open and fail close) and double acting configurations:

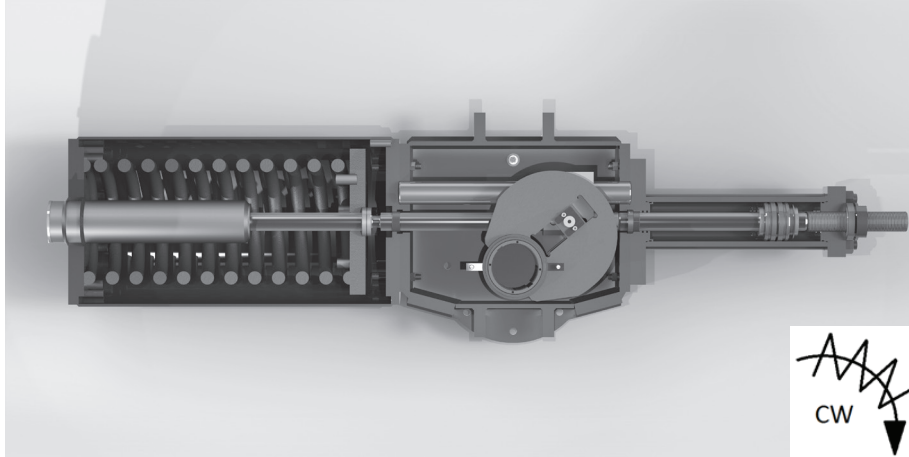


Figure 4: Single Acting Actuator Configuration: Fail Close – Fail Clockwise

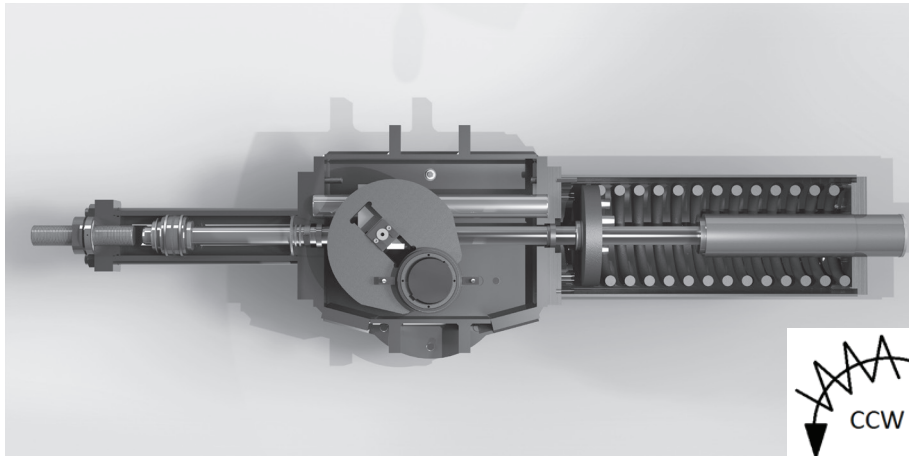


Figure 5: Single Acting Actuator Configuration: Fail Open – Fail Counterclockwise

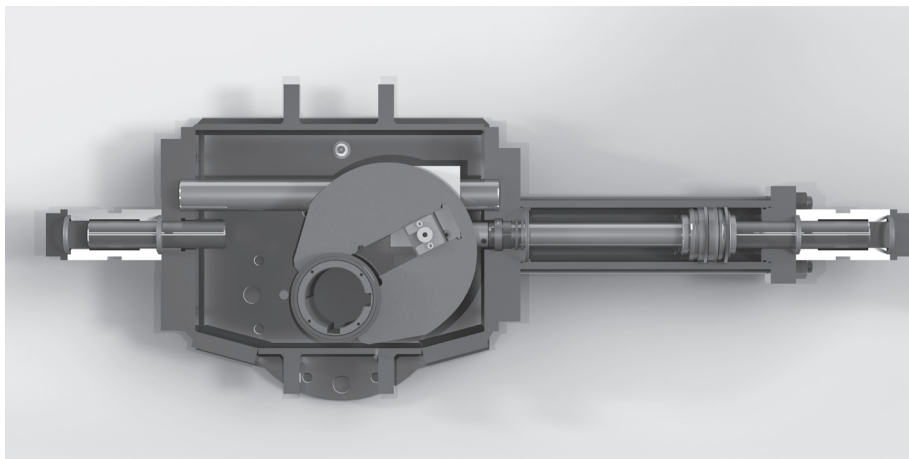


Figure 6: Double Acting Actuator Configuration – Close Position

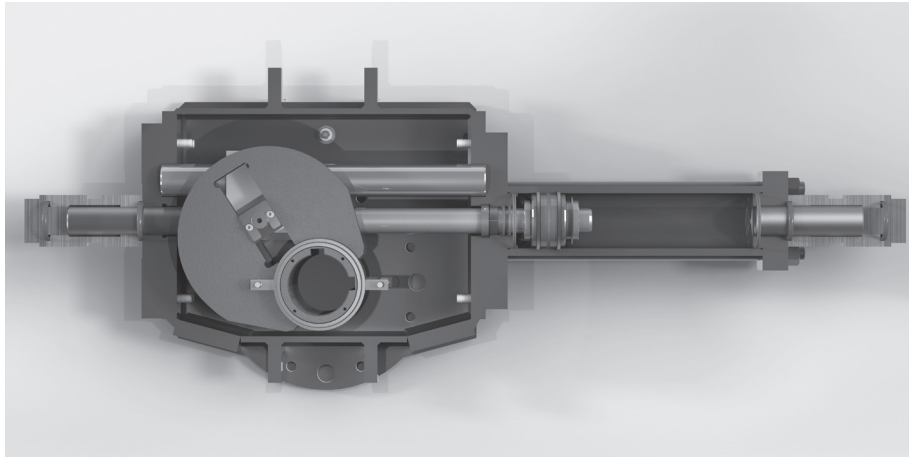


Figure 7: Double Acting Actuator Configuration – Open Position

## 6. Dimensions

The following Dimensions & Weight tables include main external dimensions referred to the relevant pictures included in each section. The overall lengths, the weights, the mounting dimension details, the interface dimensions and the tolerances are included as a guide for actuator selection.

The stated dimensions and weights include the actuators only, without any optional features, like the spool pieces, manual overrides etc.

The weight of MHPC group is given separately, in the base versions for single and double acting actuators. Weights and dimensions of MHPC may vary depending on functions requested.

**Note:** Performance data for LDG actuators is available upon request. For correct selection of LDG actuators, consult Limitorque Flowserve Application Engineers or local Sales Support.

## 7. Disclaimer

This publication is presented for information purposes only, with an effort to ensure the accuracy, the contents are not to be construed as warranties or guarantees, expressed or implied, regarding the products or services described herein or their use or applicability. The right to modify or improve the designs or specifications of our products at any time without notice is reserved.

## LDG Dimensional Data and Weights – Single Acting

Figure 8: Dimensional Data – Single Acting – Sym/Cant – Fail Close

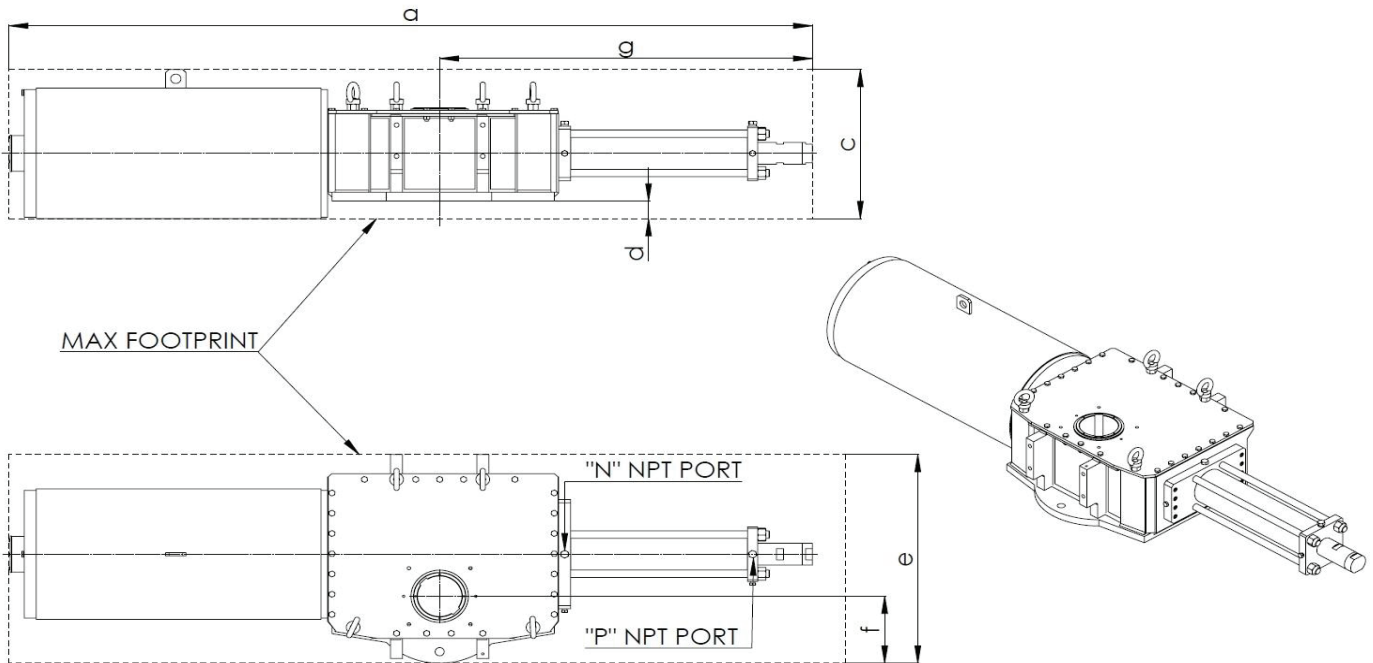
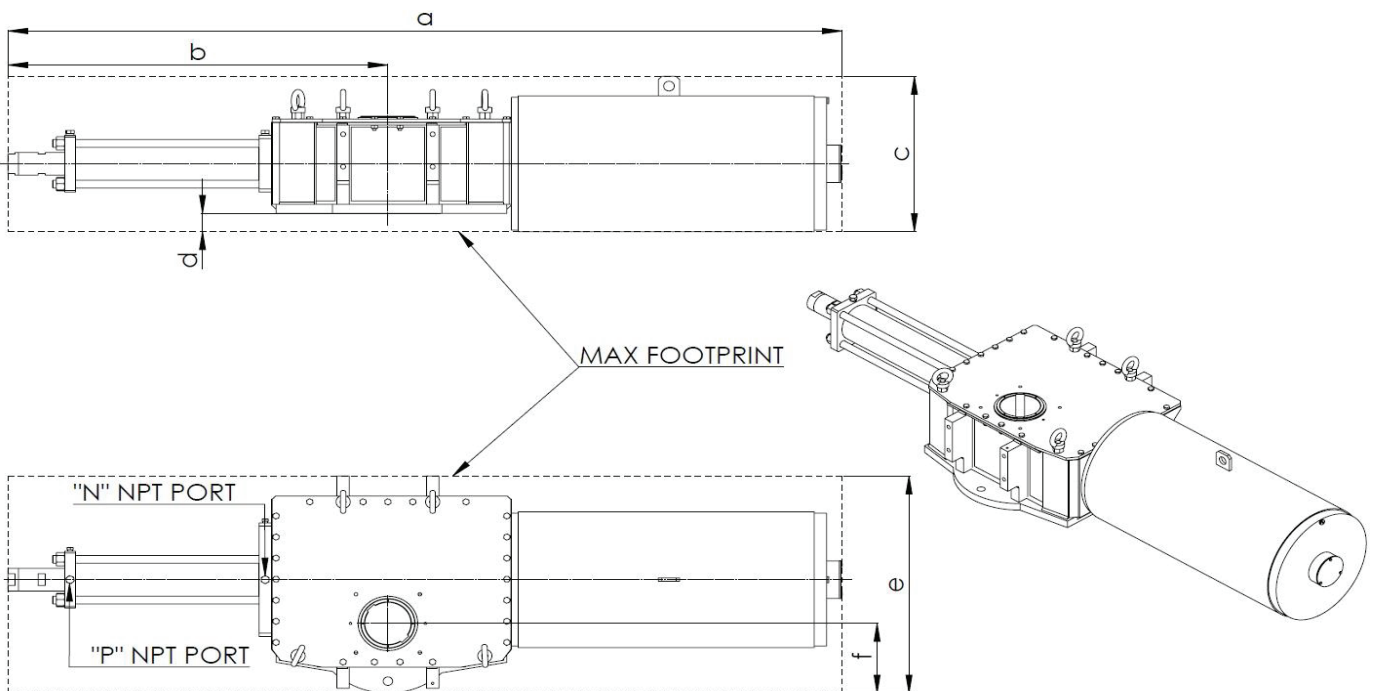


Figure 9: Dimensional Data – Single Acting – Sym/Cant – Fail Open











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Table with columns: Model, a, b, c, d, e, f, g, "P" NPT PORT, "N" NPT PORT, Weight, Swept Volume\*, MOT. Rows list various actuator models and their specifications.

\* Swept Volume data are referred to actuators with end stops adjusted for 90° of stroke.











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LDG Single Acting - Dimensions: mm (in) - Weights: Kg (lbs) - Swept Volumes: l (cu in) - MOT: Nm (ft-lb). Table with columns: Model, a, b, c, d, e, f, g, P NPT PORT, N NPT PORT, Weight, Swept Volume\*, MOT.

\* Swept Volume data are referred to actuators with end stops adjusted for 90° of stroke.

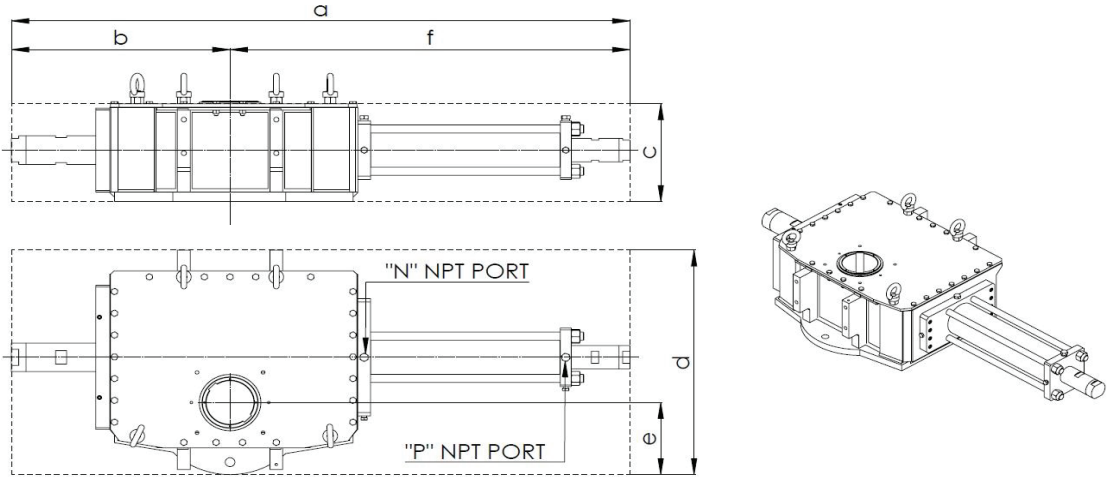






# LDG Double Acting: Dimensional, Weight and Volume Tables

Figure 10: Dimensional Data – Double Acting



LDG Double Acting - Dimensions: mm (in) - Weights: Kg (lbs) - Swept Volumes: l (cu in) - MOT: Nm (ft-lb)												
Model	a	b	c	d	e	f	"P" NPT PORT	"N" NPT PORT	Weight	Swept Volume*		MOT
										"P" PORT	"N" PORT	
LDG-15X-050Y-D1	736	256	183	352	120	480	2 x 1/2"	2 x 1/2"	79	0,3	0,2	6000
	29,0	10,1	7,2	13,9	4,7	18,9			173	18	14	4425
LDG-15X-060Y-D1	736	256	183	352	120	480	2 x 1/2"	2 x 1/2"	81	0,4	0,3	6000
	29,0	10,1	7,2	13,9	4,7	18,9			179	24	21	4425
LDG-15X-070Y-D1	736	256	183	352	120	480	2 x 1/2"	2 x 1/2"	84	0,5	0,4	6000
	29,0	10,1	7,2	13,9	4,7	18,9			184	31	27	4425
LDG-15X-080Y-D1	736	256	183	352	120	480	2 x 1/2"	2 x 1/2"	86	0,7	0,6	6000
	29,0	10,1	7,2	13,9	4,7	18,9			190	43	39	4425
LDG-15X-090Y-D1	736	256	183	352	120	480	2 x 1/2"	2 x 1/2"	93	0,9	0,8	6000
	29,0	10,1	7,2	13,9	4,7	18,9			204	55	51	4425
LDG-15X-100Y-D1	736	256	183	352	120	480	2 x 1/2"	2 x 1/2"	95	1,1	1,0	6000
	29,0	10,1	7,2	13,9	4,7	18,9			209	67	63	4425
LDG-15X-110Y-D1	769	256	183	352	120	513	2 x 1/2"	2 x 1/2"	98	1,3	1,2	6000
	30,3	10,1	7,2	13,9	4,7	20,2			215	79	74	4425
LDG-15X-120Y-D1	774	256	183	352	120	518	2 x 1/2"	2 x 1/2"	100	1,5	1,4	6000
	30,5	10,1	7,2	13,9	4,7	20,4			220	92	86	4425
LDG-20X-060Y-D1	905	323	195	444	150	582	2 x 1/2"	2 x 1/2"	126	0,5	0,4	12000
	35,6	12,7	7,7	17,5	5,9	22,9			277	31	25	8851
LDG-20X-070Y-D1	905	323	195	444	150	582	2 x 1/2"	2 x 1/2"	128	0,7	0,6	12000
	35,6	12,7	7,7	17,5	5,9	22,9			283	43	38	8851
LDG-20X-080Y-D1	905	323	195	444	150	582	2 x 1/2"	2 x 1/2"	131	0,9	0,8	12000
	35,6	12,7	7,7	17,5	5,9	22,9			289	55	50	8851
LDG-20X-090Y-D1	905	323	195	444	150	582	2 x 1/2"	2 x 1/2"	138	1,1	1,0	12000
	35,6	12,7	7,7	17,5	5,9	22,9			304	67	62	8851
LDG-20X-100Y-D1	905	323	195	444	150	582	2 x 1/2"	2 x 1/2"	140	1,4	1,3	12000
	35,6	12,7	7,7	17,5	5,9	22,9			309	85	80	8851
LDG-20X-110Y-D1	905	323	195	444	150	582	2 x 1/2"	2 x 1/2"	143	1,7	1,6	12000
	35,6	12,7	7,7	17,5	5,9	22,9			315	104	99	8851
LDG-20X-120Y-D1	953	323	195	444	150	630	2 x 1/2"	2 x 1/2"	146	2,0	1,8	12000
	37,5	12,7	7,7	17,5	5,9	24,8			321	122	112	8851
LDG-20X-140Y-D1	953	323	195	444	150	630	2 x 1/2"	2 x 1/2"	151	2,7	2,5	12000
	37,5	12,7	7,7	17,5	5,9	24,8			333	165	155	8851
LDG-25X-070Y-D1	1064	365	221	534	188	699	2 x 1/2"	2 x 1/2"	191	0,8	0,7	21000
	41,9	14,4	8,7	21,0	7,4	27,5			421	49	40	15489
LDG-25X-080Y-D1	1064	365	221	534	188	699	2 x 1/2"	2 x 1/2"	195	1,1	1,0	21000
	41,9	14,4	8,7	21,0	7,4	27,5			430	67	58	15489
LDG-25X-090Y-D1	1064	365	221	534	188	699	2 x 1/2"	2 x 1/2"	203	1,4	1,3	21000
	41,9	14,4	8,7	21,0	7,4	27,5			448	85	76	15489
LDG-25X-100Y-D1	1064	365	221	534	188	699	2 x 1/2"	2 x 1/2"	207	1,7	1,6	21000
	41,9	14,4	8,7	21,0	7,4	27,5			457	104	95	15489
LDG-25X-110Y-D1	1064	365	221	534	188	699	2 x 1/2"	2 x 1/2"	212	2,1	2,0	21000
	41,9	14,4	8,7	21,0	7,4	27,5			466	128	119	15489
LDG-25X-120Y-D1	1069	365	221	534	188	704	2 x 1/2"	2 x 1/2"	216	2,5	2,4	21000
	42,1	14,4	8,7	21,0	7,4	27,7			475	153	144	15489
LDG-25X-140Y-D1	1069	365	221	534	188	704	2 x 1/2"	2 x 1/2"	224	3,4	3,3	21000
	42,1	14,4	8,7	21,0	7,4	27,7			494	207	198	15489
LDG-25X-160Y-D1	1120	365	221	534	188	755	2 x 1/2"	2 x 1/2"	232	4,4	4,1	21000
	44,1	14,4	8,7	21,0	7,4	29,7			512	269	252	15489
LDG-25X-180Y-D1	1125	365	232	534	188	760	2 x 3/4"	2 x 3/4"	241	5,6	5,3	21000
	44,3	14,4	9,1	21,0	7,4	29,9			531	342	326	15489
LDG-30X-080Y-D1	1310	458	292	670	215	852	2 x 1/2"	2 x 1/2"	375	1,4	1,1	40500
	51,6	18,0	11,5	26,4	8,5	33,5			827	85	65	29871
LDG-30X-090Y-D1	1310	458	292	670	215	852	2 x 1/2"	2 x 1/2"	385	1,8	1,5	40500
	51,6	18,0	11,5	26,4	8,5	33,5			849	110	89	29871
LDG-30X-100Y-D1	1315	458	292	670	215	857	2 x 1/2"	2 x 1/2"	391	2,2	1,9	40500
	51,8	18,0	11,5	26,4	8,5	33,7			862	134	114	29871
LDG-30X-110Y-D1	1320	458	292	670	215	862	2 x 1/2"	2 x 1/2"	397	2,7	2,4	40500
	52,0	18,0	11,5	26,4	8,5	33,9			875	165	144	29871



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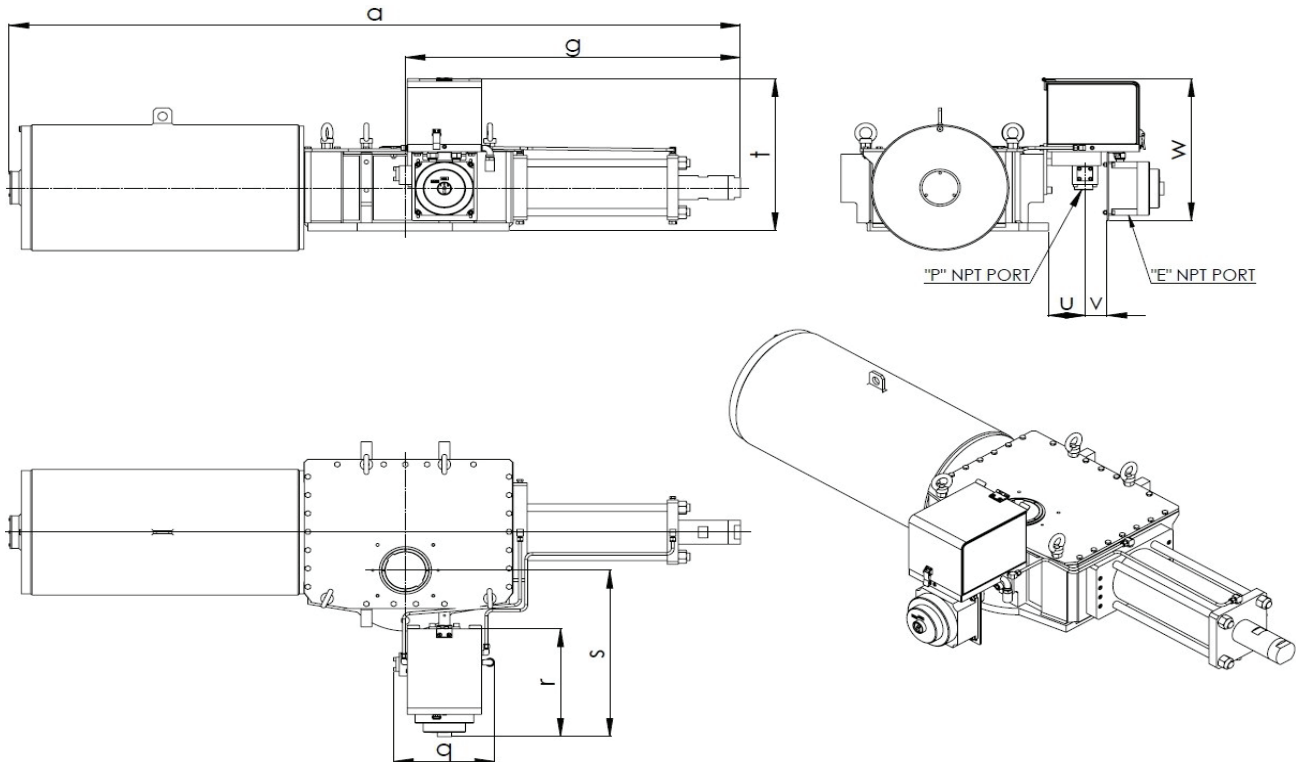
Table with columns: LDG Double Acting - Dimensions: mm (in) - Weights: Kg (lbs) - Swept Volumes: l (cu in) - MOT: Nm (ft-lb). The table lists various LDG models (e.g., LDG-30X-120Y-D1) and their specifications for dimensions (a-f), ports (P/N), weight, swept volume (P/N), and MOT.

\* Swept Volume data are referred to actuators with end stops adjusted for 90° of stroke.



# MHPC - Dimensions: mm (in) - Weights: Kg (lbs)

Single Acting - Fail Close (Fc) Configuration

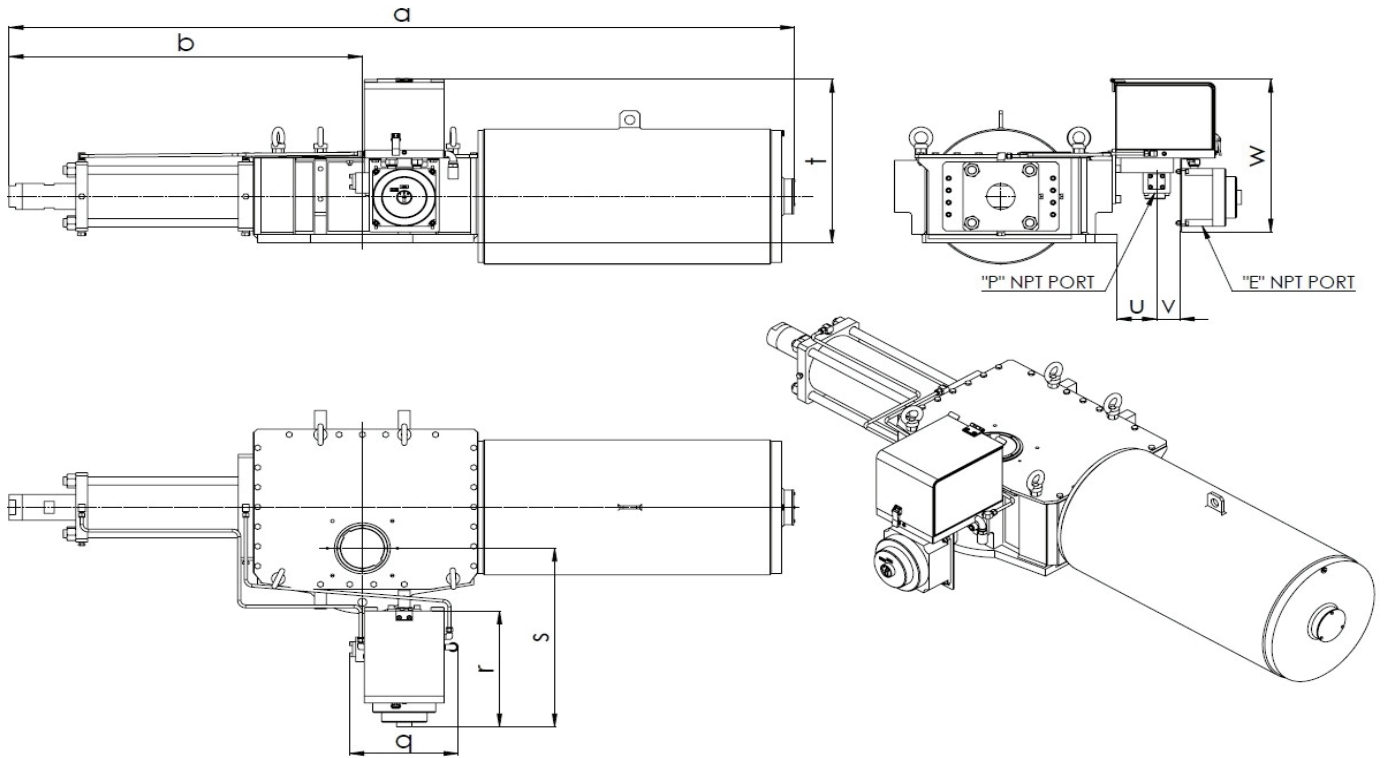


Model	a*	g*	q	r	s	t	u	v	w	MHPC "P" NPT PORT**	"E" NPT PORT	MHPC WEIGHT
LDG-15			326	382	502	340	127	72	503	1/2"	3/4"	40
			12,8	15,0	19,8	13,4	5,0	2,8	19,8			88
LDG-20			326	382	524	356	119	72	503	1/2"	3/4"	40
			12,8	15,0	20,6	14,0	4,7	2,8	19,8			88
LDG-25			326	382	568	355	125	72	503	1/2"	3/4"	40
			12,8	15,0	22,4	14,0	4,9	2,8	19,8			88
LDG-30			326	382	589	386	119	72	503	1/2"	3/4"	40
			12,8	15,0	23,2	15,2	4,7	2,8	19,8			88
LDG-35			326	382	658	409	153	72	503	1/2"	3/4"	40
			12,8	15,0	25,9	16,1	6,0	2,8	19,8			88
LDG-40			326	382	674	426	149	72	503	1/2"	3/4"	40
			12,8	15,0	26,5	16,8	5,8	2,8	19,8			88
LDG-50			326	382	758	463	160	72	503	1/2"	3/4"	40
			12,8	15,0	29,8	18,2	6,3	2,8	19,8			88

(\*) Note: for this measure see LDG DIMENSIONAL - WEIGHT - VOLUME TABLES.

(\*\*) This measure can be 1 or 2 x "P" NPT PORT upon request.

Single Acting - Fail Open (Fc) Configuration

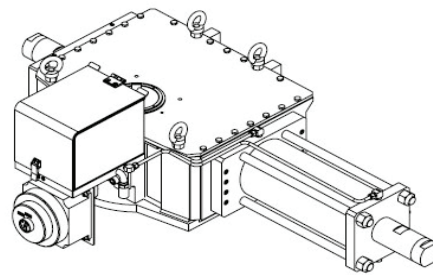
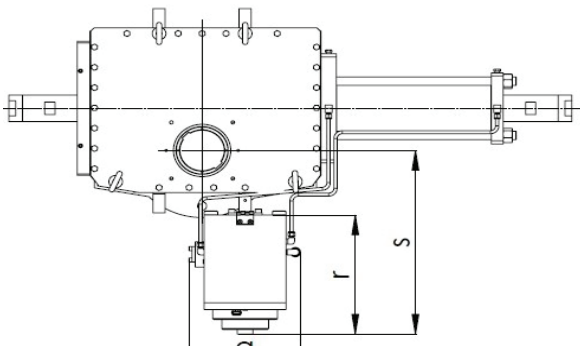
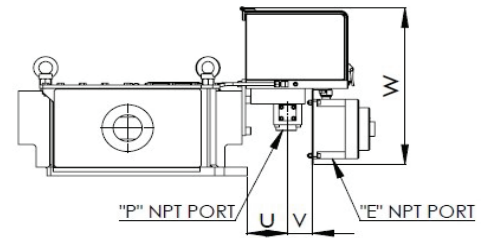
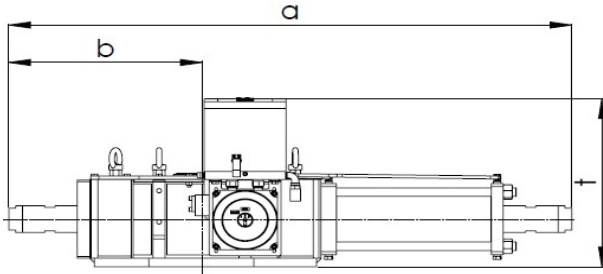


Model	a*	b*	q	r	s	t	u	v	w	MHPC "P" NPT PORT**	"E" NPT PORT	MHPC WEIGHT
LDG-15			326	382	502	340	127	72	503	½"	¾"	40
			12,8	15,0	19,8	13,4	5,0	2,8	19,8			88
LDG-20			326	382	524	356	119	72	503	½"	¾"	40
			12,8	15,0	20,6	14,0	4,7	2,8	19,8			88
LDG-25			326	382	568	355	125	72	503	½"	¾"	40
			12,8	15,0	22,4	14,0	4,9	2,8	19,8			88
LDG-30			326	382	589	386	119	72	503	½"	¾"	40
			12,8	15,0	23,2	15,2	4,7	2,8	19,8			88
LDG-35			326	382	658	409	153	72	503	½"	¾"	40
			12,8	15,0	25,9	16,1	6,0	2,8	19,8			88
LDG-40			326	382	674	426	149	72	503	½"	¾"	40
			12,8	15,0	26,5	16,8	5,8	2,8	19,8			88
LDG-50			326	382	758	463	160	72	503	½"	¾"	40
			12,8	15,0	29,8	18,2	6,3	2,8	19,8			88

(\* ) Note: for this measure see LDG DIMENSIONAL - WEIGHT - VOLUME TABLES.

(\*\* ) This measure can be 1 or 2 x "P" NPT PORT upon request.

Double Acting



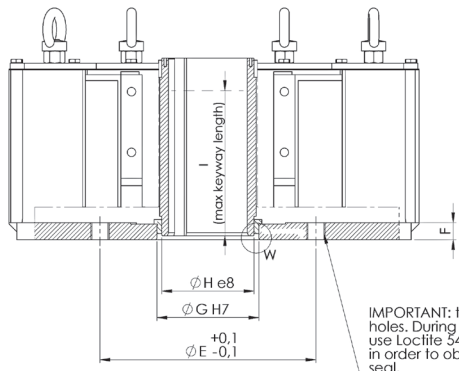
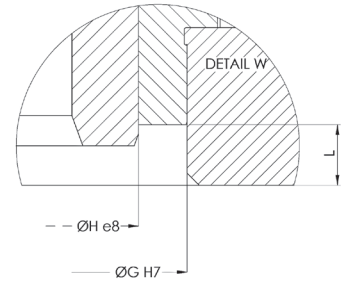
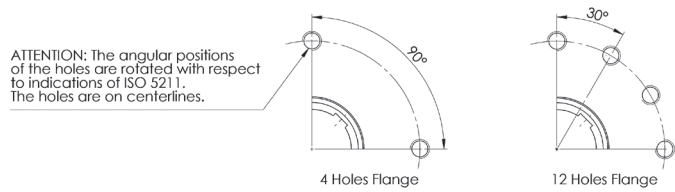
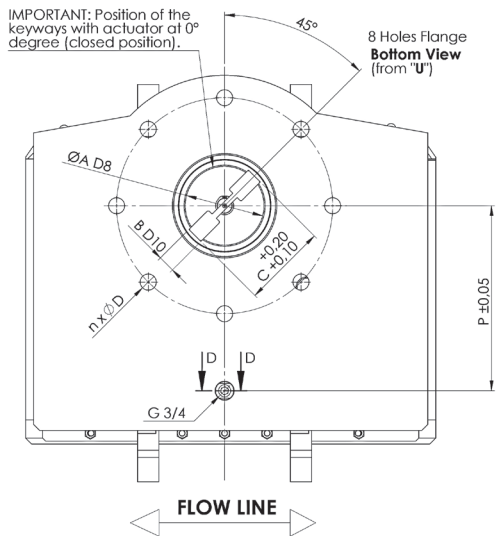
Model	a*	b*	q	r	s	t	u	v	w	MHPC "P" NPT PORT**	"E" NPT PORT	MHPC WEIGHT
LDG-15			326	382	502	340	127	72	503	1/2"	3/4"	40
			12,8	15,0	19,8	13,4	5,0	2,8	19,8			88
LDG-20			326	382	524	356	119	72	503	1/2"	3/4"	40
			12,8	15,0	20,6	14,0	4,7	2,8	19,8			88
LDG-25			326	382	568	355	125	72	503	1/2"	3/4"	40
			12,8	15,0	22,4	14,0	4,9	2,8	19,8			88
LDG-30			326	382	589	386	119	72	503	1/2"	3/4"	40
			12,8	15,0	23,2	15,2	4,7	2,8	19,8			88
LDG-35			326	382	658	409	153	72	503	1/2"	3/4"	40
			12,8	15,0	25,9	16,1	6,0	2,8	19,8			88
LDG-40			326	382	674	426	149	72	503	1/2"	3/4"	40
			12,8	15,0	26,5	16,8	5,8	2,8	19,8			88
LDG-50			326	382	758	463	160	72	503	1/2"	3/4"	40
			12,8	15,0	29,8	18,2	6,3	2,8	19,8			88

(\*) Note: for this measure see LDG DIMENSIONAL - WEIGHT - VOLUME TABLES.

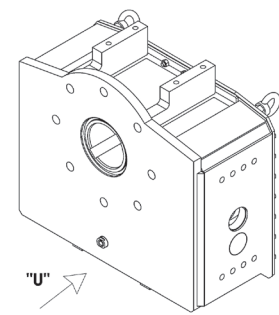
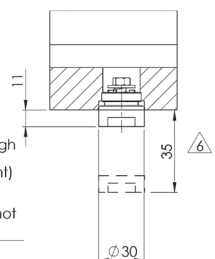
(\*\*) This measure can be 1 or 2 x "P" NPT PORT upon request.

# Mounting Interface Dimensions

LPS/LDG/LGO/LDG Series Coupling Dimensions													
Model	ISO 5211 Flange Interface (reference)	ØA	B	C	No. of Holes	Hole Diameter	P.C.D. [mm (inch)]	F	ØG	ØH	I	L	P
LPS/LDG/LGO/LDG-15	F16	65	10	70.6	4	M20	165 (6,50)	18	86	78	161	8	155
LPS/LDG/LGO/LDG-20	F25	86	12	91.6	8	M16	254 (10)	16	130	112	178	4.5	205
LPS/LDG/LGO/LDG-25	F30	100	18	108.8	8	M20	298 (11,73)	18	150	133	201	6	230
LPS/LDG/LGO/LDG-30	F35	130	28	138.6	8	M30	356 (14,02)	28	168	152	261	10	305
LPS/LDG/LGO/LDG-35	F40	150	36	166.8	8	M36	406 (15,98)	33	199	185	323	9	405
LPS/LDG/LGO/LDG-40	F48	185	45	205.8	12	M36	483 (19,02)	38	244	230	338	10	450
LPS/LDG/LGO/LDG-50	F60	230	50	252.8	20	M36	603 (23,74)	48	292	275	500	18	550



IMPORTANT: threaded through holes. During studs assembly use Loctite 542 (or equivalent) in order to obtain a perfect seal. Stud threaded length must not exceed "F" + 3 mm.



## Service Kits

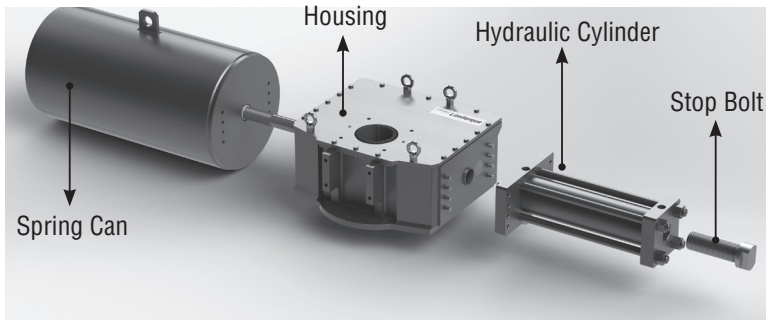


Figure 11: Single Acting Actuator

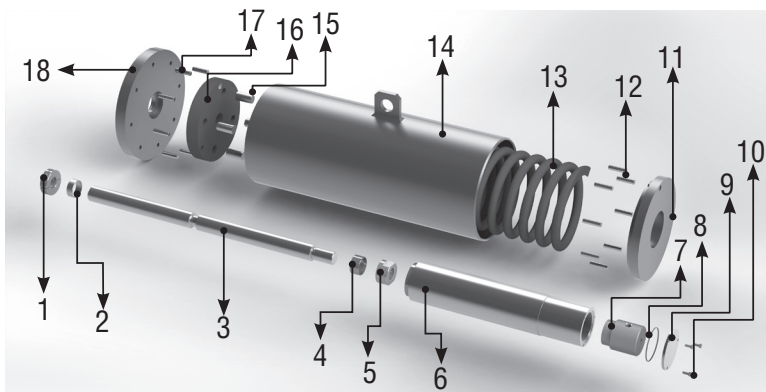


Figure 12: Spring Can Exploded View

Number	Description
1	Split Ring
2	Bushing
3	Spring Rod
4	Bushing
5	Spring Rod End Nut
6	Spring Guide
7	Spring Stop Bolt
8	O-Ring
9	Stop Bolt Cap

Number	Description
10	Hex Screw
11	Spring Can End Flange
12	Bar Pin
13	Spring
14	Spring Can
15	Bar Pin
16	Spring Plate
17	Bar Pin
18	Spring Can Head Flange

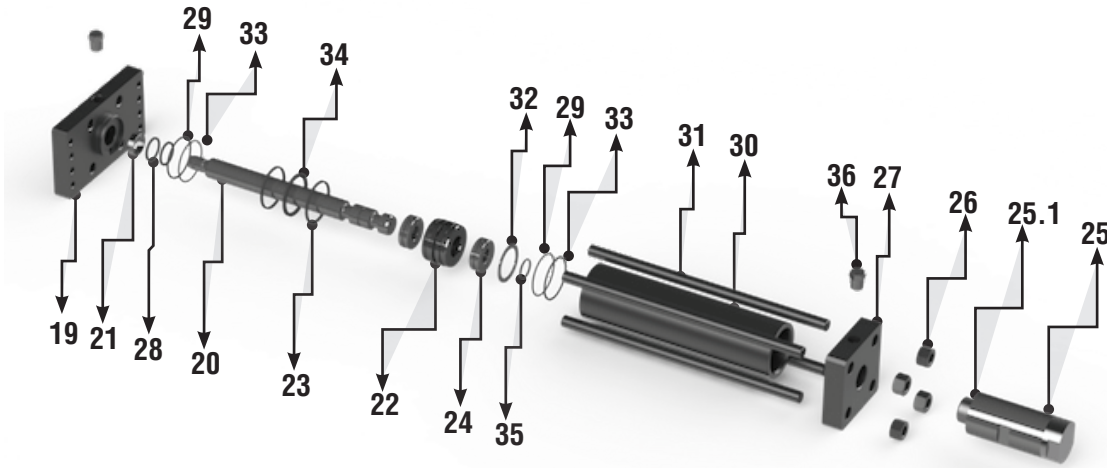


Figure 13: Exploded View of Hydraulic Cylinder – split ring version

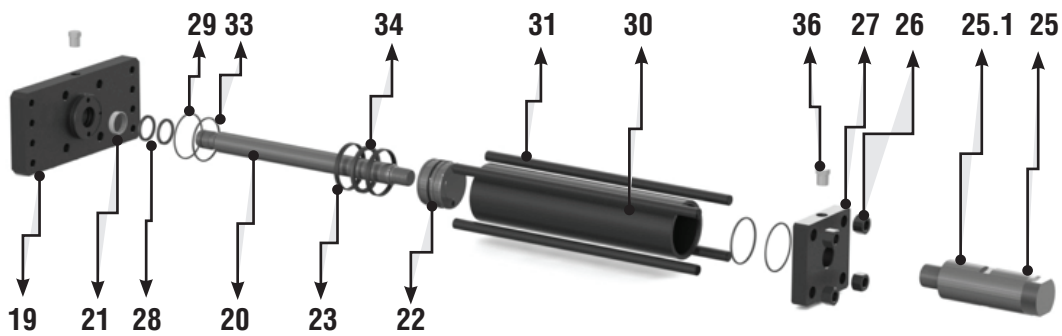


Figure 14: Exploded View of Hydraulic Cylinder – threaded piston version

Number	Description	Spare Parts*
19	Cylinder Head Flange	
20	Piston Rod	
21	Bushing	X
22	Piston	
23	Guide Ring (x2)	X
24	Split Ring	
25	Stop Bolt Assembly	
25,1	Stop Bolt Protection	
26	Hex Nut (High)	
27	Cylinder End Flange	

Number	Description	Spare Parts*
28	O-Ring (x2)	X
29	Parback Ring (x2)	X
30	Tube	
31	Tie Rod	
32	Spiral Retaining Shaft Ring	
33	O-Ring	X
34	Seal	
35	O-Ring	
36	Plugs	

\* Standard maintenance spare parts for on/off applications

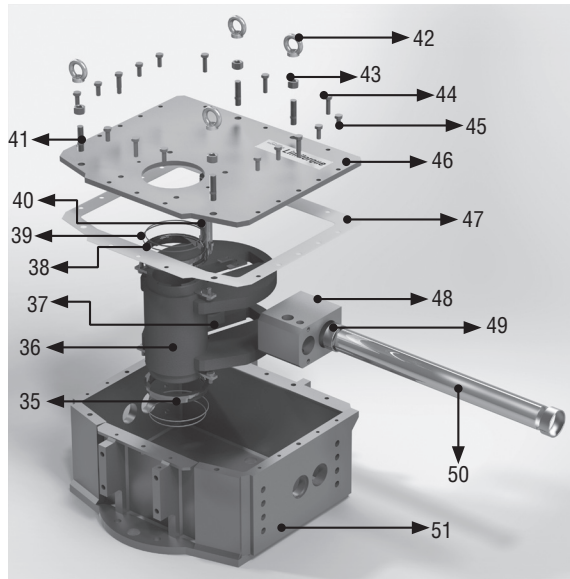


Figure 15: Exploded View of Housing

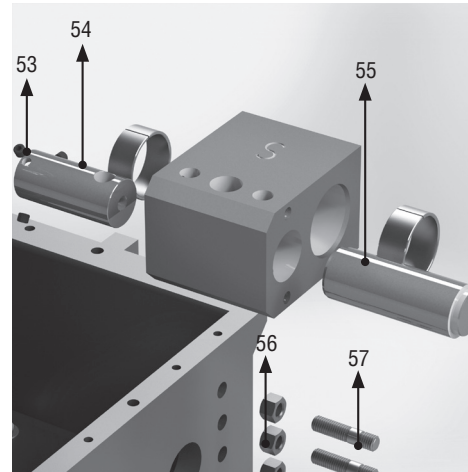


Figure 16: Exploded View of Adaptor Kit

Number	Description	Spare Parts*
35	Bushing	
36	Scotch Yoke	
37	Slider Block (x2)	
38	O-Ring	X
39	O-Ring	X
40	Guide Pin	
41	Stud	
42	Eyebolt	
43	Hex nut (High)	
44	Hex Head Shoulder Bolt	
45	Hex Head Screw	
46	Cover	
47	Cover Gasket	X

Number	Description	Spare Parts*
48	Guide Block	
49	Bushing	
50	Guide Bar	
51	Housing	
52	Center Ring	
53	Grub Screw	
54	Cylinder Adaptor	
55	Spring Adaptor	
56	Hex Nut (High)	
57	Stud	
58	Guide Adaptor Pin <sup>1</sup>	
59	Hex Head Screw <sup>1</sup>	

\*Standard Maintenance Spare Parts for On/Off Application

<sup>1</sup>Only in the double acting actuators

CW/CCW Conversion Kit Sample	
Number	Description
49	Bushing
54	Cylinder Adaptor
55	Spring Adaptor
56	Hex Nut (High)
57	Studs



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