

GE Oil & Gas

# 51/52/53 Series

Masoneilan\* Cylinder Actuator



imagination at work

# Conversion Table

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

Metric values using the following conversion factors:	Conversion Factor	Metric Unit
in.	25.4	mm
lb.	0.4535924	kg
in <sup>2</sup>	6.4516	cm <sup>2</sup>
ft <sup>3</sup> /min	0.02831685	m <sup>3</sup> /min
gal/min	3.785412	L/min
lb/hr	0.4535924	kg/hr
psig	0.06894757	barg
ft lb	1.3558181	Nm
°F	5/9 (°F-32)	°C

Note 1: Multiply USCS value with conversion factor to get metric value.

## NOTICE

For valve configurations not listed in this manual, please contact your local GE sales office or authorized representative for assistance.

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## Features

GE's Masoneilan\* Model 51/52/53 pneumatic cylinder actuator provides 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 allows 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 side-mounted handwheel option available for all actuator sizes.

### Ease of Maintenance

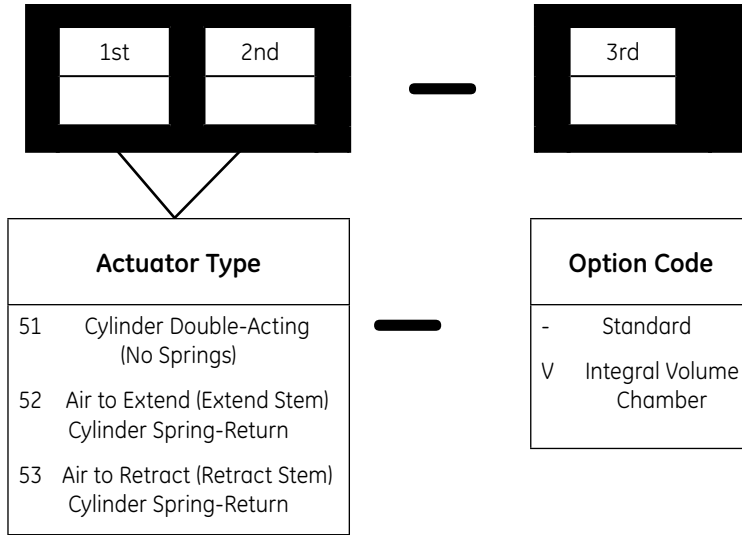
Modular construction of the cylinder and spring cartridge design provides an assembly that is both easy and safe to maintain. The actuator piston is located in a separate cylinder chamber, which allows for simple dynamic seal replacement.

### PED Compliance

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

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

# Numbering System



# General Specifications

## Standard Actuator Sizes and Spring Ranges

Actuator Size	Effective Piston Area		Maximum Stroke		Standard Spring Ranges			
	in <sup>2</sup>	cm <sup>2</sup>	in	mm	Initial	Final	Initial	Final
					psi	psi	MPa	MPa
12	112	721	2.5	63.5	10	25	0.07	0.17
					20	40	0.14	0.28
					25	50	0.17	0.34
	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

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

# Stem Travel

Actuator Size		Actuator Stroke										
		in	2	2.25	2.5	3	3.5	3.75	4	5	5.5	6
		mm	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	X	-	-	-
16		X	X	X	X	X	X	X	X	X	X	X
20		X	X	X	X	X	X	X	X	X	X	X

**Notes:**

1. Shaded regions indicate standard strokes for each actuator size.
2. Optional actuator strokes are provided using standard springs. Resultant spring ranges are shown in the following tables.

## Manual Override Options

Actuator Size	Type/Mounting	Model
12	Mechanical Hand Wheel / Side-Mounted	CM
16	Mechanical Hand Wheel / Side-Mounted	DM
20	Mechanical Hand Wheel / Side-Mounted	DM
	Hydraulic Handjack / Top-Mounted	HJ

## Valve Mounting Interfaces

Stem Size		Standard Yoke Spud Diameter		Yoke Connection	Actuator Size		
in	mm	inches	mm		12	16	20
.500	12.7	2.250	57	Drive Nut	X		
.625	15.875	3.3125	84	Drive Nut	X	X	X
.75	19.05	3.3125	84	Drive Nut	X	X	X
1	25.4	3.750	95	Drive Nut	X	X	X
1.125	28.57	3.750	95	Drive Nut	X	X	X
1.125	28.57	3.750	95	Bolted	-	X	X
1.25	31.75	5.000	127	Bolted	-	X	X

**Notes:**

1. Split clamps are used for the valve-to-piston stem connections on all actuator sizes.
2. The split clamps also provide a mechanical anti-rotation feature in both automatic and manual operating mode.

## Air Connections

Standard Pneumatic Connections	3/4" NPT – All Sizes (1/2" NPT with integral volume chamber)
Exhaust Pipe	1/2" NPT – All Sizes

# General Specifications

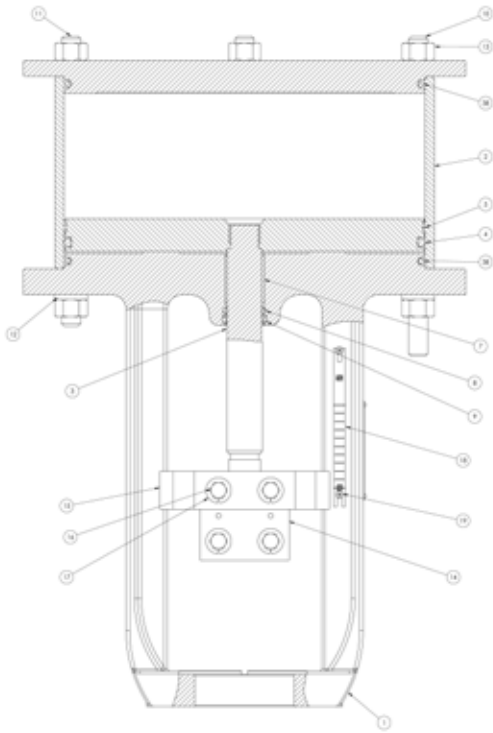
## Optional Spring Ranges – Model 52 Air to Extend

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

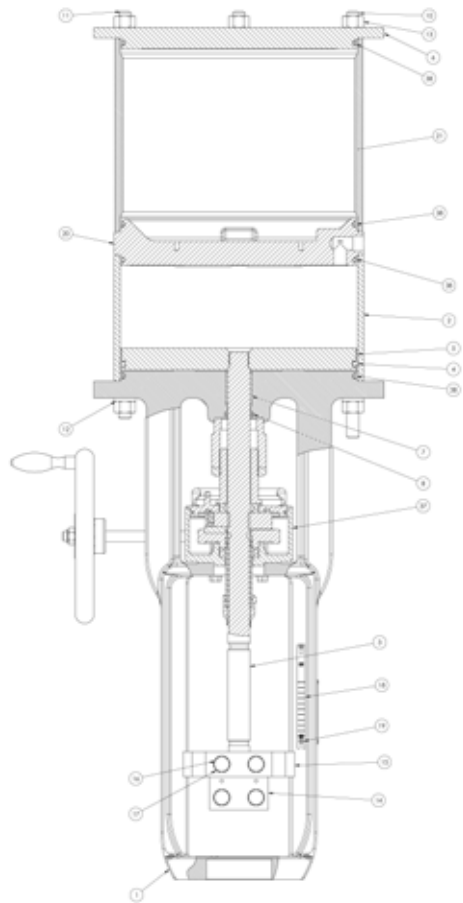
## Optional Spring Ranges – Model 53 Air to Retract

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	

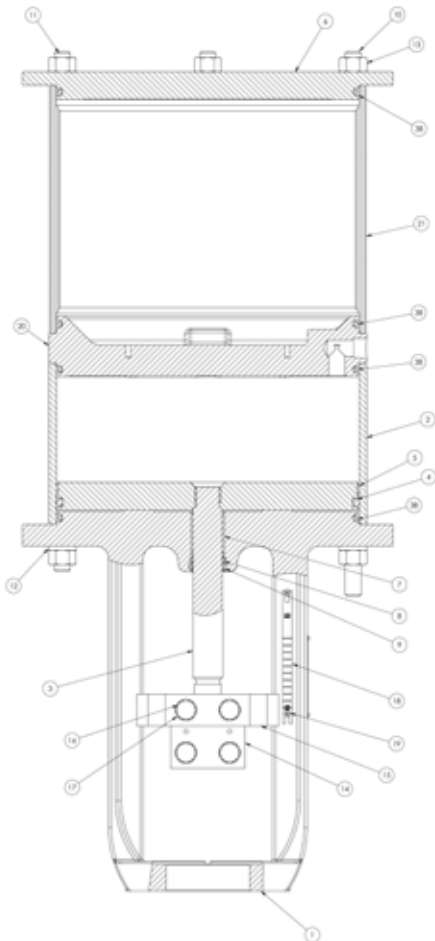
# Materials of Construction



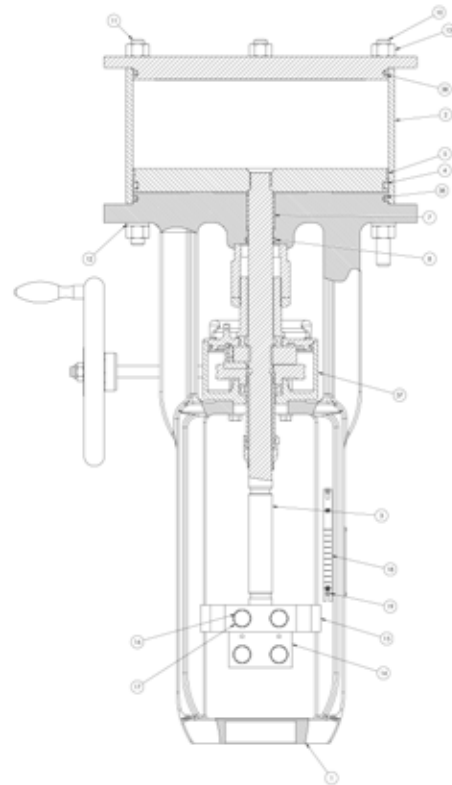
**Model 51 Double Acting**  
Without handwheel without volume chamber



**Model 51 Double Acting**  
With handwheel with volume chamber



**Model 51 Double Acting**  
Without handwheel with volume chamber



**Model 51 Double Acting**  
With handwheel without volume chamber



# Standard Construction

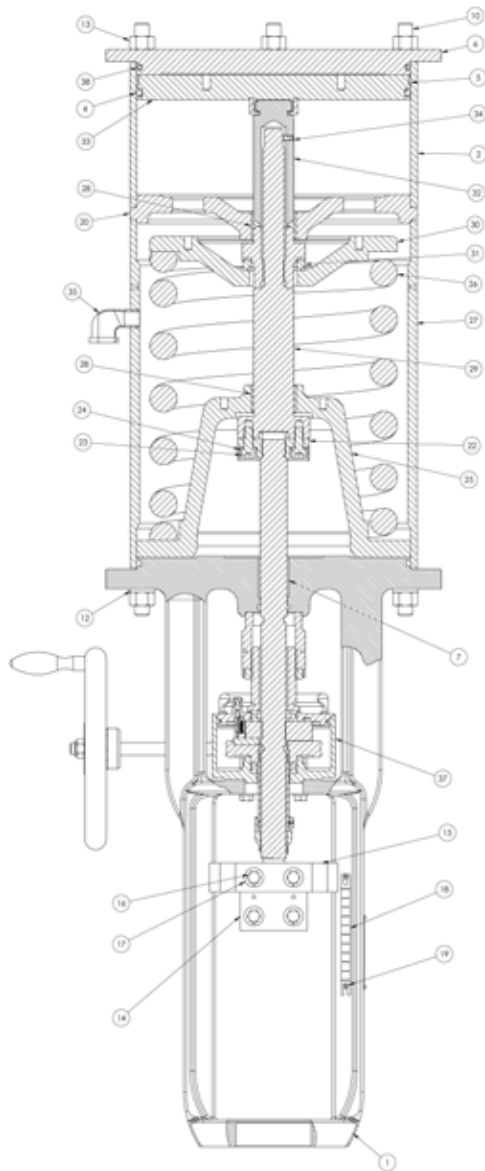
## Model 51 Double-Acting Design

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
3	Piston S/A	
	Piston rod	17-4 PH Stainless Steel H1075 or Equivalent
	Piston	Carbon Steel
4	O-ring	Nitrile (Buna-N)
5	Guide ring	Graphite Teflon
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
11	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	Cross recessed head screw	Stainless Steel
20	Separator plate	Ductile Iron
21	Volume chamber tube	Carbon Steel (with Black Oxide Finish)
37	CM Handwheel Assembly	Use for No. 12 Size Actuator
	DM Handwheel Assembly	Use for No. 16 and No. 20 Size Actuators
38	O-ring	Nitrile (Buna-N)

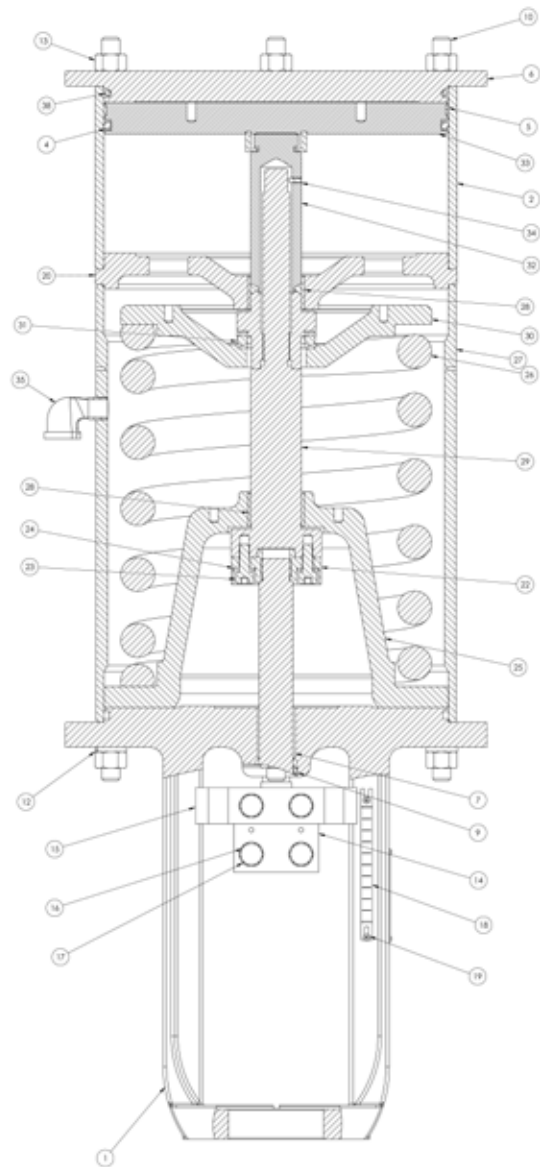
### Notes:

1. Standard materials are the same for all actuator sizes.
2. These are additional components only required for the integral volume tank design.
3. Optional handwheel assemblies provide manual override in case of air failure.

# Materials of Construction



**Model 52**  
Air to extend with handwheel



**Model 52**  
Air to extend without handwheel

# Standard Construction

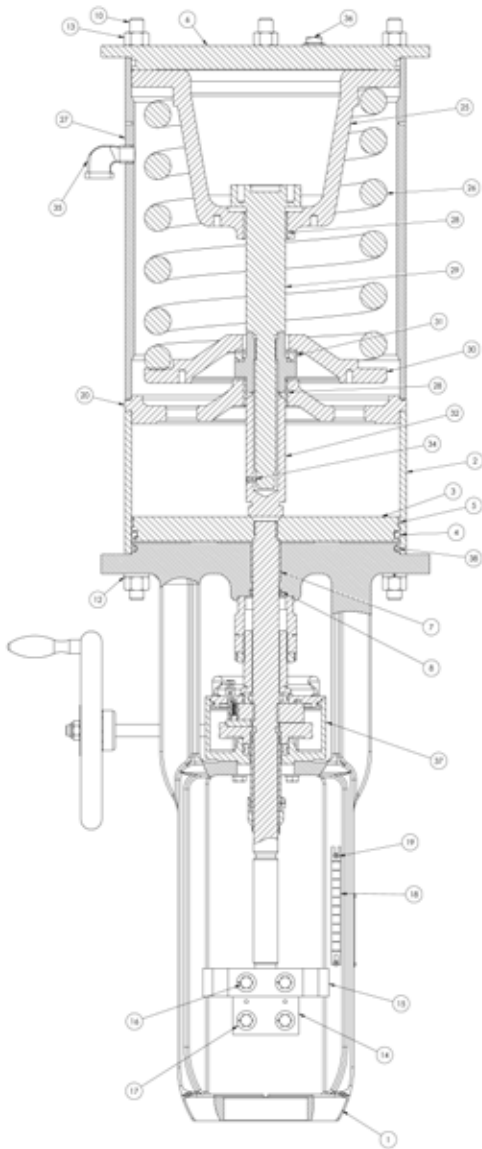
## Model 52 Air to Extend with Spring Return

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 Teflon
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	Cross recessed head 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	Use for No. 12 Size Actuator
	DM Handwheel Assembly	Use for No. 16 and No. 20 Size Actuators
38	O-ring	Nitrile (Buna-N)

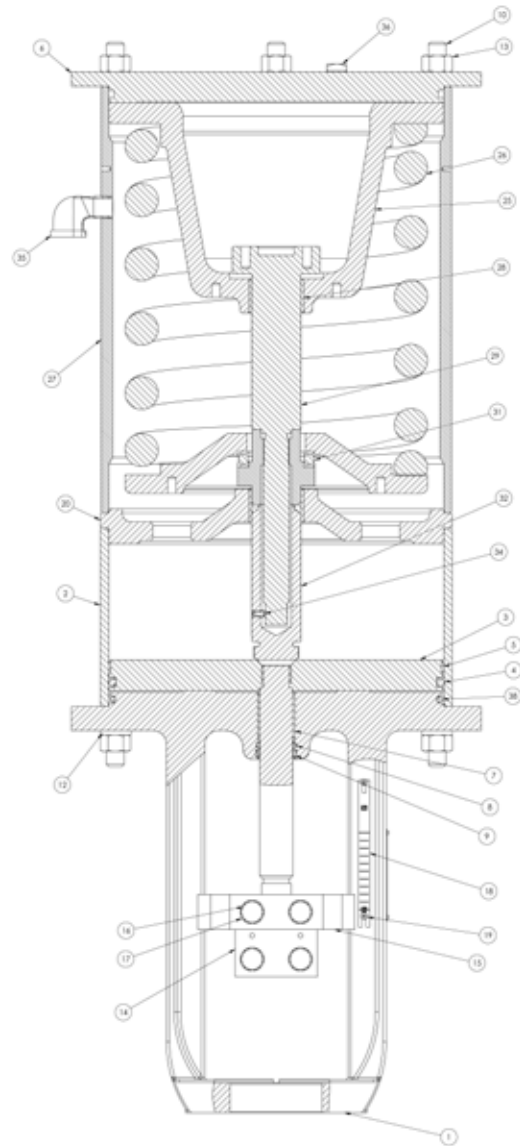
**Notes:**

1. Standard materials are the same for all actuator sizes.
2. Optional handwheel assemblies provide manual override in case of air failure.

# Materials of Construction



**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 -20°C to +100°C (-4°F to +212°F)
1	Yoke	Ductile Iron
2	Cylinder tube	Carbon Steel, Chrome Plated ID
3	Piston S/A	
	Piston rod	17-4 PH Stainless Steel H1075 or Equivalent
	Piston	Carbon Steel
4	O-ring	Nitrile (Buna-N)
5	Guide ring	Graphite Teflon
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	Cross recessed head 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	Use for No. 12 Size Actuator
	DM Handwheel Assembly	Use for No. 16 and No. 20 Size Actuators
38	O-ring	Nitrile (Buna-N)

### Notes:

1. Standard materials are the same for all actuator sizes.
2. Optional handwheel assemblies provide manual override in case of air failure.

# Optional Constructions

## Low-Temperature Service: Suitable for low ambient temperature.

Ref. No.	Description	Low Temperature Construction -50°C to +83°C (-58°F to +181°F)
1	Yoke	Carbon Steel
4	O-ring	Nitrile – Low Temperature
6	Top plate	Carbon Steel
8	O-ring	Nitrile – Low Temperature
9	Rod scraper	Nitrile – Low Temperature
14	Split clamp	Carbon Steel (Zinc-Plated with Black Oxide Finish)
16	Hexagon bolt	Carbon Steel (Zinc-Plated with Black Oxide Finish)
20	Separator plate	Carbon Steel
38	O-ring	Nitrile – Low Temperature

**Notes:**

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

## High-Temperature Service: Suitable for low ambient temperature.

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

**Notes:**

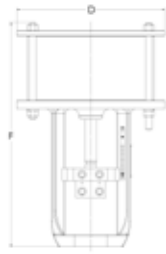
1. The above indicates only those parts that change material for high temperature service. All other parts remain the same as standard.

## 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

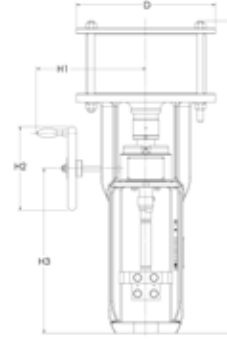
# Dimensions (inches)



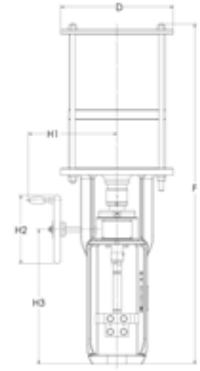
Handwheel: Without  
Volume Chamber: Without



Handwheel: Without  
Volume Chamber: With



Handwheel: With  
Volume Chamber: Without



Handwheel: With  
Volume Chamber: With

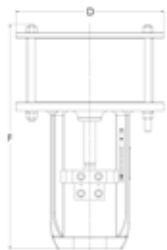
## Model 51 Dimensional Data

### US Units (Inches)

Size	D	H1	H2	H3
12	14.69	11.50	8.86	17.44
16	18.15	13.39	11.02	21.77
20	22.56	13.39	11.02	22.17

Actuator Type	Actuator Size	Dimension F		
		Nominal Actuator Travel (in.)		
		2.5	4	6
Standard	12	-	22.44	
	16	24.13	25.67	27.64
	20	24.80	26.34	28.35
Standard with Integral Volume Tank	12	31.93	33.46	
	16	35.16	36.69	38.66
	20	35.43	36.97	38.98
Standard with Handwheel	12	31.65	33.19	
	16	39.96	41.50	43.50
	20	40.67	42.20	44.17
Standard with Integral Volume Tank and Handwheel	12	42.68	44.21	
	16	50.98	52.52	54.53
	20	51.30	52.83	54.80

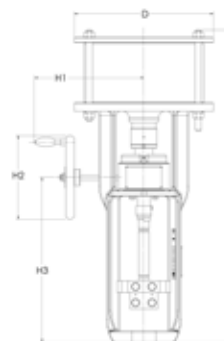
## Dimensions (mm)



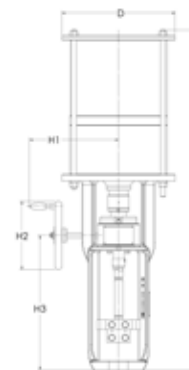
Handwheel: Without  
Volume Chamber: Without



Handwheel: Without  
Volume Chamber: With



Handwheel: With  
Volume Chamber: Without



Handwheel: With  
Volume Chamber: With

## Model 51 Dimensional Data

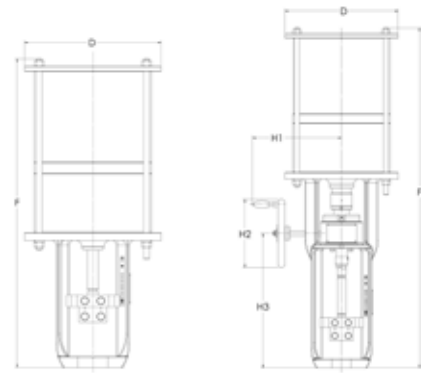
Metric Units (mm)

Size	D	H1	H2	H3
12	373	292	225	443
16	461	340	280	553
20	573	340	280	563

Actuator Type	Actuator Size	Dimension F		
		Actuator Travel (mm)		
		63.5	101.6	152.4
Standard	12	-	570	
	16	613	652	702
	20	630	669	720
Standard with Integral Volume Tank	12	811	850	
	16	893	932	982
	20	900	939	990
Standard with Handwheel	12	804	843	
	16	1015	1054	1105
	20	1033	1072	1122
Standard with Integral Volume Tank and Handwheel	12	1084	1123	
	16	1295	1334	1385
	20	1303	1342	1392



# Dimensions (inches)



Handwheel: Without

Handwheel: With

## Model 52 and 53 Dimensional Data

### US Units (Inches)

Size	D	H1	H2	H3
12	14.69	11.50	8.86	17.44
16	18.15	13.39	11.02	21.77
20	22.56	13.39	11.02	22.17

Assembly Type	Actuator Size	Dimension F (in.)									
		Actuator Travel									
		2.0	2.25	2.5	3.0	3.5	3.75	4.0	5.0	5.5	6.0
Without Handwheel	12				37.52	38.03	38.15	38.54			
	16	38.31	38.58	38.82	42.32	42.83	43.07	43.31	48.31	48.82	49.33
	20	40.00	40.24	40.51	43.98	44.49	44.72	45.00	49.96	50.47	50.98
With Handwheel	12				48.27	48.78	48.90	49.29			
	16	54.17	54.41	54.69	58.19	58.66	58.94	59.17	64.13	64.65	65.16
	20	55.83	56.06	56.34	59.80	60.31	60.55	60.83	65.79	66.30	66.81

### Metric Units (mm)

Size	D	H1	H2	H3
12	373	292	225	443
16	461	340	280	553
20	573	340	280	563

Assembly Type	Actuator Size	Dimension F (mm)									
		Actuator Travel									
		50.8	57.2	63.5	76.2	88.9	95.3	101.6	127	139.7	152.4
Without Handwheel	12				953	966	969	979			
	16	973	980	986	1075	1088	1094	1100	1227	1240	1253
	20	1016	1022	1029	1117	1130	1136	1143	1269	1282	1295
With Handwheel	12				1226	1239	1242	1252			
	16	1376	1382	1389	1478	1490	1497	1503	1629	1642	1655
	20	1418	1424	1431	1519	1532	1538	1545	1671	1684	1697

# Weights

## Models 51, 52 and 53 Weights US Units (lbs)

Actuator Size	Construction	Nominal Stroke in (mm)	Model 51		Model 52		Model 53	
			No Handwheel	With Handwheel	No Handwheel	With Handwheel	No 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
	with Integral Volume Chamber	2.5" (63.5)	578	721	-	-	-	-
		4" (101.6)	578	721	-	-	-	-
		6" (152.4)	578	721	-	-	-	-
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
	with Integral Volume Chamber	2.5" (63.5)	919	1065	-	-	-	-
		4" (101.6)	919	1065	-	-	-	-
		6" (152.4)	919	1065	-	-	-	-

# Weights

## Models 51, 52 and 53 Weights Metric Units (kg)

Actuator Size	Construction	Nominal Stroke in (mm)	Model 51		Model 52		Model 53	
			No Handwheel	With Handwheel	No Handwheel	With Handwheel	No 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
	with Integral Volume Chamber	2.5" (63.5)	262	327	-	-	-	-
		4" (101.6)	262	327	-	-	-	-
		6" (152.4)	262	327	-	-	-	-
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
	with Integral Volume Chamber	2.5" (63.5)	417	483	-	-	-	-
		4" (101.6)	417	483	-	-	-	-
		6" (152.4)	417	483	-	-	-	-

# DIRECT SALES OFFICE LOCATIONS

## AUSTRALIA

Brisbane:  
Phone: +61-7-3001-4319  
Fax: +61-7-3001-4399

Perth:  
Phone: +61-8-6595-7018  
Fax: +61 8 6595-7299

Melbourne:  
Phone: +61-3-8807-6002  
Fax: +61-3-8807-6577

## BELGIUM

Phone: +32-2-344-0970  
Fax: +32-2-344-1123

## BRAZIL

Phone: +55-11-2146-3600  
Fax: +55-11-2146-3610

## CHINA

Phone: +86-10-8486-4515  
Fax: +86-10-8486-5305

## FRANCE

Courbevoie  
Phone: +33-1-4904-9000  
Fax: +33-1-4904-9010

## GERMANY

Ratingen  
Phone: +49-2102-108-0  
Fax: +49-2102-108-111

## INDIA

Mumbai  
Phone: +91-22-8354790  
Fax: +91-22-8354791

## New Delhi

Phone: +91-11-2-6164175  
Fax: +91-11-5-1659635

## ITALY

Phone: +39-081-7892-111  
Fax: +39-081-7892-208

## JAPAN

Chiba  
Phone: +81-43-297-9222  
Fax: +81-43-299-1115

## KOREA

Phone: +82-2-2274-0748  
Fax: +82-2-2274-0794

## MALAYSIA

Phone: +60-3-2161-0322  
Fax: +60-3-2163-6312

## MEXICO

Phone: +52-5-310-9863  
Fax: +52-5-310-5584

## THE NETHERLANDS

Phone: +0031-15-3808666  
Fax: +0031-18-1641438

## RUSSIA

Veliky Novgorod  
Phone: +7-8162-55-7898  
Fax: +7-8162-55-7921

## Moscow

Phone: +7 495-585-1276  
Fax: +7 495-585-1279

## SAUDI ARABIA

Phone: +966-3-341-0278  
Fax: +966-3-341-7624

## SINGAPORE

Phone: +65-6861-6100  
Fax: +65-6861-7172

## SOUTH AFRICA

Phone: +27-11-452-1550  
Fax: +27-11-452-6542

SOUTH & CENTRAL  
AMERICA AND THE CARIBBEAN  
Phone: +55-12-2134-1201  
Fax: +55-12-2134-1238

## SPAIN

Phone: +34-93-652-6430  
Fax: +34-93-652-6444

## UNITED ARAB EMIRATES

Phone: +971-4-8991-777  
Fax: +971-4-8991-778

## UNITED KINGDOM

Woburn Green  
Phone: +44-1628-536300  
Fax: +44-1628-536319

## UNITED STATES

Massachusetts  
Phone: +1-508-586-4600  
Fax: +1-508-427-8971

## Corpus Christi, Texas

Phone: +1-361-881-8182  
Fax: +1-361-881-8246

## Deer Park, Texas

Phone: +1-281-884-1000  
Fax: +1-281-884-1010

## Houston, Texas

Phone: +1-281-671-1640  
Fax: +1-281-671-1735

