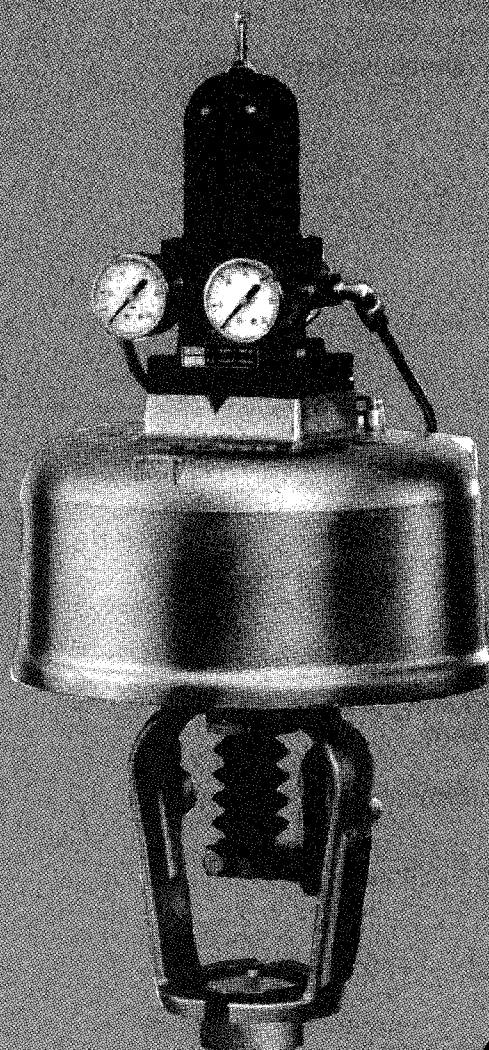


# Type 71 Domotor®

## Pneumatic Positioning Piston Actuator



*Annin*

**Masoneilan**

**DRESSER**

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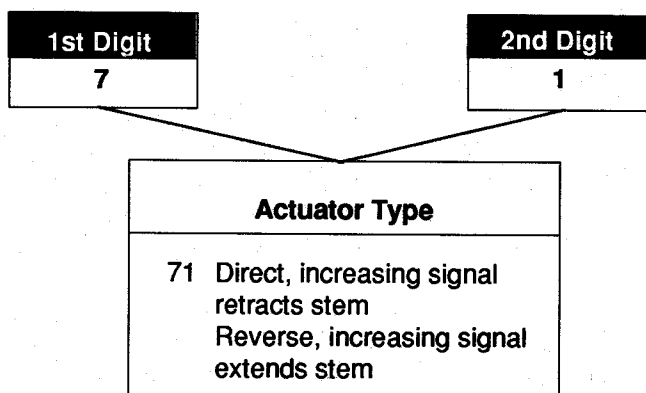
## Foreword

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Masoneilan's Domotor® actuator is a powerful, pneumatic positioning cylinder which incorporates the following features:

- Accurately positions in response to any common pneumatic controller signal.
- Sufficient stiffness to assure stability under severe operating conditions.
- Long stroke for smooth equipment control.
- Speed and high thrust.
- Top mounted positioner is away and protected from heat and corrosion effects from valve bonnet and incidental packing box leaks.
- Direct mechanical feedback eliminates external positioner leakage.
- Positioner feedback and rate spring housed in instrument air purge environment, eliminates corrosion attack on feedback elements.
- Actuator can be removed from valve without affecting calibration.

## Numbering System



## General Data

- **Type**  
positioning pneumatic cylinder with integral positioner and loading regulator
- **Auxiliary Handwheel**  
available with A, B and C sizes
- **Ambient Temperature Limit**  
+180°F / 82°C ①
- **Action**  
increasing signal retracts stem (direct positioner)  
  
increasing signal extends stem (reverse positioner)
- **Instrument Signal**  
common full and split range pneumatic signals
- **Supply Pressure**  
up to 100 psi
- **Loading Pressure**  
depends on available supply pressure, process conditions, fluid flow direction and fail safe action
- **Span Error**  
± 5% of the span
- **Hysteresis**  
0.8% of the span
- **Linearity**  
± 2.0% of the span
- **Repeatability**  
smaller than 0.1% of the span
- **Dead Band**  
0.2% of the span
- **Static Air Consumption**  
0.5 SCFM @ 60 psi supply pressure
- **Air Connections**  
1/4" NPT instrument and supply

① High Temperature (+250°F/120°C)

## Domotor Operation

On both air to close and air to open actuators the supply pressure is piped to both the loading regulator and the positioner through a common port. The reducing-relief loading regulator provides a constant load on top of the piston. The positioner output provides actuating pressure under the piston. The difference between positioner output pressure under the piston and the load above provides the actuating force.

### Air to Open Action (Stem retracts on increased signal)

Air to open actuators are supplied with a direct action positioner, in which the larger of two diaphragms is located at the bottom. Since the lower diaphragm has the largest area, an increase in signal pressure will result in a downward movement of the double diaphragm assembly. This movement causes the positioner pilot valve to open the output port and increase pressure under the piston.

The increased pressure causes the piston to move up, retracting the stem. The piston will continue to move until the force exerted by the range spring balances the force exerted by the double diaphragm assembly. Positioner output then stabilizes to maintain the desired piston rod position.

On air failure, a built-in check valve locks in air pressure on

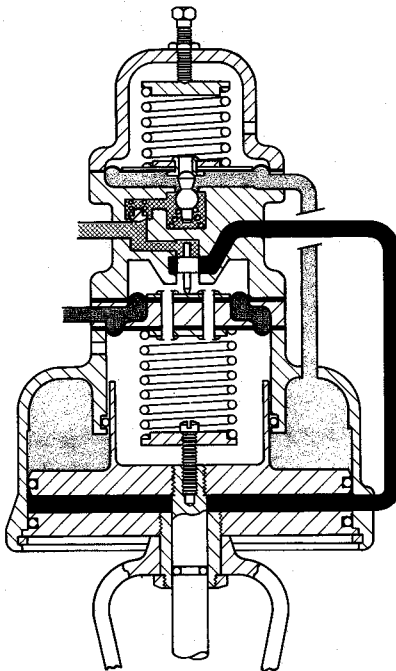
top of the piston while the positioner bleeds off air under the piston, closing the valve. A helper spring may be installed on top of the piston for valves operated with low supply pressures.

### Air to Close Action (Stem extends on increased signal)

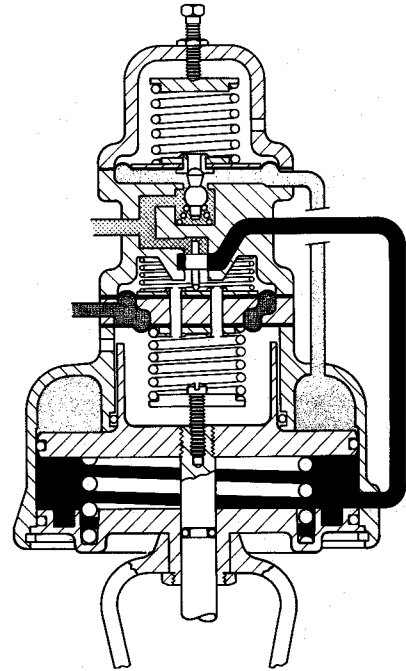
Air to close actuators are supplied with a reverse action positioner, which has the larger area diaphragm at the top.

An increase in air signal will result in an upward movement of the double diaphragm assembly. This movement causes the positioner pilot valve to move toward the supply port, restricting supply flow, and allowing air to exhaust from under the piston. The resultant decreased pressure permits the piston to move down, thus extending the stem. The piston will continue to move until the force exerted by the bias spring is equal to the combined range spring and controller signal pressure forces. Positioner output then stabilizes to maintain the desired piston rod position.

On air failure, the pressure on top of the piston flows back into the air supply line and the force of the fluid against the plug, plus the locked-in air pressure under the piston, opens the valve. In addition, a spring is provided to help raise the piston and plug.



Air to open action



Air to close action

## Stroking Times - Typical Bench Values<sup>①</sup>

Actuator Size	Maximum Stroke (in.)	Nominal Effective Area (sq. in.)	Standard Full Stroke Time Max. (sec.)	Super Response Full Stroke Time Max. (sec.)
A	3/4	25	2	1.0
B	1 1/2	50	8	2.0
C	2 1/2	100	33	4.0
D	6	200	67	9.0

## Available Thrust

Actuator Series	Maximum Travel (in.)	Nominal Size (sq. in.)	Cylinder Diameter (in.)	Effective Area		Maximum Supply Pressure (psig)	Maximum Loading Pressure (psig)	Max. Available Extending Force $P_s = 100$ psig (lbs.)	Max. Available Bi-directional Force $P_s = 100$ psig $P_L = 50$ psig (lbs.)
				Over Piston (sq. in.)	Under Piston (sq. in.)				
A	3/4	25	6 3/4	30.9	35.4	100	60	1854	1545
B	1 1/2	50	8 1/2	51.5	56.2	100	60	3090	2575
C	2 1/2	100	11 1/2	98.7	103.0	100	60	5922	4935
D	6	200	16	188.5	198.6	100	90	16950	9425

$P_s$  = Supply Pressure - Minimum 10 psi above  $P_L$

$P_L$  = Loading Pressure

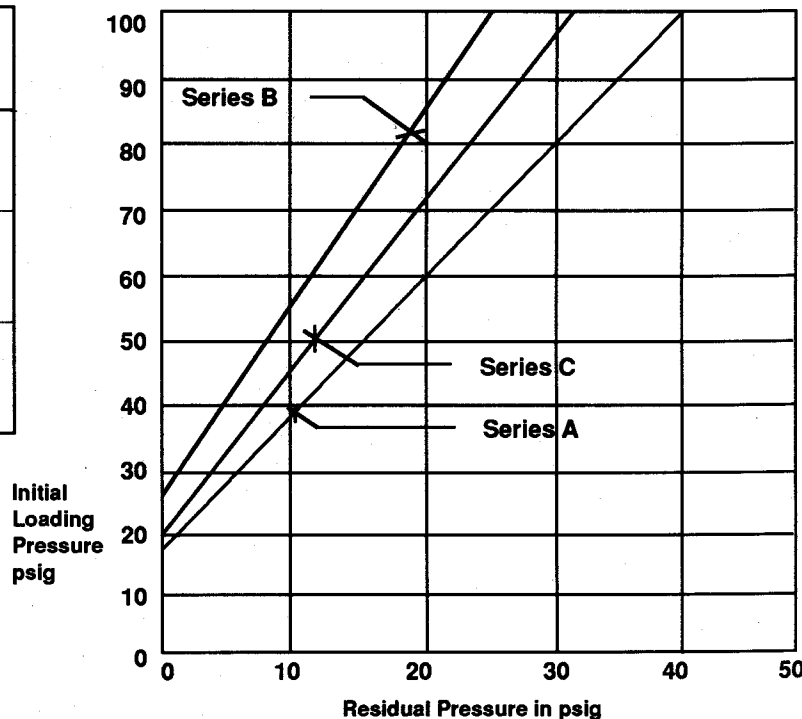
① Based on 100 psi supply and 50 psi preload and no valve forces

## Helper Spring Loads for Domotor Actuators

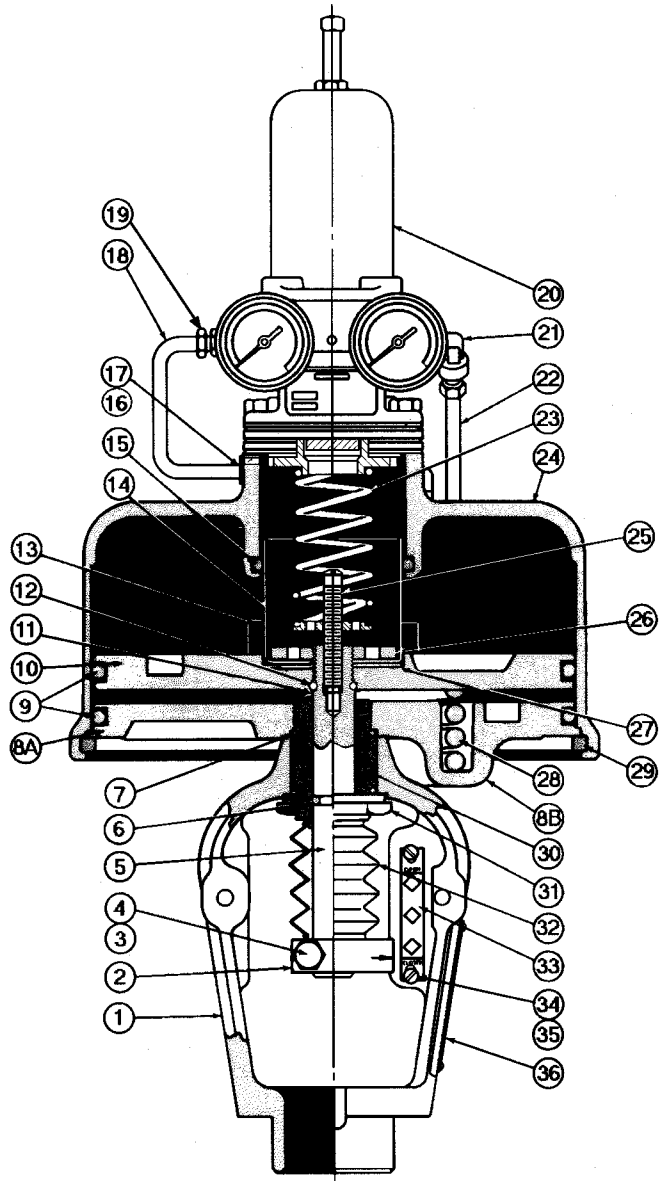
Size	Action	Force Open (lbs.)	Forced Closed (lbs.)
A	Direct	123	106
	Reverse	44	175
B	Direct	200	80
	Reverse	90	123
C	Direct	110	10
	Reverse	0	300

Note: Direct = Air to Open, Spring Fail Closed  
Reverse = Air to Close, Spring Fail Open

## Annin Domotor Residual Loading Pressure

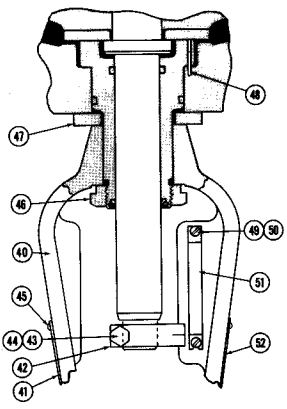
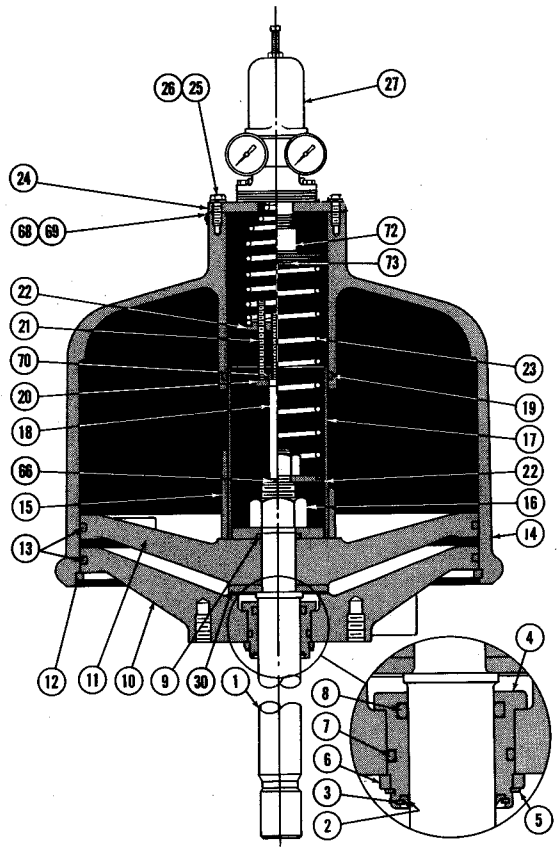


Dome loading pressure vs residual actuator pressure for full stroke of the actuator for Series A, B & C Domotors. Note residual loading pressure will be higher for reduced stroke units.

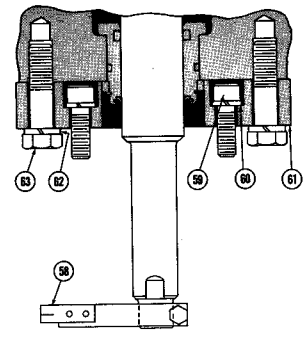


**Materials, Series A, B, & C**

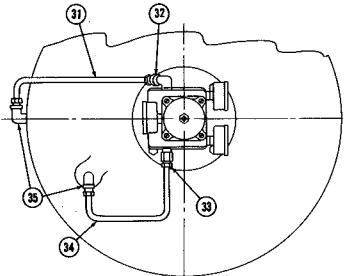
<b>Ref. No.</b>	<b>Description</b>	<b>Material</b>
1	Yoke	Iron
2	Stem Lock	Steel
3	Bolt (stem lock)	Steel
4	Nut (stem lock)	Steel
5	Piston Rod	St. St.
6	O-ring (piston rod)	Buna-N
7	O-ring (adapter screw)	Buna-N
8	Base Plate	Aluminum
9	O-ring (base plate & piston)	Buna-N
10	Piston Plate	Aluminum
11	Washer (piston rod)	St. St.
12	O-ring (piston rod)	Buna-N
13	Travel Stop	Aluminum
14	Seal Tube	Brass
15	O-ring (seal tube)	Buna-N
16	Caution Plate	St. St.
17	Drive Screw	St. St.
18	Loading Tube	St. St.
19	Connector	St. St.
20	Regulator-Positioner Assembly	See Page 10
21	Elbow	St. St.
22	Actuating Tube	St. St.
23	Rate Spring Assembly	Steel
24	Dome	Aluminum
25	Adjustment Screw	Steel
26	Retainer (seal tube)	Steel
27	Gasket (seal tube)	Teflon
28	Spring (reverse acting only)	Steel
29	Retaining Ring (dome)	Steel
30	Adapter Screw	Alum. Bronze
31	Nut (adapter)	Steel
32	Stem Boot	Neoprene
33	Travel Plate	St. St.
34	Screw (travel plate)	St. St.
35	Nut (travel plate)	St. St.
36	Name Plate	St. St.



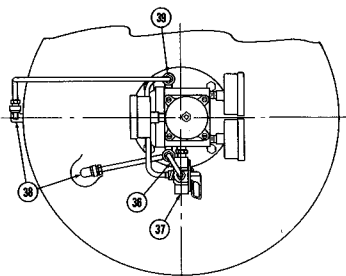
**Series D Domotor®  
with C Yoke**



**Series D Domotor®  
on Group 65 Valve**



**Standard tubing arrangement**



**Tubing arrangement,  
side mounted handwheel**



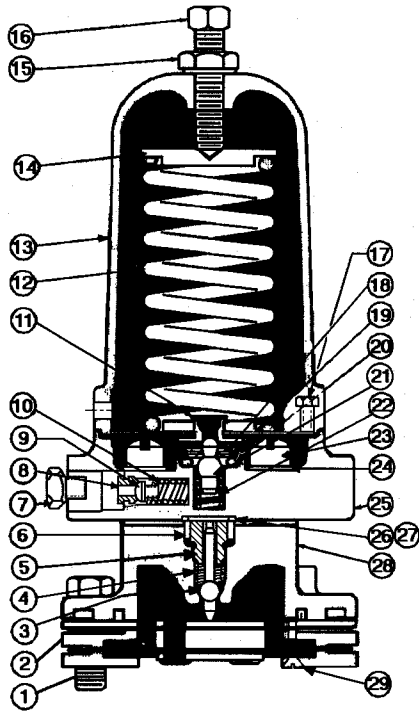
## Materials, Series D

Ref. No.	Description	Material
1	Piston Rod	St. St.
2	Rod Scraper	Polyurethane
3	Retaining Ring	Steel
4	Bushing	Alum. Bronze
5	Retaining Ring	Steel
6	Guide Ring	Steel
7	O-ring (bushing)	Buna-N
8	O-ring (piston rod)	Buna-N
9	O-ring (seal tube)	Buna-N
10	Base Plate	Aluminum
11	Piston	Aluminum
12	Retaining Ring	Steel
13	O-ring (piston and base plate)	Buna-N
14	Dome	Aluminum
15	Travel Stop	Aluminum
16	Nut	Steel
17	Seal Tube	Aluminum
18	Extension Rod	Steel
19	O-ring (seal tube)	Buna-N
20	Stop (set screw)	Steel
21	Set Screw	Steel
22	Spring Button	Aluminum
23	Rate Spring	Steel
24	Dome Cap	Steel
25	Cap Screw	Steel
26	Lock Washer	Steel
27	Regulator-Positioner Assembly	See Page 10
28	Closure Spring (not shown)	Steel
29	Spring Button (not shown)	Steel
30	Spacer Washer	Steel
31	Tubing (actuating)	St. St.
32	Elbow	St. St.
33	Connector	St. St.
34	Tubing (loading)	St. St.
35	Elbow	St. St.
36	Tubing	St. St.

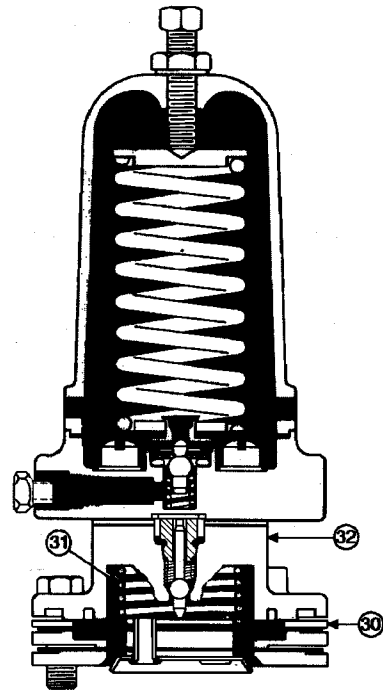
Ref. No.	Description	Material
37	4-Way Valve	Brass
38	Elbow	St. St.
39	Tee	St. St.
40	Yoke	Iron
41	Tag Plate (optional)	St. St.
42	Stem Lock	Steel
43	Cap Screw	Steel
44	Nut	Steel
45	Drive Screw	St. St.
46	Adapter Nut	Steel
47	Bushing	Steel
48	Roll Pin	Steel
49	Screw	St. St.
50	Nut	St. St.
51	Travel Plate	St. St.
52	Name Plate	St. St.
53	Adapter Nut	Alum. Bronze
54	O-ring (adapter nut)	Buna-N
55	Gasket	Teflon
56	O-ring (handwheel bushing)	Buna-N
57	Stem Boot	Neoprene
58	Indicator Plate	St. St.
59	Screw	St. St.
60	Lock Washer	Steel
61	Mounting Plate	Aluminum
62	Lock Washer	Steel
63	Cap Screw	Steel
66	Lock Washer	Steel
67	Travel Stop	Aluminum
68	Caution Plate	St. St.
69	Drive Screw	St. St.
70	Nut	Steel
72 *	Adjusting Screw (rate spring)	Steel
73 *	Upper Spring Button	Steel

\* 3 1/2" - 6" Strokes

## Regulator-Positioner Assembly



Direct

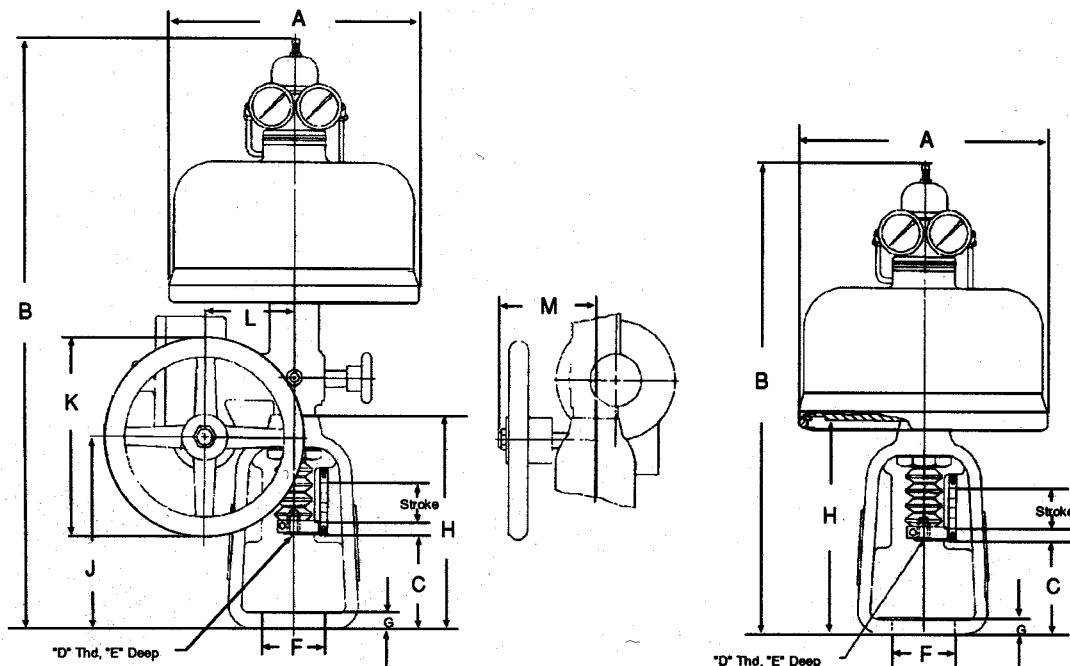


Reverse

Ref. No.	Description	Material
1	Hex Head Cap Screw	St. St.
2	Diaphragm Assembly	Alum. & Rubber
3	Valve	St. St.
4	Spring	Steel
5	Cage	St. St.
6	Shim	Brass
7	Hex Head Pipe Plug	St. St.
8	Cage	Brass
9	Check Valve	Viton
10	Spring	Steel
11	Diaphragm Assembly (regulator)	Steel & Rubber
12	Spring	Steel & PVC
13	Cap	Aluminum
14	Button	Aluminum
15	Hex Nut	St. St.
16	Screw	St. St.

Ref. No.	Description	Material
17	Hex Head Machine Screw	St. St.
18	Snap Ring	Steel
19	Seat	Brass & Viton
20	O-ring	Buna-N
21	Screw	St. St.
22	Seal	Aluminum
23	Gauge Block	Aluminum
24	Valve	Brass
25	Spring	Steel
26	O-ring	Buna-N
27	O-ring	Buna-N
28	Positioner Block	Aluminum
29	Screw	St. St.
30	Diaphragm Assembly	Alum. & Rubber
31	Spring	Steel
32	Positioner Block	Aluminum

**Dimensions**



Domotor Size (sq. in.)	Stroke	A	B		C	D	E	F	G	H	J	K	L	M
			60 & 100 psi Supply											
			With Handwheel	Without Handwheel										
25 A	.75	7.62	21.60	17.40	2.94	3/8"-24 Thd	.56	2.250 2.251	.62	5.94	5.80	8.00	3.75	4.4
50 B	1.50	9.25	24.80	19.70	3.34	1/2"-20 Thd	.69	2.250 2.251	.69	7.62	6.20	8.00	3.75	4.4
100 C	2.50	13.25	33.13	25.30	4.91	11/16"-16 Thd	.94	3.313 3.314	.88	10.81	9.60	10.00	4.50	4.9
200 D	6.00	18.00	---	41.38	5.00	1 5/8"-12 Male Thd	---	3.310 3.750	.98 1.00	16.00	---	---	---	---

**Weights**

With Standard Yoke		With Standard Yoke and Handwheel	
A	20	A	40
B	27	B	47
C	50	C	70
D	140	---	---

## Accessories & Options

I/PEX 9000 Electropneumatic Transducer  
(See Specification Data CS9000)  
Input Range 4-20 mA or 10-50 mA  
Split range up to 3 times  
Output (Direct or Reverse)  
3-15 psi, adjustable to 0-20 psi

8005A/8006A Electropneumatic Transducer  
(See Specification Data CS6000)  
Input Signals 10-50 mA, 104 ohms  
4-20 mA, 173 ohms  
Output Signals (Direct or Reverse)  
Model 8005A: 3-15 psi  
Model 8006A: 3-15, 6-30, 0-20 or 0-35 psi

80-4 or 80-40 Airset  
(See Specification Data CY7800)  
77-6 or 77-60 Lockup Valve  
(See Specification Data CY7700)  
2" Gauge 0-30 psi

2700 Controllers (See Specification Data CW6000)

### Microswitches, One & Two Position

Model	Exar	Exhar	Exdar	Opar	Ophar
Type	SPDT Explosion- Proof	SPDT Hermetically Sealed Explosion- Proof	DPDT Explosion- Proof	SPDT Weather- Proof	SPDT Hermetically Sealed Weather- Proof

### Solenoid Valves 3-Way

Size (in.)	Model No.	Part No.	Enclosure	Max. Differential Pressure (psi)	
				60 Hz AC 115V-230V	DC 24V
1/4	8320 G174	347143-152	G.P. NEMA 1	100	50
1/4	8320 G174	347992-136	EXP. NEMA 4,7,9	100	50
3/8	8316 G14*	336633-110	G.P. NEMA 1	250	250
3/8	8316 G14*	335920-123	EXP. NEMA 4,7,9	250	250

\*Minimum differential pressure of 10 psi required

### Volume Tanks

439	Cubic Inches	(1.9 Gallon)
739	Cubic Inches	(3.2 Gallon)
1086	Cubic Inches	(4.7 Gallon)
1616	Cubic Inches	(7.0 Gallon)
3095	Cubic Inches	† (13.4 Gallon)
4389	Cubic Inches	† (19 Gallon)

† Cannot be furnished valve mounted

Refer to specific accessory specification literature for complete information