

Masoneilan™ 51/52/53 Series

Cylinder Actuator

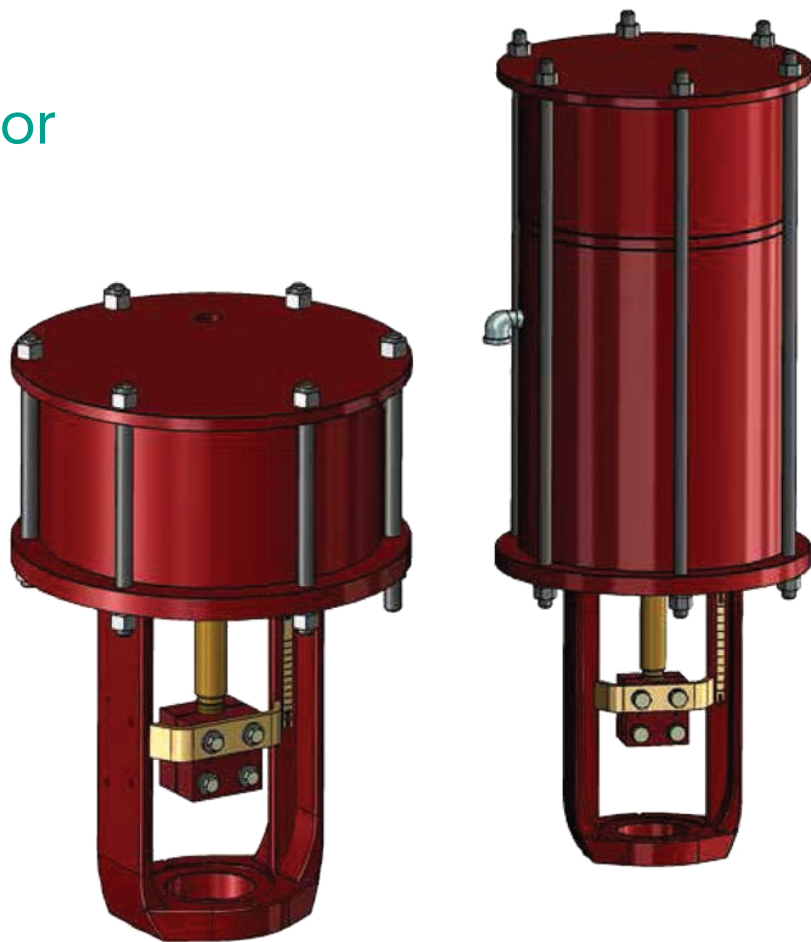


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Conversion Table

All the USCS values are converted to
metric values using the following conversion factors:

USCS Unit	Conversion Factor	Metric Unit
in.	25.4	mm
lb.	0.4535924	kg
in ²	6.4516	cm ²
ft ³ /min	0.02831685	m ³ /min
gal/min	3.785412	L/min
lb/hr	0.4535924	kg/hr
psig	0.06894757	barg
ft lb	1.3558181	Nm
°F	$\frac{5}{9} (\text{°F} - 32)$	°C

Note: Multiply USCS value with conversion factor to get metric value.

Features

Masoneilan 51/52/53 Series pneumatic cylinder actuators provide high thrust and dynamic stiffness to meet a variety of throttling control and on/off applications. Some of the key cylinder actuator features include:

Rugged Construction

Heavy internal guiding and support provides proper alignment of the dynamic components, delivering a rugged construction suited for the most demanding valve actuation requirements.

Application Versatility

Standard construction options include double-acting without springs, as well as heavy mechanical spring-return for both air-to-extend and air-to-retract operation. Air volume in the cylinder is reduced in each design, providing high dynamic stiffness and improving speed of response.

Safety and Ease of Assembly

The standard spring-return design includes separate spring cartridge subassemblies, which allow for safe pre-compression of the springs prior to final assembly into the actuator cylinder. The spring cartridge subassembly is also fully field reversible, which helps to reduce plant inventory.

Long Life Cycle

Heavy guiding of the actuator stem results in excellent mechanical alignment of the key components, thus minimizing dynamic seal and sliding surface wear. This also helps to reduce overall operating friction, which enhances throttling control performance.

Optional Accessories

Fail action mode for the double-acting configuration without springs can be provided using an integral volume tank design. There is also an optional manual override available for all actuator sizes. Standard materials are the same for all actuator sizes. Optional handwheel/handjack assemblies provide manual override in case of air failure.

Ease of Maintenance

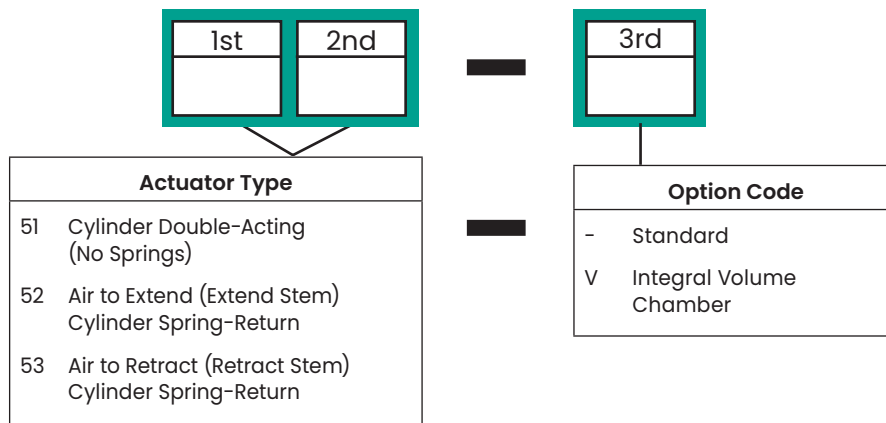
Modular construction of the cylinder and spring cartridge design provides an assembly that is both easy and safe to maintain. The actuator piston is located in a separate cylinder chamber, which allows for simple dynamic seal replacement.

PED Compliance

The 51/52/53 Series conforms to European Pressure Equipment Directive (PED) requirements.

Please consult your local Baker Hughes sales representative for any additional product information.

Numbering System



General Specifications

Model 51 - Double Acting

Size	Cylinder Dia	Piston Type	Actuator Thrust (max)		Effective Area			Maximum Stroke		Chamber Volume		
	mm		N	lb	(Note)	inch ²	mm ²	inch	mm	inch ³	m ³	
12	305	Single	50232	11293	Upper	112.8	72800	4	101.6	988.6	0.0162	
					Lower	111.8	72100					
16	386		80661	18133	Upper	181.2	116900	6	152.4	1489	0.0244	
					Lower	179.8	116000	12	304.8	-	-	
16L	386		80661	18133	Upper	181.2	116900	30	762	-	-	
					Lower	179.8	116000					
20	488		128961	28992	Upper	289.7	186900	6	152.4	2264	0.0371	
					Lower	287.4	185400	12	304.8	-	-	
20L	488		128961	28992	Upper	289.7	186900	30	762	-	-	
					Lower	287.4	185400					
24	386		Double	123066	27666	Upper	359.9	232200	6	152.4	-	-
						Lower	356.0	229700	12	304.8	-	-
24L	572	Single	177054	39803	Upper	397.7	256600	6	152.4	3353	0.0549	
					Lower	395.4	255100	30	762	-	-	
28	488	Double	197266	44347	Upper	576.9	372200	6	152.4	-	-	
					Lower	573.0	369700	12	304.8	-	-	
28L	705	Single	269307	60543	Upper	605.0	390300	6	152.4	5003	0.0820	
					Lower	602.6	388800	12	304.8	-	-	
32	574	Double	256750	57720	Upper	795.9	513500	6	152.4	-	-	
					Lower	788.0	508400	12	304.8	-	-	
32L	815	Single	359904	80910	Upper	808.5	521600	6	152.4	6686	0.1096	
					Lower	804.3	518900	12	304.8	-	-	
40	705	Double	388400	87316	Upper	1204.0	776800	6	152.4	-	-	
					Lower	1198.9	773500					

General Specifications

52/53 Spring Return Design – Standard Actuator Sizes and Spring Ranges

Actuator Size	Effective Piston Area		Maximum Stroke		Standard Spring Ranges			
					Initial	Final	Initial	Final
	in ²	cm ²	in	mm	psi	psi	MPa	MPa
12	112	721	4	101.6	10	25	0.07	0.17
					20	40	0.14	0.28
					25	50	0.17	0.34
16	180	1160	2.5	63.5	10	25	0.07	0.17
					20	40	0.14	0.28
					25	50	0.17	0.34
			4	101.6	10	25	0.07	0.17
					20	40	0.14	0.28
					25	50	0.17	0.34
			6	152.4	10	25	0.07	0.17
					20	40	0.14	0.28
					25	50	0.17	0.34
20	287	1854	2.5	63.5	10	25	0.07	0.17
					20	40	0.14	0.28
					25	50	0.17	0.34
			4	101.6	10	25	0.07	0.17
					20	40	0.14	0.28
					25	50	0.17	0.34
			6	152.4	10	25	0.07	0.17
					20	40	0.14	0.28
					25	50	0.17	0.34

Notes: Standard Ambient Temperature Range: -4°F to +180°F (-20°C to +83°C).
 Maximum Supply Pressure: 150 psig (1.03 MPa).

Stem Travel Model 51

Actuator Size	Model 51 Actuator Stroke																		
	in.	0.25	0.38	0.5	0.62	0.75	0.8	1	2	3	4	5	6	7	8	9	10	11	12
	mm	6.4	9.7	12.7	15.7	19	20	25.4	50.8	76.2	101.6	127	152.4	177.8	203.2	228.6	254	279	305
12		X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-
16		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
24L		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
28		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
28L		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
32		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
32L		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
40		X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-
46		X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-

Actuator Size	Model 51 Actuator Stroke (cont.)																		
	in.	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	mm	330	356	381	406	432	457	483	508	533	559	584	610	635	660	686	711	737	762
12		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16L		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20L		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
24		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24L		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
28		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32L		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: The stroke is available in .25" increments for Model 51 Actuators.

Stem Travel Model 52/53

Actuator Size	Model 52/53 Actuator Stroke																			
	in.	.25	.38	.5	.62	.75	.8	1	1.25	1.5	2	2.25	2.5	3	3.5	3.75	4	5	5.5	6
	mm	6.4	9.7	12.7	15.7	19	20	25.4	31.8	38.1	50.8	57.2	63.5	76.2	88.9	95.3	101.6	139.7	152.4	152.4
12		-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X ¹	-	-	-
16		X	X	X	X	X	X	X	X	X	X	X	X ¹	X	X	X	X ¹	X	X	X ¹
20		X	X	X	X	X	X	X	X	X	X	X	X ¹	X	X	X	X ¹	X	X	X ¹

1. Indicates standard strokes for each actuator size.

Note: Optional actuator strokes are provided using standard springs. Resultant spring ranges are shown in the following tables.

General Specifications

Adjustable Travel Stops

Model	Size	Stroke		Adjustable Stroke Range									
				Up Stop					Down Stop				
		Stroke		Adjustable Valve Opening (Down seating)			Stroke		Adjustable Valve Opening (Down seating)				
		inch	mm	inch	inch				inch	mm			
51 (see Notes)	12	2.5	63.5	2.0	50.8	20%	-	100%	1.25	31.8	0%	-	50%
		4	101.6	2.0	50.8	50%	-	100%	2.0	50.8	0%	-	50%
	16 20 24 28 32	2.5	63.5	2.5	63.5	0%	-	100%	1.25	31.8	0%	-	50%
		4	101.6	3.0	76.2	25%	-	100%	2.0	50.8	0%	-	50%
		6	152.4	3.0	76.2	50%	-	100%	3.0	76.2	0%	-	50%
		8	203.2	4.0	101.6	50%	-	100%	4.0	101.6	0%	-	50%
		10	254	5.0	127.0	50%	-	100%	5.0	127.0	0%	-	50%
		12	304.8	6.0	152.4	50%	-	100%	6.0	152.4	0%	-	50%
52/53	12	4	101.6	2.0	50.8	50%	-	100%	2.0	50.8	0%	-	50%
	16 20	2.5	63.5	2.5	63.5	0%	-	100%	1.25	31.8	0%	-	50%
		4	101.6	3.0	76.2	25%	-	100%	2.0	50.8	0%	-	50%
		6	152.4	3.0	76.2	50%	-	100%	3.0	76.2	0%	-	50%

Notes:

- Adjustable stopper is available only for without volume chamber.
- One adjustable stop can be supplied on a given actuator. It is not possible to have both an up and down stop within the same actuator.
- For 52/53 size 20, adjustable stopper is available only for without hydraulic handjack.
- For sizes 16L, 20L, 24L, 28L, 32L, 40 and 46, travel stop can be developed on demand.

Manual Override Options

Actuator Size	Actuator Model	Type / Mounting	Model Designation
12	51/52/53	Mechanical Handwheel / Side-Mounted	CM
16	51/52/53	Mechanical Handwheel / Side-Mounted	DM
20	51	Mechanical Handwheel / Side-Mounted	DM
20	52/53	Hydraulic Handjack / Top-Mounted	HH
24/28/32	51	Mechanical Handwheel / Side-Mounted	DM

Valve Mounting Interfaces

Standard Yoke Spud Diameter		Yoke Connection	Actuator Size												
Inch	mm		12	16	16L	20	20L	24	24L	28	28L	32	32L	40	46
2.25	57	Drive Nut	X	X	-	-	-	-	-	-	-	-	-	-	-
3.31	84	Drive Nut	X	X	-	X	-	-	-	-	-	-	-	-	-
3.75	95	Drive Nut	X	X	-	X	-	-	-	-	-	-	-	-	-
3.75	95	Bolted	-	X	-	X	-	-	-	-	-	-	-	-	-
5	127	Bolted	-	X	X	X	X	X	X	X	X	X	X	X	X
6	152	Bolted	-	X	-	X	-	-	-	-	-	-	-	-	-
7.25	184	Bolted	-	-	-	-	-	-	-	X	X	X	X	X	X

Stem Size		Actuator Size													
inch	mm	12	16	16L	20	20L	24	24L	28	28L	32	32L	40	46	
0.5	12.7	x	-	-	-	-	-	-	-	-	-	-	-	-	
0.63	15.9	x	x	x	x	x	-	-	-	-	-	-	-	-	
0.75	19.1	x	x	x	x	x	-	-	-	-	-	-	-	-	
1	25.4	x	x	x	x	x	x	x	x	x	x	x	x	x	
1.13	28.6	x	x	x	x	x	x	x	x	x	x	x	x	x	
1.25	31.8	-	x	x	x	x	x	x	x	x	x	x	x	x	
1.5	38.1	-	x	x	x	x	x	x	x	x	x	x	x	x	
1.63	41.3	-	-	-	-	-	x	x	x	x	x	x	x	x	

Notes:

Split clamps are used for the valve stem to piston stem connections on all actuator sizes.

Split clamps also provide a mechanical anti-rotation feature in both automatic and manual operating mode.

General Specifications

Air Connections

	Size 12/16/20		Size 24/28		Size 32	
	Top and Yoke	Separator Plate	Top and Yoke	Separator Plate	Top and Yoke	Separator Plate
Standard	3/4 NPT, qty 1	1/2 NPT, qty 1	3/4 NPT, qty 1	1/2 NPT, qty 2	3/4 NPT, qty 1	3/4 NPT, qty 2
Option A	3/4 NPT, qty 2	1/2 NPT, qty 2	3/4 NPT, qty 2	1/2 NPT, qty 4	3/4 NPT, qty 2	3/4 NPT, qty 4
Option B (for size 12/16/20 without volume chamber)	1 NPT, qty 1	-	-	-	-	-
Option C (for size 12/16/20 without volume chamber)	1 NPT, qty 2	-	-	-	-	-
Option D (for size 12/16/20 without volume chamber)	3/4 NPT, qty 3	-	-	-	-	-

	Size 16L/20L/24L/28L/32L		Size 40/46	
	Top and Yoke	Separator Plate	Top and Yoke	Separator Plate
Standard	3/4 NPT, qty 1	3/4 NPT, qty 1	3/4 NPT, qty 1	3/4 NPT, qty 2
Option A	-	-	-	-

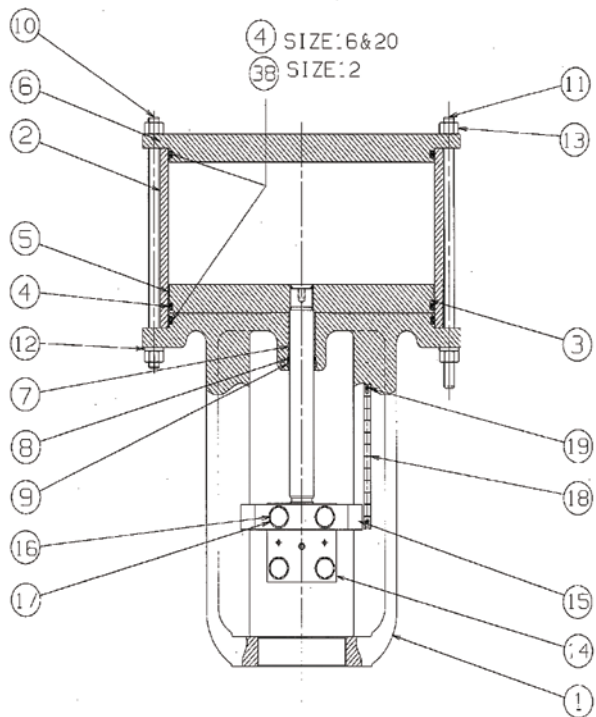
Optional Spring Ranges – Model 52 Air-to-Extend

Actuator Size	Actuator Stroke		Optional Spring Ranges			
	in	mm	Initial	Final	Initial	Final
			psi	psi	MPa	MPa
12	3.75	95.3	10	24	.07	.17
			20	39	.14	.27
			25	48	.17	.33
	3.5	88.9	10	23	.07	.16
			20	38	.14	.26
			25	47	.17	.32
	3	76.2	10	21	.07	.14
			20	35	.14	.24
			25	44	.17	.30
16	5.5	139.7	10	24	.07	.17
			20	38	.14	.26
			25	48	.17	.33
	5	127	10	23	.07	.16
			20	37	.14	.26
			25	46	.17	.32
	3.75	95.3	10	24	.07	.17
			20	39	.14	.27
			25	48	.17	.33
	3.5	88.9	10	23	.07	.16
			20	38	.14	.26
			25	47	.17	.32
	3	76.2	10	21	.07	.14
			20	35	.14	.24
			25	44	.17	.30
2.25	57.2	10	24	.07	.17	
		20	38	.14	.26	
		25	48	.17	.33	
2	50.8	10	22	.07	.15	
		20	36	.14	.25	
		25	45	.17	.31	
20	5.5	139.7	10	24	.07	.17
			20	38	.14	.26
			25	48	.17	.33
	5	127	10	23	.07	.16
			20	37	.14	.26
			25	46	.17	.32
	3.75	95.25	10	24	.07	.17
			20	39	.14	.27
			25	48	.17	.33
	3.5	88.9	10	23	.07	.16
			20	38	.14	.26
			25	47	.17	.32
	3	76.2	10	21	.07	.14
			20	35	.14	.24
			25	44	.17	.30
2.25	57.15	10	24	.07	.17	
		20	38	.14	.26	
		25	48	.17	.33	
2	50.8	10	22	.07	.15	
		20	36	.14	.25	
		25	45	.17	.31	

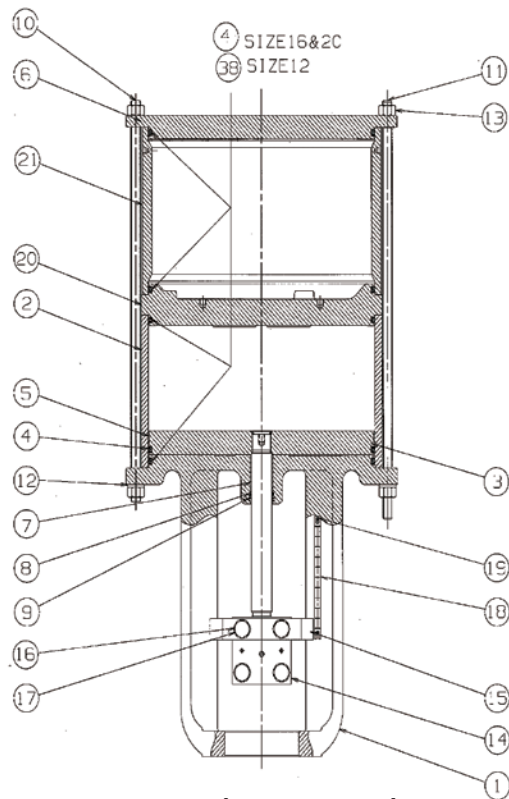
Optional Spring Ranges – Model 53 Air-to-Retract

Actuator Size	Actuator Stroke		Optional Spring Ranges			
	in	mm	Initial	Final	Initial	Final
			psi	psi	MPa	MPa
12	3.75	95.3	11	25	.08	.17
			21	40	.14	.28
			27	50	.19	.34
	3.5	88.9	12	25	.08	.17
			22	40	.15	.28
			28	50	.19	.34
	3	76.2	14	25	.10	.17
			25	40	.17	.28
			31	50	.21	.34
16	5.5	139.7	11	25	.08	.17
			22	40	.15	.28
			27	50	.19	.34
	5	127	12	25	.08	.17
			23	40	.14	.28
			29	50	.20	.34
	3.75	95.3	11	25	.08	.17
			21	40	.14	.28
			27	50	.19	.34
	3.5	88.9	12	25	.08	.17
			22	40	.15	.28
			28	50	.19	.34
	3	76.2	14	25	.10	.17
			25	40	.17	.28
			31	50	.21	.34
2.25	57.2	11	25	.08	.17	
		22	40	.15	.28	
		27	50	.19	.34	
2	50.8	13	25	.09	.17	
		24	40	.17	.28	
		30	50	.21	.34	
20	5.5	139.7	11	25	.08	.17
			22	40	.15	.28
			27	50	.19	.34
	5	127	12	25	.08	.17
			23	40	.14	.28
			29	50	.20	.34
	3.75	95.25	11	25	.08	.17
			21	40	.14	.28
			27	50	.19	.34
	3.5	88.9	12	25	.08	.17
			22	40	.15	.28
			28	50	.19	.34
	3	76.2	14	25	.10	.17
			25	40	.17	.28
			31	50	.21	.34
2.25	57.15	11	25	.08	.17	
		22	40	.15	.28	
		27	50	.19	.34	
2	50.8	13	25	.09	.17	
		24	40	.17	.28	
		30	50	.21	.34	

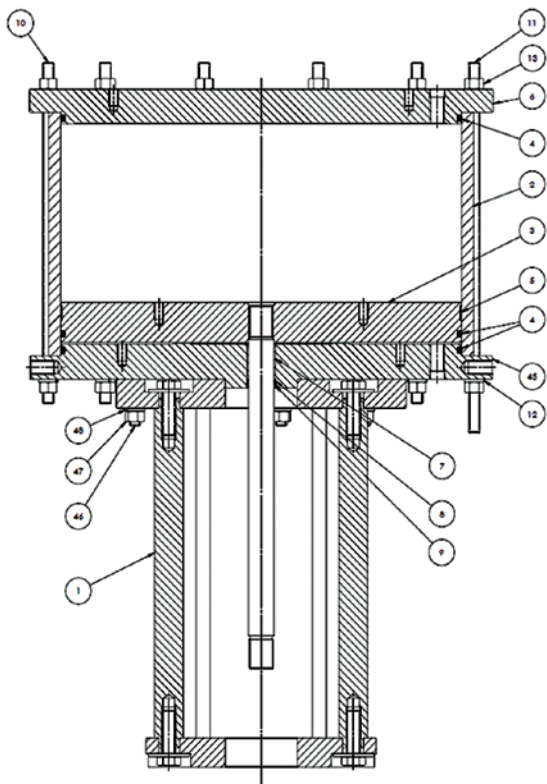
Materials of Construction – Model 51



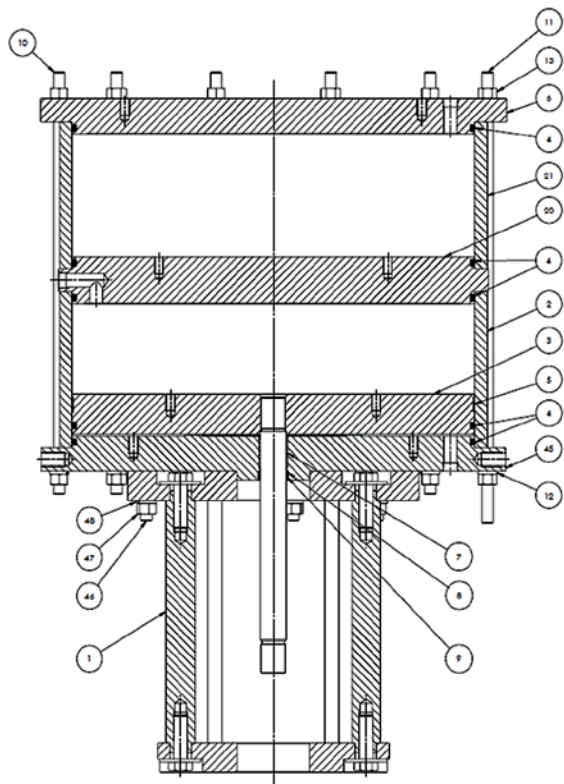
Model 51 (Double Acting)
size 12, 16, 20



Model 51 (Double Acting)
with Volume Chamber,
size 12, 16, 20

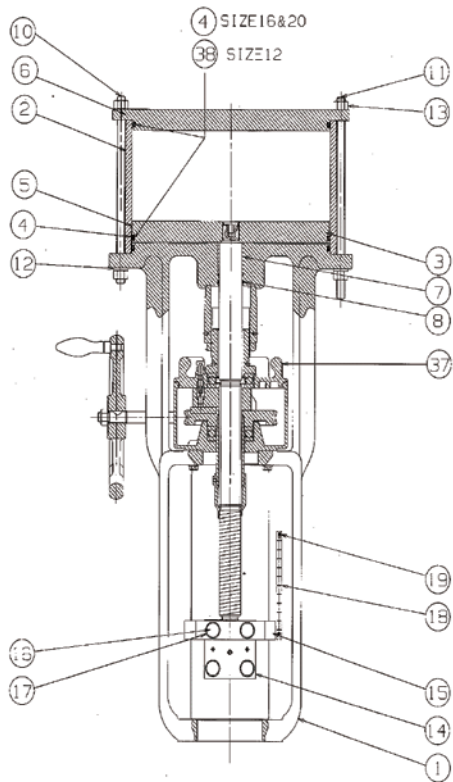


Model 51 (Double Acting)
size 16L, 20L, 24L, 28L, 32L

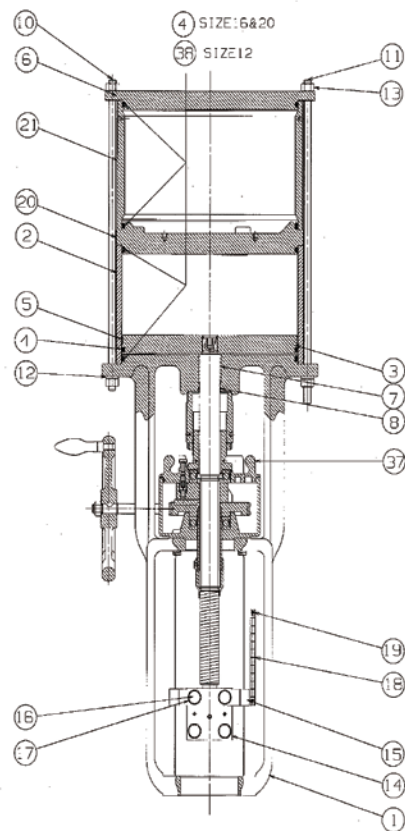


Model 51 (Double Acting)
with Volume Chamber,
size 24L, 28L, 32L

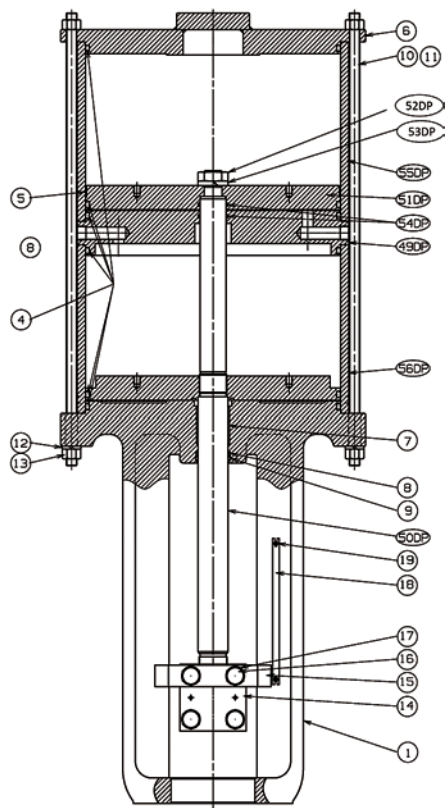
Materials of Construction – Model 51



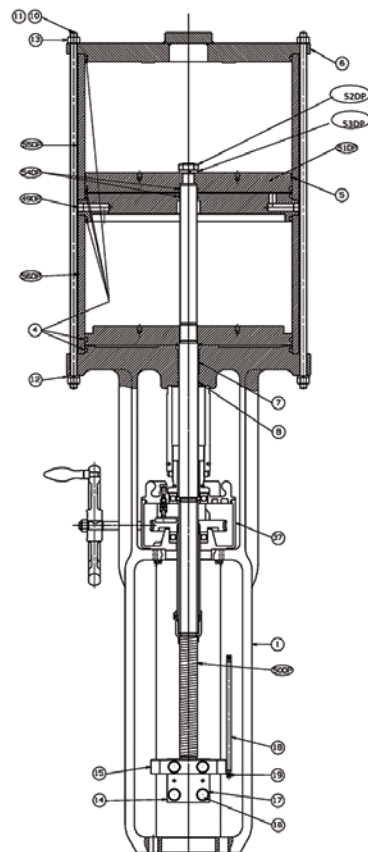
Model 51 (Double Acting) with Handwheel,
size 12, 16, 20



Model 51 (Double Acting) with Volume Chamber
and Handwheel, size 12, 16, 20

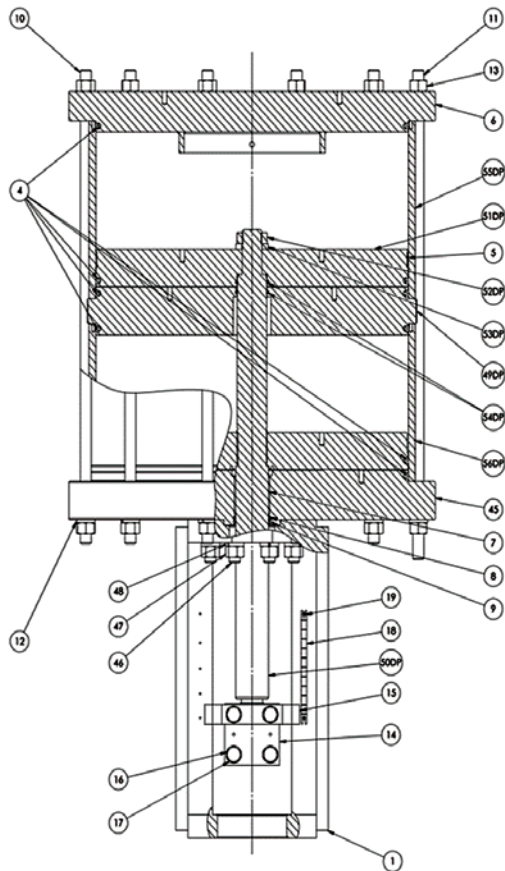


Model 51 Double Piston (Double Acting),
size 24, 28

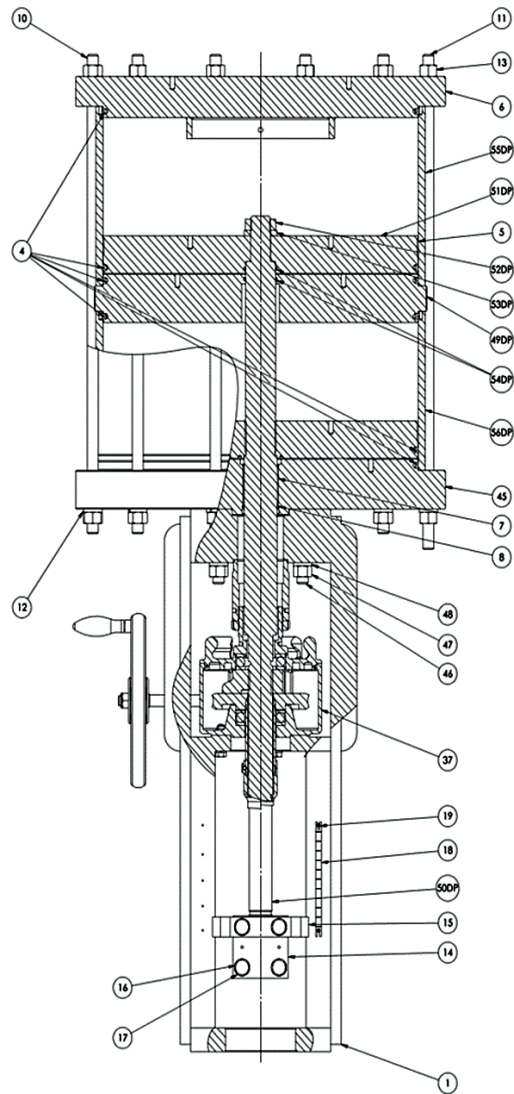


Model 51 Double Piston (Double Acting)
with Handwheel, size 24, 28

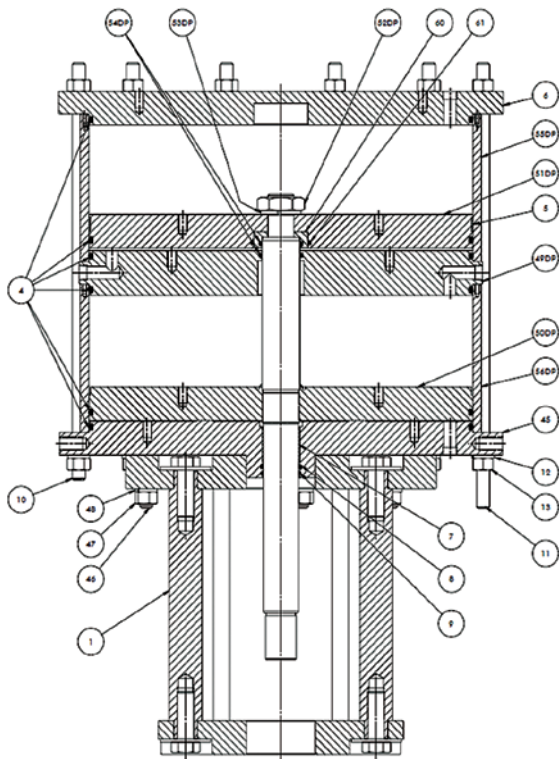
Materials of Construction – Model 51



Model 51 Double Piston (Double Acting)
size 32



Model 51 Double Piston (Double Acting)
with Handwheel, size 32



Model 51 Double Piston (Double Acting)
size 40, 46

Standard Construction

Model 51 Size 12, 16, 16L, 20, 20L, 24L, 28L, 32L / Model 52/53 Size 12, 16, 20

Ref. No.	Part Name	Standard Material (PED)	
1	Yoke (Size 12,16,20)	ASTM A395 GR 60-40-18 / EN-JS 1025 / EN 1563	
1	Yoke S/A (Size 16L,20L,24L,28L,32L)	General Sub-Assemblies	
1-1	Yoke bottom plate	ASTM A105	
1-2	Yoke column	AISI 1045 HRC 20 MIN - LIQUID QUENCH AND TEMPER	
1-3	Yoke top plate	ASTM A105	
1-4	Hex. Head cap screw	DICHROMATE ZINC PLATE CARBON STEEL CLASS 8.8	
1-5	Plain washer	DICHROMATE ZINC PLATE PER CARBON STEEL CLASS 8.8	
2	Cylinder tube	ASTM A105 PER PMA MN0023	
3	Piston S/A	General Sub-Assemblies	
3-1a	Piston rod	17-4 PH STAINLESS STEEL HI075	
3-1b	Piston rod (Handwheel)	17-4 PH STAINLESS STEEL HI075	
3-2	Piston	ASTM A105 PER PMA MN0023	
4	O-ring	NITRILE ASTM D1418 CLASS 1 NBR	
5	Guide ring	AS SPECIFIED (Graphite PTFE)	
6	Top plate	ASTM A105 PER PMA MN0023	
7	Guide bushing	AS SPECIFIED (PTFE/Steel)	
8	O-ring	NITRILE ASTM D1418 CLASS 1 NBR	
9	Rod scraper	NITRILE ASTM D1418 CLASS 1 NBR	
10	Center bolt	ASTM A193 GR B7/EN 1.7225	
11	Center bolt	ASTM A193 GR B7/EN 1.7225	
12	Spring lock washer	ASTM J489b ZINC PLATED	
13	Hexagon nut	ASTM A194 Grade 2H	
14	Split clamp	ASTM A105	
15	Indicator arm	ASTM A36	
16	Hexagon bolt	CARBON STEEL CLASS 8.8	
17	Spring lock washer	ASTM J489b ZINC PLATED	
18	Indicator plate	Austenitic Stainless Steel	
19	Cross recessed head screw	Austenitic Stainless Steel	
20	Separator plate ⁽¹⁾	Model 51 size 12, 16, 20	ASTM A395 GR 60-40-18 / EN-JS 1025 / EN 1563
20	Separator plate ⁽¹⁾	Model 51 size 16L, 20L, 24L, 28L, 32L	ASTM A105 PER PMA MN0023
20	Separator plate ⁽¹⁾	Model 52/53	ASTM A395 (UNS F32800)
21	Volume chamber tube ⁽¹⁾	Model 51	ASTM A105 PER PMA MN0023
22	Piston rod S/A	Model 52/53	General Sub-Assemblies
22-1a	Piston rod		17-4 PH STAINLESS STEEL HI075
22-1b	Piston rod (Handwheel)		17-4 PH STAINLESS STEEL HI075
22-2	Rod joint		ASTM A36
23	Hexagon socket head cap screw	Model 52/53	ASTM A574 ZINC PLATING
24	Spring lock washer	Model 52/53	ASTM J489b ZINC PLATED
25	Lower spring button	Model 52/53	SEE DRAWING FOR MATERIAL SPECIFICATIONS (ASTM A48 Class 40)
26	Spring	Model 52/53	SEE DRAWING FOR MATERIAL SPECIFICATIONS (SUP10)
27	Spring tube	Model 52/53	ASTM A106 GRADE B HRC 22 MAXIMUM
28	Guide bushing	Model 52/53	AS SPECIFIED (PTFE/Steel)
29	Compression bolt	Model 52/53	AISI 1045 HRC 20 MIN - LIQUID QUENCH AND TEMPER
30	Upper spring button	Model 52/53	ASTM A536 GRADE 65-45-12 (UNS F33100)
31	Thrust bearing	Model 52/53	AS SPECIFIED (High carbon chromium bearing steel)
32	Compression nut	Model 52/53	ASTM A276 TYPE 304 HRC 22 MAXIMUM (UNS S30400)
33	Piston plate S/A	Model 52/53	General Sub-Assemblies
33-1	Piston		ASTM A105
33-2	Stop collar		ASTM A36
34	Set screw	Model 52/53	SEE DRAWING (UNBRAKO special steel)
35	Exhaust pipe	Model 52/53	CARBON STEEL (1010 to 1030) HRC 22 MAX DICHROMATE ZINC PLATED

1. Additional components only required for the integral volume tank design.

Standard Construction

Model 51 Size 12, 16, 16L, 20, 20L, 24L, 28L, 32L / Model 52/53 Size 12, 16, 20 (cont.)

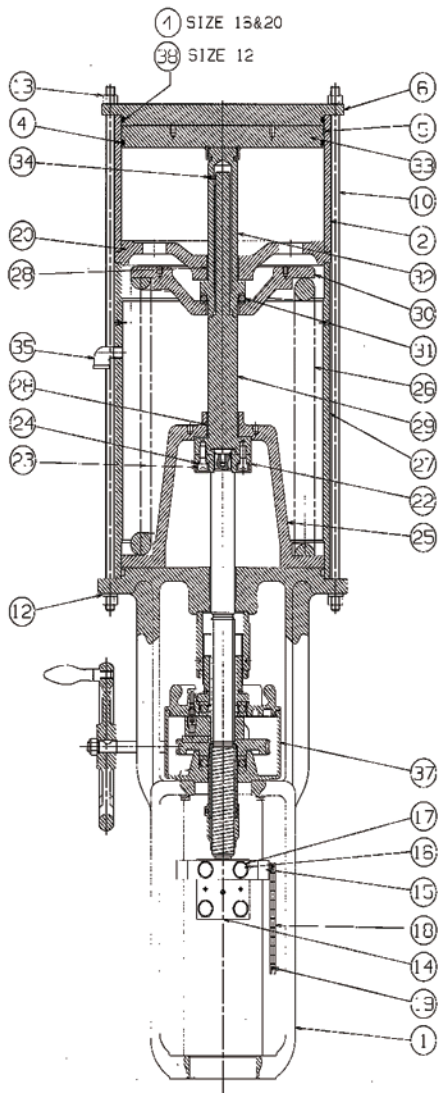
Ref. No.	Part Name	Standard Material (PED)
36	Plug	Model 53 CARBON STEEL (1010 to 1030) HRc 22 MAX DICHROMATE ZINC PLATED
37	Handwheel S/A	General Sub-Assemblies
45	Base plate (size 16L, 20L, 24L, 28L, 32L)	ASTM A105 PER PMA MN0023
46	Stud bolt (size 16L, 20L, 24L, 28L, 32L)	ASTM A193 GR B7/EN 1.7225
47	Hexagon nut (size 16L, 20L, 24L, 28L, 32L)	ASTM A194 Grade 2H
48	Spring lock washer (size 16L, 20L, 24L, 28L, 32L)	DICHROMATE ZINC PLATE CARBON STEEL CLASS 8.8
130	Hydraulic cylinder S/A	General Sub-Assemblies
132	Connection Block	ASTM A105
133	Hexagon bolt	ASTM A193 GRADE B7
-	Cap screw (Bonnet, yoke joint) ⁽¹⁾	ASTM A574 ZINC PLATING
134	Hexagon nut	ASTM A194 Grade 2H
135	Stud bolt	ASTM A193 GRADE B7
136	Oring	NITRILE ASTM D1418 CLASS 1 NBR
137	Connection Rod S/A	General Sub-Assemblies
137-1	Connection Rod	17-4 PH STAINLESS STEEL H1075
137-2	Rod joint	ASTM A36
138	Hexagon socket head cap screw	ASTM A574 ZINC PLATING
139	Spring lock washer	ASTM J489b ZINC PLATED

1. Cap screw (Bonnet, yoke joint) is available for Model 51/52/53 except size 12.

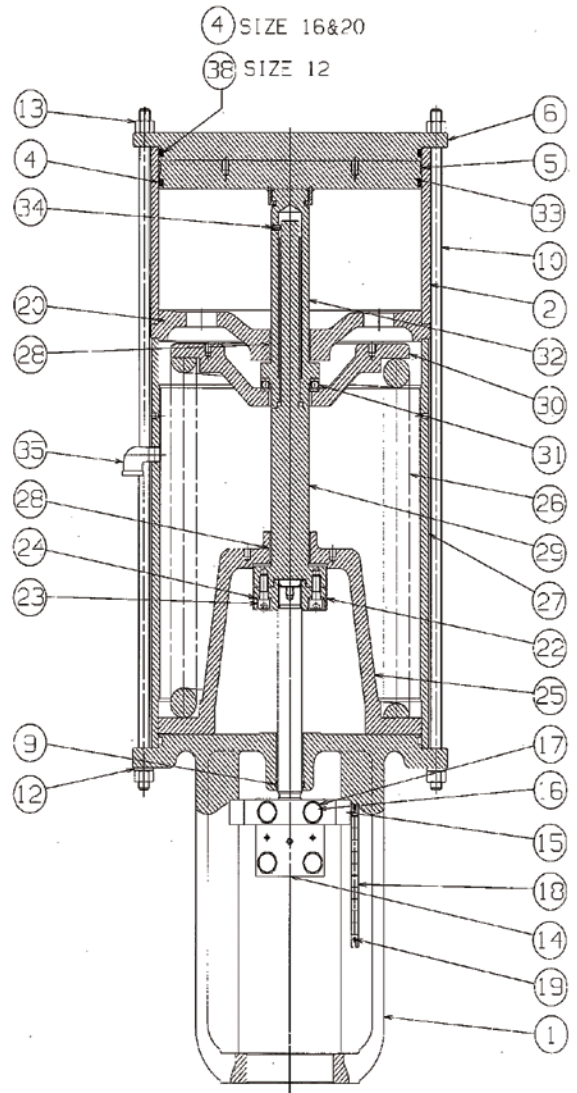
Model 51 Size 24, 28, 32, 40, 46

Ref. No.	Part Name	Standard Material (PED)
1	Yoke (size 24,28)	ASTM A395 GR 60-40-18 / EN-JS 1025 / EN 1563
1	Yoke (size 32)	CARBON STEEL (1010 to 1030) HRC 22 MAXIMUM
1	Yoke S/A (size 40, 46)	General Sub-Assemblies
1-1	Yoke bottom plate	ASTM A105
1-2	Yoke column	AISI 1045 HRC 20 MIN - LIQUID QUENCH AND TEMPER
1-3	Yoke top plate	ASTM A105
1-4	Hex. Head cap screw	DICHROMATE ZINC PLATE CARBON STEEL CLASS 8.8
1-5	Plain washer	DICHROMATE ZINC PLATE CARBON STEEL CLASS 8.8
4	O-ring	NITRILE ASTM D1418 CLASS 1 NBR
5	Guide ring	AS SPECIFIED (Graphite PTFE)
6	Top plate	ASTM A105 PER PMA MN0023
7	Guide bushing	AS SPECIFIED (PTFE/Steel)
8	O-ring	NITRILE ASTM D1418 CLASS 1 NBR
9	Rod scraper	NITRILE ASTM D1418 CLASS 1 NBR
10	Center bolt	ASTM A193 GR B7/EN 1.7225
11	Center bolt	ASTM A193 GR B7/EN 1.7225
12	Spring lock washer	ASTM J489b ZINC PLATED
13	Hexagon nut	ASTM A194 Grade 2H
14	Split clamp	ASTM A105
15	Indicator arm	ASTM A36
16	Hexagon bolt	CARBON STEEL CLASS 8.8
17	Spring lock washer	ASTM J489b ZINC PLATED
18	Indicator plate	Austenitic Stainless Steel
19	Cross recessed head screw	Austenitic Stainless Steel
37	Handwheel S/A	General Sub-Assemblies
45	Base plate (size 32, 40, 46)	ASTM A105 PER PMA MN0023
46	Stud bolt (size 32, 40, 46)	ASTM A193 GR B7/EN 1.7225
47	Hexagon nut (size 32, 40, 46)	ASTM A194 GRADE 2H
48	Spring lock washer (size 32, 40, 46)	ASTM J489b ZINC PLATED
49DP	Separator plate	ASTM A105 PER PMA MN0023
50DP	Piston S/A	General Sub-Assemblies
50DP-1	Lower Piston	ASTM A105 PER PMA MN0023
50DP-2a	Piston rod	17-4 PH STAINLESS STEEL H1075
50DP-2b	Piston rod (Handwheel)	17-4 PH STAINLESS STEEL H1075
51DP	Upper Piston	ASTM A105 PER PMA MN0023
52DP	Hexagon nut	ASTM J489b ZINC PLATED
53DP	Spring lock washer	ASTM A194 GRADE 2H
54DP	O-ring	NITRILE ASTM D1418 CLASS 1 NBR
55DP	Upper Cylinder tube	ASTM A105 PER PMA MN0023
56DP	Lower Cylinder tube	ASTM A105 PER PMA MN0023
60	Upper piston bushing (size 40, 46)	17-4 PH STAINLESS STEEL H1075
61	O-ring (size 40, 46)	NITRILE ASTM D1418 CLASS 1 NBR
-	Cap screw (bonnet, yoke joint)	ASTM A574 ZINC PLATING

Materials of Construction – Model 52



Model 52
Air-to-extend with Handwheel



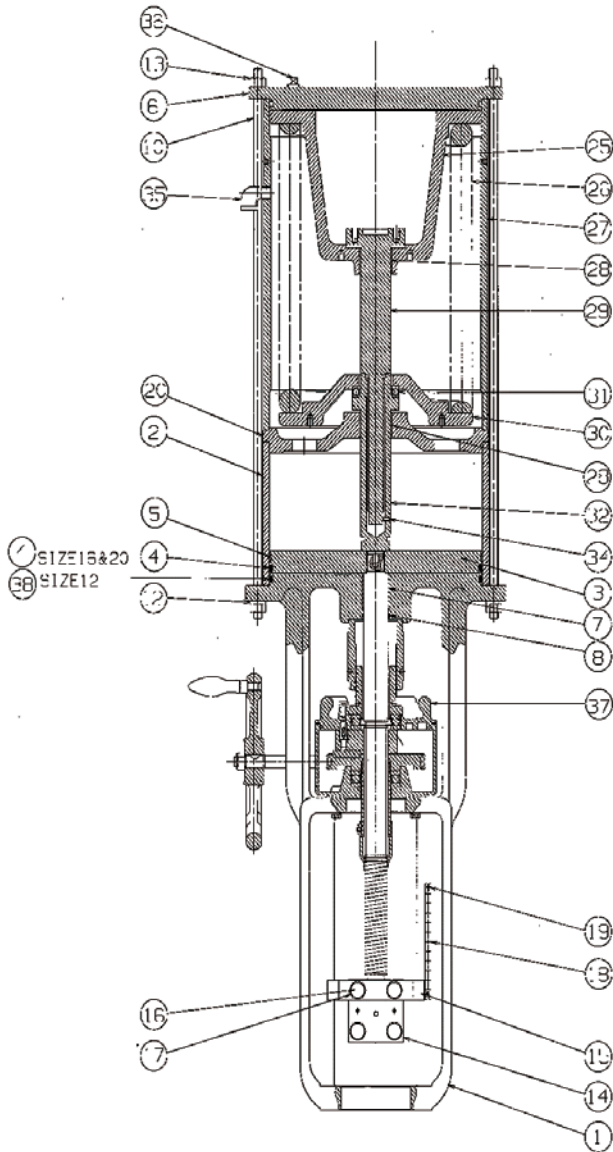
Model 52
Air-to-extend without Handwheel

Standard Construction

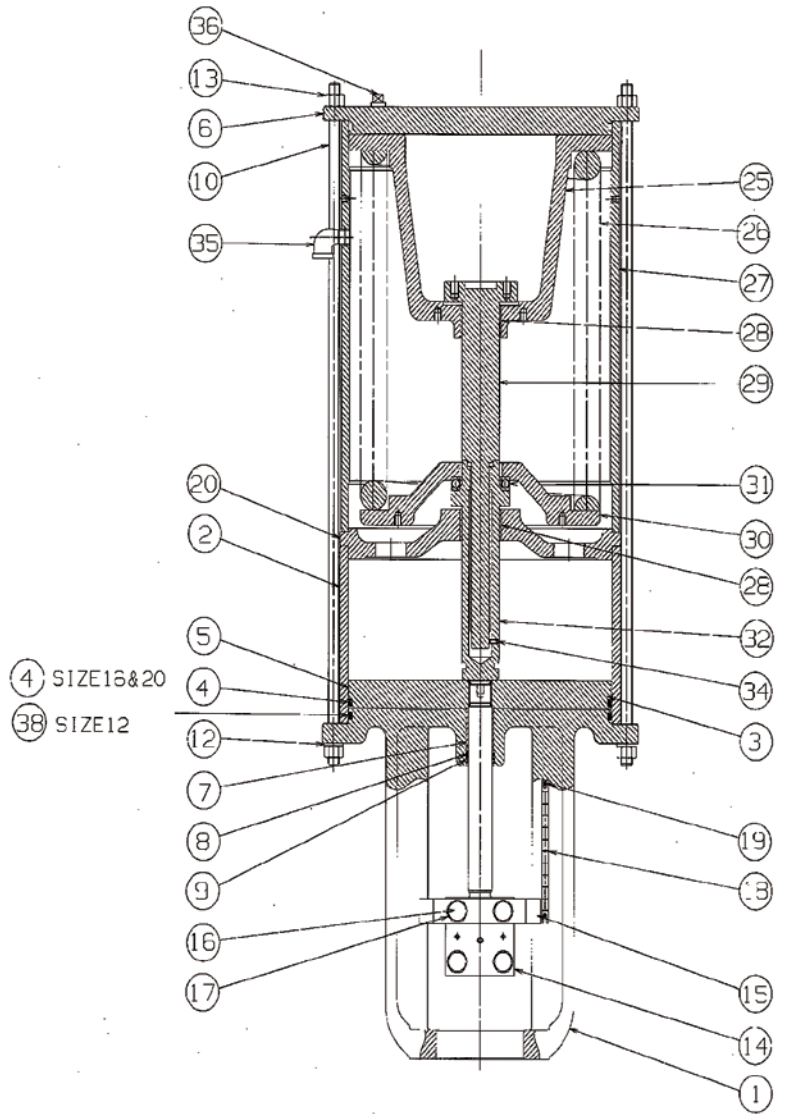
Model 52 Air-to-Extend with Spring-Return

Ref. No.	Description	Standard Materials -20°C to +100°C (-4°F to +212°F)
1	Yoke	DUCTILE IRON
2	Cylinder tube	CARBON STEEL, CHROME PLATED ID
4	O-ring	NITRILE (BUNA-N)
5	Guide ring	GRAPHITE / PTFE
6	Top plate	CARBON STEEL
7	Guide bushing	PTFE/STEEL
8	O-ring	NITRILE (BUNA-N)
9	Rod scraper	NITRILE (BUNA-N)
10	Center bolt	ALLOY STEEL
12	Spring lock washer	CARBON STEEL (ZINC-PLATED WITH BLACK OXIDE FINISH)
13	Hexagon nut	CARBON STEEL (ZINC-PLATED WITH BLACK OXIDE FINISH)
14	Split clamp	CARBON STEEL (BLACK OXIDE FINISH)
15	Indicator arm	CARBON STEEL
16	Hexagon bolt	CARBON STEEL (ZINC-PLATED WITH BLACK OXIDE FINISH)
17	Spring lock washer	CARBON STEEL (ZINC-PLATED WITH BLACK OXIDE FINISH)
18	Indicator plate	STAINLESS STEEL
19	Indicator plate screw	STAINLESS STEEL
20	Separator plate	DUCTILE IRON
22	Piston rod S/A	
	Piston rod	17-4 PH STAINLESS STEEL H1075 OR EQUIVALENT
	Piston rod (Handwheel)	17-4 PH STAINLESS STEEL H1075 OR EQUIVALENT
	Rod joint	CARBON STEEL
23	Hexagon socket head cap screw	ALLOY STEEL (ZINC PLATED)
24	Spring lock washer	CARBON STEEL (ZINC-PLATED)
25	Lower spring button	CAST IRON
26	Spring	ALLOY STEEL
27	Spring tube	CARBON STEEL
28	Guide bushing	PTFE/STEEL
29	Compression bolt	CARBON STEEL
30	Upper spring button	DUCTILE IRON
31	Thrust bearing	CHROME-ALLOY STEEL
32	Compression nut	STAINLESS STEEL
33	Piston plate S/A	
	Piston	CARBON STEEL
	Stop collar	CARBON STEEL
34	Set screw	STAINLESS STEEL
35	Exhaust pipe	CARBON STEEL (ZINC-PLATED)
37	CM Handwheel Assembly	STEEL
	DM Handwheel Assembly	STEEL
38	O-ring	NITRILE (BUNA-N)

Materials of Construction – Model 53



Model 53
Air-to-retract with Handwheel



Model 53
Air-to-retract without Handwheel

Standard Construction

Model 53 Air-to-Retract with Spring-Return

Ref. No.	Description	Standard Materials -4°F to +212°F (-20°C to +100°C)
1	Yoke	Ductile Iron
2	Cylinder tube	Carbon Steel, Chrome Plated ID
3	Piston S/A	
	Piston rod	17-4 PH Stainless Steel HI075 or Equivalent
	Piston	Carbon Steel
4	O-ring	Nitrile (Buna-N)
5	Guide ring	Graphite / PTFE
6	Top plate	Carbon Steel
7	Guide bushing	PTFE/Steel
8	O-ring	Nitrile (Buna-N)
9	Rod scraper	Nitrile (Buna-N)
10	Center bolt	Alloy Steel
12	Spring lock washer	Carbon Steel (Zinc-Plated with Black Oxide Finish)
13	Hexagon nut	Carbon Steel (Zinc-Plated with Black Oxide Finish)
14	Split clamp	Carbon Steel (Black Oxide Finish)
15	Indicator arm	Carbon Steel
16	Hexagon bolt	Carbon Steel (Black Oxide Finish)
17	Spring lock washer	Carbon Steel (Zinc-Plated with Black Oxide Finish)
18	Indicator plate	Stainless Steel
19	Indicator plate screw	Stainless Steel
20	Separator plate	Ductile Iron
25	Upper spring button	Cast Iron
26	Spring	Alloy Steel
27	Spring tube	Carbon Steel
28	Guide bushing	PTFE/Steel
29	Compression bolt	Carbon Steel
30	Lower spring button	Ductile Iron
31	Thrust bearing	Chrome-Alloy Steel
32	Compression nut	Stainless Steel
34	Set screw	Stainless Steel
35	Exhaust pipe	Carbon Steel (Zinc-Plated)
36	Plug	Carbon Steel (Zinc-Plated)
37	CM Handwheel Assembly	Steel
	DM Handwheel Assembly	Steel
38	O-ring	Nitrile (Buna-N)

Optional Constructions

Low-Temperature Service: Suitable for low ambient temperature

Low Temperature-1 (-46°C up to 83°C)

Item No.	Part Name	Size	Description
2	Cylinder	12, 16, 16L, 20, 20L, 24L, 28L, 32L	ASTM A350 GRADE LF2 HRc 22 MAXIMUM
55DP, 56DP		24, 28, 32, 40, 46	
21	Volume chamber	12, 16, 20, 24L, 28L, 32L	ASTM A350 GRADE LF2 HRc 22 MAXIMUM
20, 49DP	Separator Plate	12, 16, 20	ASTM A352 GR LCC HRc 22 MAXIMUM
		24, 28, 32, 24L, 28L, 32L, 40, 46	ASTM A350 GRADE LF2 HRc 22 MAXIMUM
10,11	Center Bolt	All	ASTM A193 Grade B8 Class 2
12, 17	Spring lock washer	All	AUSTENITIC STAINLESS STEEL
13	Hexagon Nut	All	ASTM A194 Grade 8M HRc 22 Maximum
16	Hexagon bolt	All	ASTM A193 GRADE B8 CLASS 2
46	Stud bolt	16L, 20L, 24L,	A4-80 (ISO 3506) 316L
47	Hexagon nut	28L, 32L, 40, 46	A4-80 (ISO 3506) 316L
4, 8, 9, 38, 136, 54DP, 103	O-ring	All	NITRILE PARKER COMPOUND
9	Rod Scraper	All	NITRILE PARKER COMPOUND

Low Temperature-2 (-50°C up to 83°C)

Item No.	Part Name	Size	Description
1	Yoke	12, 16, 20, 24, 28	ASTM A352 GRADE LC1 HRc 22 MAXIMUM - S21 HEAT TREATMENT
		32	ASTM A182 GRADE F 304 HRc 22 MAXIMUM
1-1	Yoke bottom plate	16L, 20L, 24L, 28L, 32L, 40, 46	ASTM A182 GRADE F304H HRc 22 MAXIMUM
1-2	Yoke column		ASTM A182 GRADE F304H HRc 22 MAXIMUM
1-3	Yoke top plate		ASTM A182 GRADE F304H HRc 22 MAXIMUM
1-4	Hex head cap screw		A4-80 (ISO 3506) 316L
1-5	Plain washer		A4-80 (ISO 3506) 316L
6	Top plate	All	ASTM A182 GRADE F 304 HRc 22 MAXIMUM
3	Piston	12, 16, 16L, 20, 20L, 24L, 28L, 32L	ASTM A182 GRADE F 304 HRc 22 MAXIMUM
50DP, 51DP		24, 28, 32, 40, 46	ASTM A182 GRADE F 304 HRc 22 MAXIMUM
2	Cylinder	12, 16, 16L, 20, 20L, 24L, 28L, 32L	ASTM A182 GRADE F 304 HRc 22 MAXIMUM
55DP, 56DP		24, 28, 32, 40, 46	ASTM A182 GRADE F 304 HRc 22 MAXIMUM
21	Volume chamber	12, 16, 20, 24L, 28L, 32L	ASTM A182 GRADE F 304 HRc 22 MAXIMUM
20, 49DP	Separator Plate	12, 16, 20	ASTM A352 GRADE LC1 HRc 22 MAXIMUM - S21 HEAT TREATMENT
		24, 28, 32, 24L, 28L, 32L, 40, 46	ASTM A182 GRADE F 304 HRc 22 MAXIMUM
10, 11	Center Bolt	All	ASTM A193 Grade B8 Class 2
12, 17	Spring lock washer	All	AUSTENITIC STAINLESS STEEL
13	Hexagon Nut	All	ASTM A194 Grade 8M HRc 22 Maximum

Note: The above indicates only those parts that change material for low temperature service. All other parts remain the same as standard.

Optional Constructions

High-Temperature Service: Suitable for high ambient temperature

Ref. No.	Description	High Temperature Construction -4°F to +212°F (-20°C to +100°)
4	O-ring	Nitrile – High Temperature
8	O-ring	Nitrile – High Temperature
38	O-ring	Nitrile – High Temperature

Note: The above indicates only those parts that change material for high temperature service. All other parts remain the same as standard.

Integral Volume Tanks

The Model 51 Double-Acting Actuator without springs is also available with integral volume tanks for emergency fail action. Key advantages of the integrated volume tank design include sealing integrity and a reduced number of components. Standard sizes are shown in the chart below. Consult the factory for proper selection to meet the specific application requirements.

Actuator Size	Volume Tank Size	
	Gallons (US)	Liters
12	4.3	16.2
16	6.5	24.4
20	9.8	37.1
24L	14.2	54.9
28L	21.6	82
32L	28.8	109.6

Adjustable Travel Stops

Item No.	Part Name	STD Material (PED)
100-1	Top plate	Carbon steel
100-2	Stopper boss	ASTM A36
101	Stop bolt	Stainless steel
103	O-ring	Nitrile (Buna-N)
104	Hexagon nut	Carbon steel
106	Hexagon bolt	Stainless steel
107	Hexagon nut	Carbon steel
109-1	Piston	ASTM A105 PER PMA MN0023
109-2a	Piston rod	17-4 PH Stainless steel
109-2b	Piston rod (Handwheel)	17-4 PH Stainless Steel
110	Stop collar	Carbon steel

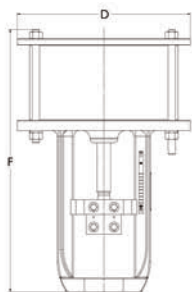
Stainless Steel Bolting

Item No.	Part Name	STD Material
10 & 11	Center bolt	Stainless steel
13	Hexagon nut	Stainless steel
16	Hexagon bolt	Stainless steel
133	Hexagon bolt	Stainless steel
134	Hexagon nut	Stainless steel
135	Stud bolt	Stainless steel

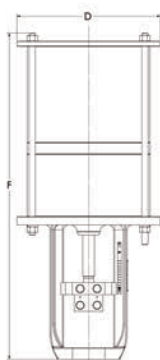
Steel Yoke

Item No.	Part Name	STD Material
1	Yoke	Carbon steel LCC

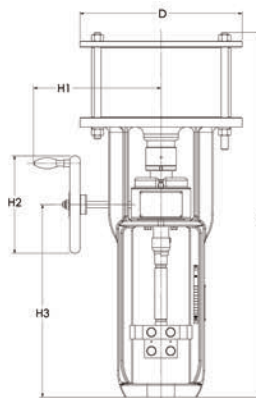
Dimensions



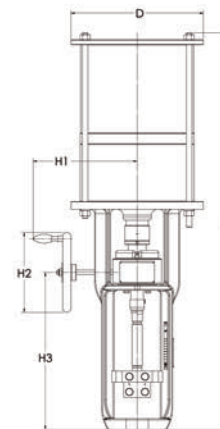
Without Handwheel
Without Volume Chamber



Without Handwheel
With Volume Chamber



With Handwheel
Without Volume Chamber



With Handwheel
With Volume Chamber

Model 51 Dimensional Data

Inches / mm

Size	D		H1		H2		H3	
	inch	mm	inch	mm	inch	mm	inch	mm
12	14.7	373	11.5	292	8.9	225	17.4	443
16	18.1	461	13.4	340	11	280	21.7	553
16L	18.1	461	-	-	-	-	-	-
20	22.6	573	13.4	340	11	280	22.1	563
20L	22.6	573	-	-	-	-	-	-
24	18.1	461	13.4	340	11	280	22.1	563
24L	25.9	656	-	-	-	-	-	-
28	22.6	573	13.4	340	11	280	22.1	563
28L	32.2	816	-	-	-	-	-	-
32	26.4	670	13.4	340	11	280	22.2	564
32L	36.9	936	-	-	-	-	-	-
40	32.1	815	-	-	-	-	-	-
46	36.8	933	-	-	-	-	-	-

Dimensions

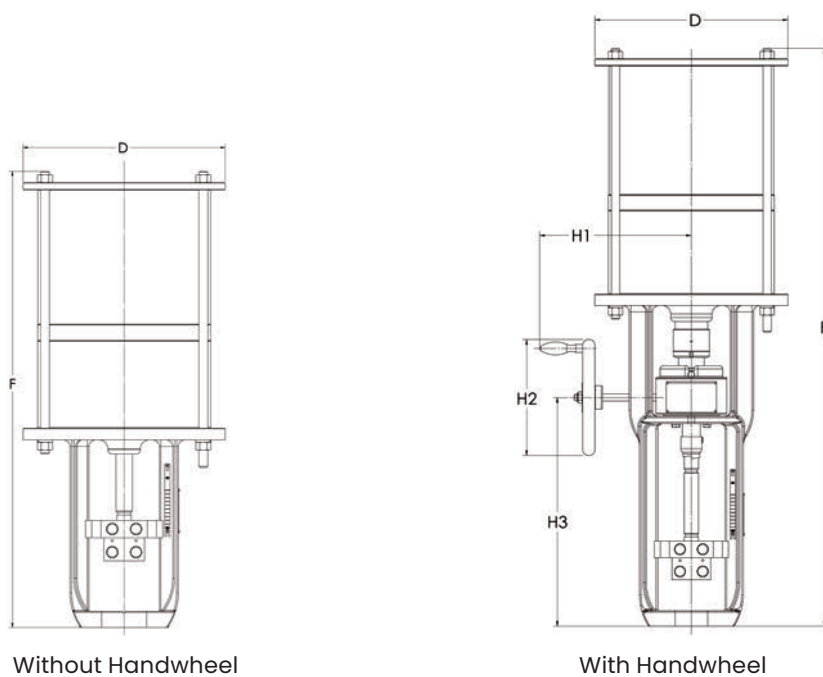
Model 51 Dimensional Data - Inches / mm

Actuator Type	Actuator Size	F													
		Nominal Actuator Travel													
		inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
		2.5	63.5	4	101.6	6 in	152.4	8	203.2	10	254	12	304.8	14	355.6
Standard	12	21.5	546	23.0	584	-	-	-	-	-	-	-	-	-	
	16	24.7	628	26.2	666	28.2	717	36.2	920	38.2	971	42.2	1073	-	-
	16L	-	-	-	-	-	-	-	-	-	-	-	-	47.6	1208.2
	20	25.4	645	26.9	683	28.9	734	36.7	931	38.7	982	45.0	1142	-	-
	20L	-	-	-	-	-	-	-	-	-	-	-	-	48.1	1221.2
	24	33.1	842	36.1	918	40.1	1020	48.1	123	52.1	1324	60.2	1528	-	-
	24L	26.3	669	29.3	745.2	33.3	846.8	37.3	948.4	41.3	1050	45.3	1151.6	49.3	1253.2
	28	34.3	870	37.3	946	52.2	1326	49.3	1251	53.3	1353	61.3	1556	-	-
	28L	28.4	722	31.4	798.2	35.4	899.8	39.4	1001.4	43.4	1103	47.4	1204.6	-	-
	32	42.7	1085	45.7	1161	49.7	1262	57.8	1467	61.8	1569	69.8	1773	-	-
	32L	30.5	774.5	33.5	850.7	37.5	952.3	41.5	1053.9	45.5	1155.5	49.5	12587.1	-	-
40	38.1	967	42.6	1081.3	48.6	1299.7	-	-	-	-	-	-	-	-	
46	40.2	1021	44.7	1135.3	50.7	1287.7	-	-	-	-	-	-	-	-	
Standard with Integral Volume Tank	12	32.5	826	34.0	864	-	-	-	-	-	-	-	-	-	-
	16	35.8	908	37.3	946	39.3	997	-	-	-	-	-	-	-	-
	20	36.0	915	37.5	953	39.5	1004	-	-	-	-	-	-	-	-
	24L	37.8	960	40.8	1036.2	44.8	1137.8	-	-	-	-	-	-	-	-
	28L	39.8	1012	42.8	1088.2	46.8	1189.8	-	-	-	-	-	-	-	-
32L	41.9	1064.5	44.9	1140.7	48.9	1242.3	-	-	-	-	-	-	-	-	
Standard with Hand-wheel	12	32.2	819	33.7	857	-	-	-	-	-	-	-	-	-	-
	16	40.6	1031	42.1	1069	44.1	1119	59.3	1506	61.3	1557	69.3	1760	-	-
	20	41.2	1048	42.7	1086	44.7	1136	59.6	1513	61.6	1564	69.6	1767	-	-
	24	48.2	1224	51.2	1301	55.2	1402	71.2	1808	75.2	1910	85.2	2164	-	-
	28	49.2	1249	52.2	1326	53.2	1427	72.1	1831	76.1	1933	86.1	2187	-	-
32	56.6	1440	59.7	1516	63.7	1617	79.7	2025	83.7	2126	93.7	2381	-	-	
Standard with Integral Volume Tank and Hand-wheel	12	43.3	1099	44.8	1137	-	-	-	-	-	-	-	-	-	-
	16	51.6	1311	53.1	1349	55.1	1399	-	-	-	-	-	-	-	-
	20	51.9	1318	53.4	1356	55.4	1406	-	-	-	-	-	-	-	-

Model 51 Dimensional Data (Cont.)

Actuator Type	Actuator Size	F											
		Nominal Actuator Travel											
		inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
		16	406.4	18	457.2	20	508	22	558.8	24	609.6	30	762
Standard	12	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-
	16L	51.6	1309.2	55.6	1414.4	59.6	1513	63.6	1614.6	67.6	1716.2	79.6	2021
	20	-	-	-	-	-	-	-	-	-	-	-	-
	20L	52.1	1322.8	56.1	1424.4	60.1	1526	64.1	1627.6	68.1	1729.2	80.1	2034
	24	-	-	-	-	-	-	-	-	-	-	-	-
	24L	53.3	1354.8	57.3	1456.4	61.3	1558	65.3	1659.6	69.3	1761.2	81.3	2066
	28	-	-	-	-	-	-	-	-	-	-	-	-
	28L	-	-	-	-	-	-	-	-	-	-	-	-
	32	-	-	-	-	-	-	-	-	-	-	-	-
	32L	-	-	-	-	-	-	-	-	-	-	-	-
40	-	-	-	-	-	-	-	-	-	-	-	-	
46	-	-	-	-	-	-	-	-	-	-	-	-	
Standard with Integral Volume Tank	12	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-
	24L	-	-	-	-	-	-	-	-	-	-	-	-
	28L	-	-	-	-	-	-	-	-	-	-	-	-
32L	-	-	-	-	-	-	-	-	-	-	-	-	
Standard with Hand-wheel	12	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-
	24	-	-	-	-	-	-	-	-	-	-	-	-
	28	-	-	-	-	-	-	-	-	-	-	-	-
32	-	-	-	-	-	-	-	-	-	-	-	-	
Standard with Integral Volume Tank and Hand-wheel	12	-	-	-	-	-	-	-	-	-	-	-	-
	16	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-	-	-	-	-	-

Dimensions – Model 52 and 53



Model 52 and 53 Dimensional Data

Inches / mm

Size	D		H1		H2		H3	
	inch	mm	inch	mm	inch	mm	inch	mm
12	14.69	373	11.50	292	8.86	225	17.44	443
16	18.15	461	13.39	340	11.02	280	21.77	553
20	22.56	573	13.39	340	11.02	280	22.17	563

Actuator Type	Actuator Size	F					
		Nominal Actuator Travel					
		inch	mm	inch	mm	inch	mm
		2.5	63.5	4	101.6	6	152.4
Standard	12	-	-	39.1	993.8	-	-
	16	39.5	1003	44	1117	50	1269
	20	41.1	1045	45.6	1159	51.6	1311
Standard with Handwheel	12	-	-	49.9	1267	-	-
	16	55.3	1406	59.8	1520	65.8	1671
	20	64.6	1642	69.1	1756	75.11	1908

Weights

In US Units (lbs)

Actuator Size	Construction	Nominal Stroke		Model 51		Model 52		Model 53	
		inch	mm	Without Handwheel	With Handwheel	Without Handwheel	With Handwheel	Without Handwheel	With Handwheel
12	Standard	4	101.6	179	227	412	456	410	454
	with Integral Volume Chamber	4	101.6	280	328	-	-	-	-
16	Standard	2.5	63.5	386	529	712	853	703	849
		4	101.6	386	529	761	902	754	897
		6	152.4	386	529	864	1005	855	1001
		10	254	465	628	-	-	-	-
		12	304.8	500	688	-	-	-	-
	with Integral Volume Chamber	2.5	63.5	578	721	-	-	-	-
		4	101.6	578	721	-	-	-	-
		6	152.4	578	721	-	-	-	-
		10	254	-	-	-	-	-	-
		12	304.8	-	-	-	-	-	-
16L	Standard	16	406.4	653	-	-	-	-	-
		20	508	699	-	-	-	-	
		24	609.6	745	-	-	-	-	
		30	762	814	-	-	-	-	
20	Standard	2.5	63.5	639	785	1157	1303	1149	1294
		4	101.6	639	785	1261	1407	1252	1398
		6	152.4	639	785	1387	1532	1378	1523
		10	254	699	849	-	-	-	-
		12	304.8	741	919	-	-	-	-
	with Integral Volume Chamber	2.5	63.5	919	1065	-	-	-	-
		4	101.6	919	1065	-	-	-	-
		6	152.4	919	1065	-	-	-	-
		10	254	-	-	-	-	-	-
		12	304.8	-	-	-	-	-	-
20L	Standard	16	406.4	956	-	-	-	-	-
		20	508	1022	-	-	-	-	
		24	609.6	1087	-	-	-	-	
		30	762	1187	-	-	-	-	
24	Standard	6	152.4	714	970	-	-	-	-
		10	254	791	1109	-	-	-	-
		12	304.8	838	1177	-	-	-	-
24L	Standard	2.5	63.5	1067	-	-	-	-	-
		4	101.6	1092	-	-	-	-	-
		6	152.4	1125	-	-	-	-	-
		10	254	1190	-	-	-	-	-
		12	304.8	1224	-	-	-	-	-
		16	406.4	1290	-	-	-	-	-
		20	508	1356	-	-	-	-	-
		24	609.6	1422	-	-	-	-	-
		30	762	1521	-	-	-	-	-
	with Integral Volume Chamber	2.5	63.5	1540	-	-	-	-	-
		4	101.6	1565	-	-	-	-	-
		6	152.4	1597	-	-	-	-	-

Weights

In US Units (lbs) (cont.)

Actuator Size	Construction	Nominal Stroke		Model 51		Model 52		Model 53	
		Inch	mm	Without Handwheel	With Handwheel	Without Handwheel	With Handwheel	Without Handwheel	With Handwheel
28	Standard	6	152.4	1190	1362	-	-	-	-
		10	254	1305	1506	-	-	-	-
		12	304.8	1369	1579	-	-	-	-
28L	Standard	2.5	63.5	1922	-	-	-	-	-
		4	101.6	1966	-	-	-	-	-
		6	152.4	2025	-	-	-	-	-
		10	254	2142	-	-	-	-	-
		12	304.8	2201	-	-	-	-	-
	with Integral Volume Chamber	2.5	63.5	2714	-	-	-	-	-
		4	101.6	2760	-	-	-	-	-
32	Standard	6	152.4	2116	2299	-	-	-	-
		10	254	2235	2449	-	-	-	-
		12	304.8	2304	2522	-	-	-	-
32L	Standard	2.5	63.5	2875	-	-	-	-	-
		4	101.6	2935	-	-	-	-	-
		6	152.4	3014	-	-	-	-	-
		10	254	3174	-	-	-	-	-
		12	304.8	3253	-	-	-	-	-
	with Integral Volume Chamber	2.5	63.5	3957	-	-	-	-	-
		4	101.6	4020	-	-	-	-	-
40	Standard	2.5	63.5	3081	-	-	-	-	-
		4	101.6	3151	-	-	-	-	-
		6	152.4	3232	-	-	-	-	-
46	Standard	2.5	63.5	4499	-	-	-	-	-
		4	101.6	4593	-	-	-	-	-
		6	152.4	4718	-	-	-	-	-

Weights

In Metric Units (kg)

Actuator size	Construction	Nominal stroke		Model 51		Model 52		Model 53	
		in	mm	Without handwheel	with handwheel	Without handwheel	with handwheel	Without handwheel	with handwheel
12	Standard	4	101.6	81	103	187	207	186	206
	With Integral Volume Chamber	4	101.6	127	149	-	-	-	-
16	Standard	2.5	63.5	175	240	323	387	319	385
		4	101.6	175	240	345	409	342	407
		6	152.4	175	240	392	456	388	454
		10	254	211	285	-	-	-	-
		12	304.8	227	312	-	-	-	-
	With Integral Volume Chamber	2.5	63.5	262	327	-	-	-	-
		4	101.6	262	327	-	-	-	-
		6	152.4	262	327	-	-	-	-
		10	254	-	-	-	-	-	-
		12	304.8	-	-	-	-	-	-
16L	Standard	16	406.4	296	-	-	-	-	-
		20	508	317	-	-	-	-	
		24	609.6	338	-	-	-	-	
		30	762	369	-	-	-	-	
20	Standard	2.5	63.5	290	356	525	591	521	587
		4	101.6	290	356	572	638	568	634
		6	152.4	290	356	629	695	625	691
		10	254	317	385	-	-	-	-
		12	304.8	336	417	-	-	-	-
	With Integral Volume Chamber	2.5	63.5	417	483	-	-	-	-
		4	101.6	417	483	-	-	-	-
		6	152.4	417	483	-	-	-	-
		10	254	-	-	-	-	-	-
		12	304.8	-	-	-	-	-	-
20L	Standard	16	406.4	434	-	-	-	-	-
		20	508	464	-	-	-	-	
		24	609.6	493	-	-	-	-	
		30	762	538	-	-	-	-	
24	Standard	6	152.4	324	440	-	-	-	-
		10	254	359	503	-	-	-	-
		12	304.8	380	534	-	-	-	-
24L	Standard	2.5	63.5	484	-	-	-	-	-
		4	101.6	495	-	-	-	-	-
		6	152.4	510	-	-	-	-	-
		10	254	540	-	-	-	-	-
		12	304.8	555	-	-	-	-	-
		16	406.4	585	-	-	-	-	-
		20	508	615	-	-	-	-	-
		24	609.6	645	-	-	-	-	-
		30	762	690	-	-	-	-	-
	With Integral Volume Chamber	2.5	63.5	699	-	-	-	-	-
		4	101.6	710	-	-	-	-	-
		6	152.4	725	-	-	-	-	-

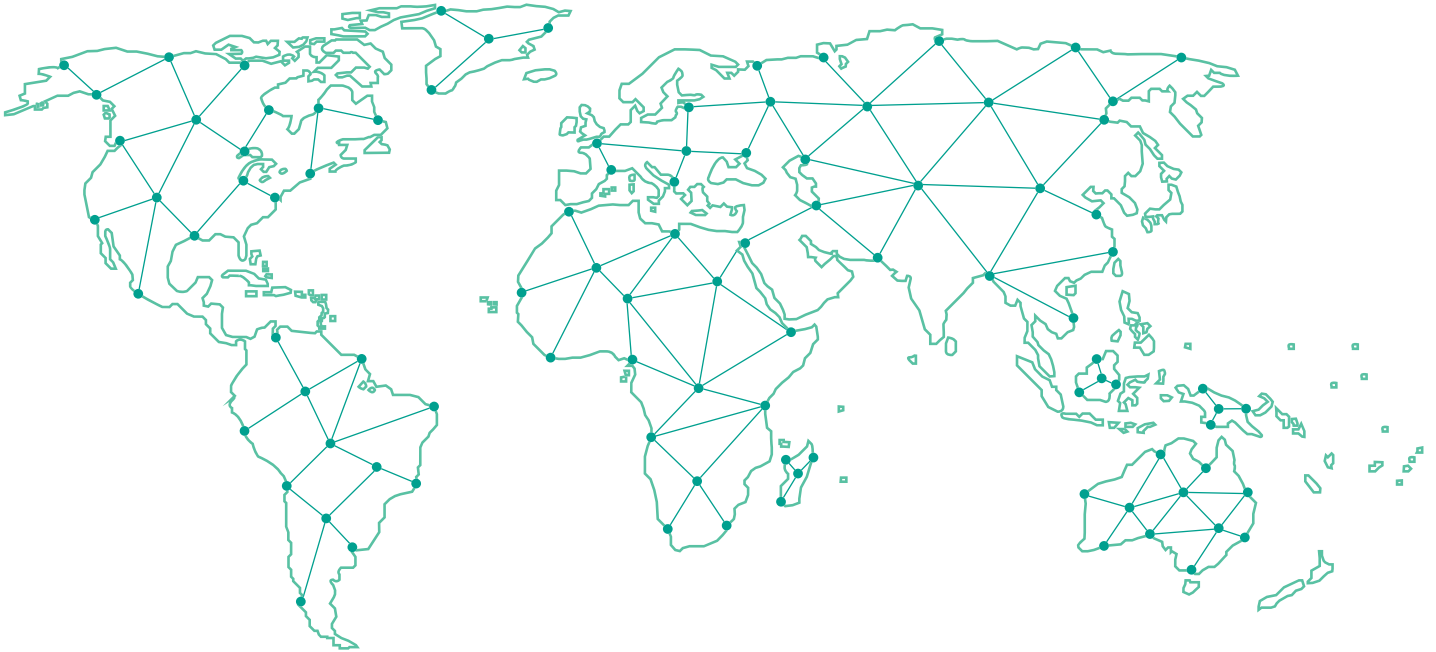
Weights

In Metric Units (kg) (cont.)

Actuator size	Construction	Nominal stroke		Model 51		Model 52		Model 53	
		in	mm	Without handwheel	with handwheel	Without handwheel	with handwheel	Without handwheel	with handwheel
28	Standard	6	152.4	540	618	-	-	-	-
		10	254	592	683	-	-	-	-
		12	304.8	621	716	-	-	-	-
28L	Standard	2.5	63.5	872	-	-	-	-	-
		4	101.6	892	-	-	-	-	-
		6	152.4	918	-	-	-	-	-
		10	254	972	-	-	-	-	-
		12	304.8	999	-	-	-	-	-
	With Integral Volume Chamber	2.5	63.5	1231	-	-	-	-	-
		4	101.6	1252	-	-	-	-	-
32	Standard	6	152.4	960	1043	-	-	-	-
		10	254	1014	1111	-	-	-	-
		12	304.8	1045	1144	-	-	-	-
32L	Standard	2.5	63.5	1304	-	-	-	-	-
		4	101.6	1331	-	-	-	-	-
		6	152.4	1367	-	-	-	-	-
		10	254	1440	-	-	-	-	-
		12	304.8	1476	-	-	-	-	-
	With Integral Volume Chamber	2.5	63.5	1795	-	-	-	-	-
		4	101.6	1824	-	-	-	-	-
40	Standard	2.5	63.5	1398	-	-	-	-	-
		4	101.6	1429	-	-	-	-	-
		6	152.4	1466	-	-	-	-	-
46	Standard	2.5	63.5	2041	-	-	-	-	-
		4	101.6	2083	-	-	-	-	-
		6	152.4	2140	-	-	-	-	-

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