Instruction No. ER3000E
Rev. A 3/82

Masoneilan Spring-Diaphragm Actuator Instructions

No. 9, 11, 13, 15, 18 and 24 actuators

Masoneilan DRESSER

description

Caution: Follow instructions whenever working on equipment to prevent damage or injury.

The spring-diaphragm actuator is a simple, powerful mechanical device. There are two general types, "Air-to-Extend Stem" and "Air-to-Retract Stem." Actuators are designated by case size: Nos. 9, 11, 13, 15, 18, 18L and 24. Case sizes are identified on the serial plate and by case and yoke dimensions.

If equipment differs from what is described on instructions, consult the nearest Masoneilan Sales Office or Representative, or Masoneilan International, Inc.

The nominal range of a spring-diaphragm actuator is the air pressure range in pounds per square inch (psi) for rated stroke under no load. Common ranges are 3-15 and 6-30 psi. The spring range and maximum allowable supply pressure are marked on the serial plate. For a 3-15 psi nominal range, the stem will start to stroke when the air pressure reaches 3 psi and will complete the stroke when the pressure reaches 15 psi (plus or minus 5%).

In the air-to-extend actuator, conformation of the molded diaphragm to the diaphragm plate serves as a flexible upper guide for the actuator stem (26). The lower guide is an oil impregnated, bronze bushing (37) located in the spring adjustor (36). The air-to-retract actuator differs from the air-to-extend unit in that the spring (22), spring barrel (71) and spring adjustor (36) are located above the diaphragm plate (40) and diaphragm (39) which are inverted. On the No. 9 through 18 actuators a gasket (19) at the joint of the diaphragm case and yoke and a packing box around the actuator stem prevents air leakage. The diaphragm acts as a flexible upper guide and the packing box assembly as the lower guide for the actuator stem.

Air connections are ¼" NPT on No. 9 through 18 actuators and ½" NPT on No. 24 actuators. Connections are located in the upper diaphragm case (air-to-extend actuators) or yoke (air-to-retract actuators).

Warning: Do not exceed the recommended air pressure shown on serial plate.

Standard Actuator Size	Effective Diaphragm Area (sq. in.)	Maximum Stroke (in.)
9	43	¾
11	66	1
13	97	1½
15	130	2
18	200	2½
18L	165	4
24	273	4

maintenance

Caution: Do not attempt to disassemble actuators, unless air pressure has been shut off.

Air-to-Extend Actuators

diaphragm replacement: Warning: Before disassembling the actuator, all spring compression should be relieved by turning the spring adjustor (36), to prevent the upper case popping up when the cap screws (45) are removed. This is especially important on actuators with a high initial spring setting. Remove cap screws (45), nuts (46) and upper diaphragm case (43). Remove nut (30) or cap screw (76) and washer (41) to release the diaphragm (39). If possible, the replacement diaphragm should be of the molded type supplied by Masoneilan International, Inc. (see back cover for part numbers) but in an emergency a diaphragm may be cut from flat sheet stock for up to and including No. 15 actuators. To allow sufficient stroke without restriction due to flatness of the diaphragm, the diaphragm bolt circle should be about 10% greater than that of the diaphragm case.

Replace washer (41), nut (30) or cap screw (76) and upper diaphragm case.

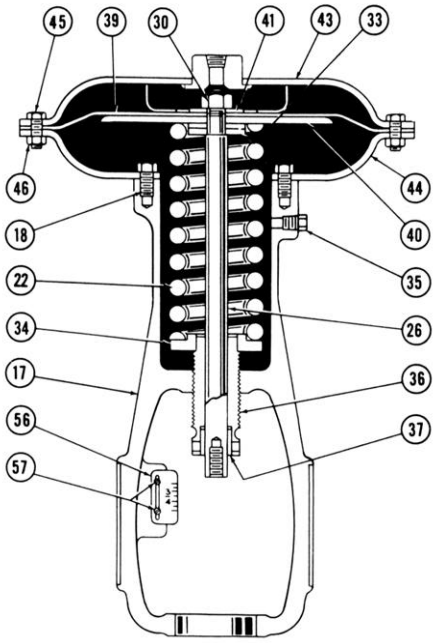
spring adjustment: An air supply, with a gauge and regulator, should be piped to the upper diaphragm case for this adjustment. Adjust spring compression so that the actuator stem (26) just begins to move when air pressure reaches minimum pressure of the range stamped on the serial plate. This movement is most easily detected by feeling the stem as air pressure is applied. **Note: Adjust spring compression only when there is no air pressure on diaphragm.**

Air-to-Retract Actuators

diaphragm replacement: Procedure is the same as for air-to-extend actuators except that the entire upper case assembly (including spring barrel (71), upper diaphragm case (43), spring (22), spring seats (33 & 34), nut (30) and diaphragm plate (40)) must be removed to release the diaphragm. Install a new diaphragm and reassemble the above parts.

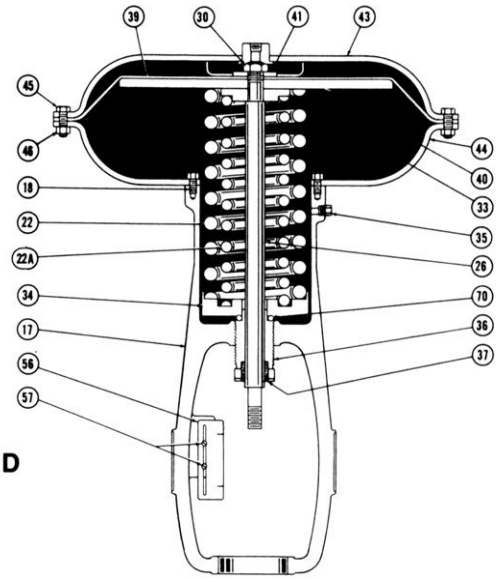
spring adjustment: Procedure is identical with that for air-to-extend actuators except that supply air is piped to the NPT in the yoke.

packing box: The packing box is subject to low air pressure only and requires minimum maintenance. The packing is ⅛" (No. 9-15 actuators) or 3/16" (No. 18 and 24 actuator) string type graphite asbestos. The packing may be added to or completely replaced without disassembling either the actuator or the mechanism (or valve) to which it is attached. Be sure to tighten packing nut (20) lightly. Overtightening will cause excessive friction resulting in sluggish performance.

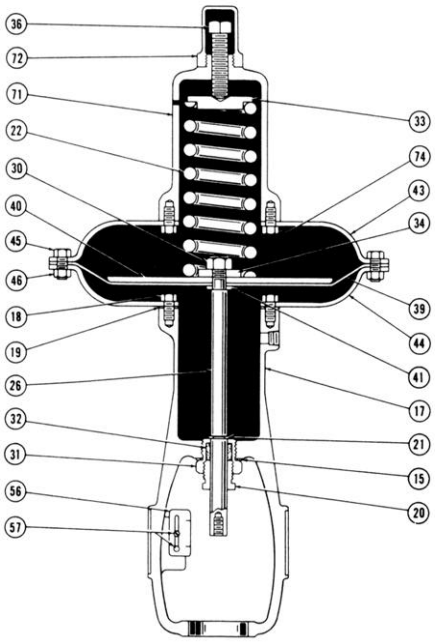


Case Nos. 9, 11 & 13

AIR-TO-EXTEND ACTUATORS

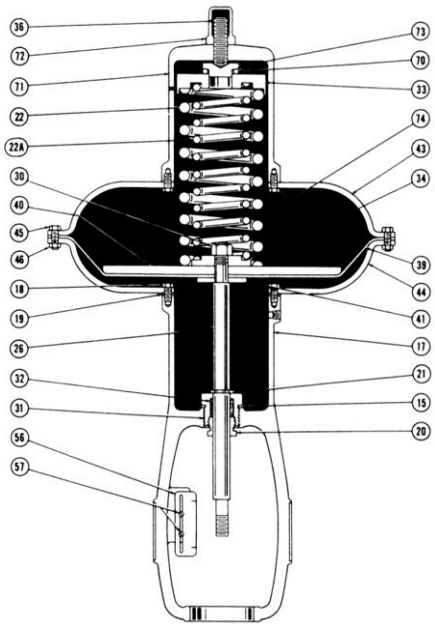


Case Nos. 15, 18 & 18L



Case Nos. 9, 11, & 13

AIR-TO-RETRACT ACTUATORS

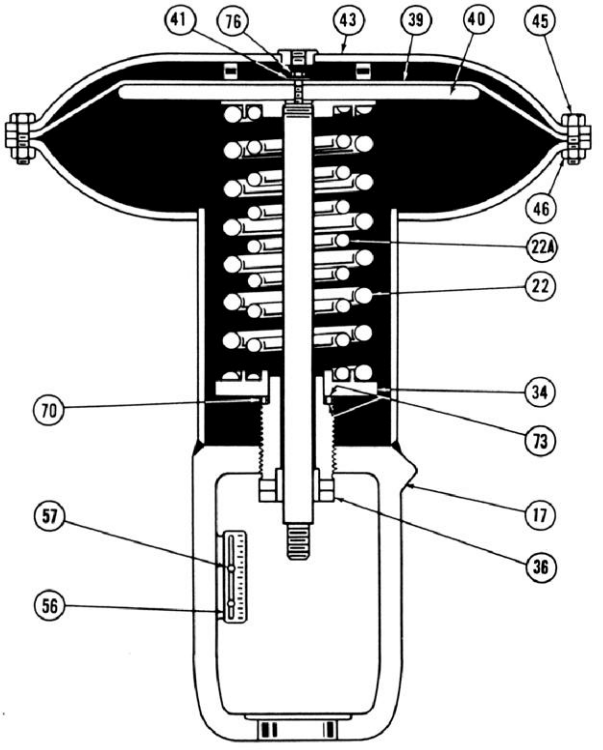


Case Nos. 15, 18 & 18L

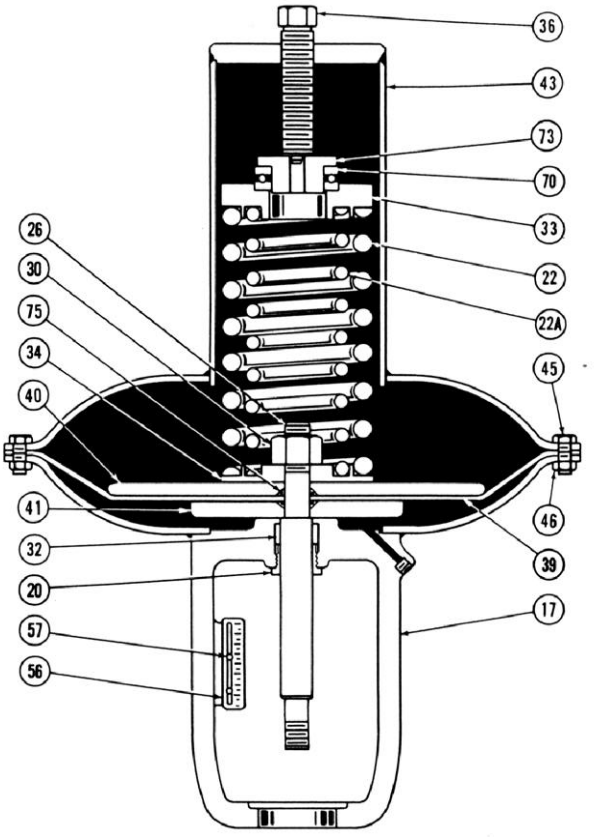
PARTS REFERENCE

Ref. No.	Part Name	Computer Abbrev.	Ref. No.	Part Name	Computer Abbrev.	Ref. No.	Part Name	Computer Abbrev.
*15	Gasket (packing box)	GASKET	*32	Packing	PACKING	45	Cap Screw (diaph. case)	CAP SCR
17	Yoke	YOKE	33	Spring Seat (upper)	USPR ST	46	Nut (diaph. case)	NUT
18	Cap Screw (L. case to yoke)	CAP SCR	34	Spring Seat (lower)	LSPR ST	56	Travel Indicator Scale	T I SCL
*19	Gasket (L. case to yoke)	GASKET	35	Pipe Plug	PIP PLG	57	Machine Screw	MCN SCR
20	Packing Nut	PKG NUT	36	Spring Adjustor	SPR ADJ	70	Ball and Retainer	BAL & RTN
21	Snap Ring	SNP RNG	37	Bushing (spring adjustor)	BUSHING	71	Spring Barrel	SPR BRL
22	Actuator Spring	ACT SPR	*39	Diaphragm	DIAPHRM	72	Spring Barrel Cap	SBL CAP
22A	Actuator Spring	ACT SPR	40	Diaphragm Plate	DPH PLT	73	Ball Bearing Race	BBG RCE
26	Actuator Stem	ACT STM	41	Diaphragm Washer	DPH WSH	74	Cap Screw (SBL to U D CSE)	CAP SCR
30	Nut (actuator stem)	NUT	43	Upper Diaphragm Case	U D CSE			
31	Packing Box	PKG BOX	44	Lower Diaphragm Case	L D CSE			

*Recommended spare parts.



Air-to-Extend



Air-to-Retract

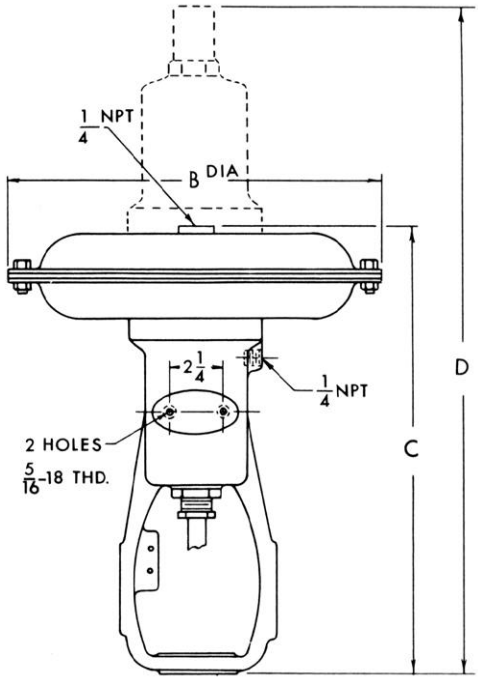
Case No. 24

PARTS REFERENCE

Ref. No.	Part Name	Computer Abbrev.	Ref. No.	Part Name	Computer Abbrev.	Ref. No.	Part Name	Computer Abbrev.
17	Yoke	YOKE	33	Spring Seat (upper)	USPR ST	46	Nut (diaph. case)	NUT
20	Packing Nut	PKG NUT	34	Spring Seat (lower)	LSPR ST	56	Travel Indicator Scale	T I SCL
22	Actuator Spring	ACT SPR	36	Spring Adjustor	SPR ADJ	57	Machine Screw	MCH SCR
22A	Actuator Spring	ACT SPR	39	Diaphragm	DIAPHRM	70	Ball and Retainer	BAL & RTN
26	Actuator Stem	ACT STM	40	Diaphragm Plate	DPH PLT	73	Ball Bearing Race	BBG RCE
30	Nut (actuator stem)	NUT	41	Diaphragm Washer	DPH WSH	75	O Ring	ORING
32	Packing	PACKING	43	Upper Diaphragm Case	U D CSE	76	Diaphragm Cap Screw	CAP SCR
			45	Cap Screw (diaph. case)	CAP SCR			

dimensions

Actuator Size	B	C	D
9	11	16⅛	23¾
11	13	16⅜	24⅛
13	15	20⅛	29⅝
15	17½	25⅝	35½
18	20¾	26⅞	36¾
18L	20¾	33⅜	42⅛
24	27½	34¾	45½



Case No. 24 has ½" NPT

recommended spare parts*

For complete parts list, refer to
"Instruction No. 6018E-Parts Supplement"

Ref. No.	Part Name	Qty.	Actuator Size		
			9	11	13
15	Gasket	1	001904-294-426	001904-294-426	001904-197-426
19	Gasket	1	001904-550-800	001904-550-800	001904-552-800
32	Packing	1	971919-003-916	971919-003-916	971919-006-916
39	Diaphragm	1	010271-018-686	010272-017-686	010273-018-686

Ref. No.	Part Name	Qty.	Actuator Size			
			15	18	18L	24
15	Gasket	1	001904-604-426	001904-604-426	001904-604-426	–
19	Gasket	1	001904-628-800	001904-628-800	001904-628-800	–
32	Packing	1	971919-007-916	971919-007-916	971919-007-916	971919-007-916
39	Diaphragm	1	010274-022-686	010275-023-686	010275-023-686	008387-002-658+ 008387-003-658±

*Air-to-Extend Actuators, order item 39 only.
Air-to-Retract Actuators, order item 15, 19, 32 & 39

+Direct
±Reverse

USEFUL EQUIVALENTS

U.S. CUSTOMARY UNITS

Specific gravity of air G = 1 (reference for gases)

Specific gravity of water = 1 (reference for liquids)

U.S. gallon of water = 8.33 lbs @ std. cond.
1 cubic foot of water = 7.48 gallons
Air specific volume = 1/density = 13.1 cubic feet/lb
G of any gas = density of gas/0.076

$$T + 460$$

Standard conditions (U.S. customary) are at 14.69 psia & 60°F

Flow conversion of gas

$$SCFH = \frac{Lbs/hr}{density} \qquad SCFH = \frac{Lbs/hr \times 379}{M} \qquad SCFH = \frac{Lbs/hr \times 13.1}{G}$$

Flow conversion of liquid

$$GPM = \frac{Lbs/hr}{500 \times G}$$

Temperature Conversion

F (Fahrenheit) = C(9/5) + 32

C (Celsius) = (F - 32) 5/9

METRIC CONVERSION TABLES

Multiply	By	To Obtain
LENGTH		
millimeters	0.039	inches
centimeters	0.394	inches
inches	2.54	centimeters
feet	30.48	centimeters
feet	0.304	meters
AREA		
sq. centimeters	0.155	sq. inches
sq. centimeters	0.001076	sq. feet
sq. inches	6.452	sq. centimeters
sq. inches	0.00694	sq. feet
sq. feet	929	sq. centimeters
FLOW RATES		
gallons US/minute (GPM)	3.785	liters/min
gallons US/minute	0.133	ft^3/min
gallons US/minute	0.227	m^3/hr
cubic feet/minute	7.481	GPM
cubic feet/hour	0.1247	GPM
cubic feet/hour	0.01667	ft^3/min
cubic meters/hour	4.403	GPM
cubic meters/hour	35.31	ft^3/hr
VELOCITY		
feet per second	0.3048	meters/second
feet per second	1.097	km/hr
feet per second	0.6818	miles/hr

Multiply	By	To Obtain
VOLUME & CAPACITY		
cubic feet	28.32	liters
cubic feet	7.4805	gallons
liters	61.02	cubic inches
liters	0.03531	cubic feet
liters	0.264	gallons
gallons	3785.0	cubic cm
gallons	231.0	cubic inches
gallons	0.1337	cubic feet
WEIGHT		
pounds	0.453	kilogram
kilogram	2.205	pounds
PRESSURE & HEAD		
pounds/sq. inch	0.06895	bar
pounds/sq. inch	0.06804	atmosphere
pounds/sq. inch	0.0703	Kg/cm^2
pounds/sq. inch	6.895	kPa
pounds/sq. inch	2.307	ft of H_20 (4°C)
pounds/sq. inch	0.703	m of H_20 (4°C)
pounds/sq. inch	5.171	cm of Hg (0°C)
pounds/sq. inch	2.036	in of Hg (0°C)
atmosphere	14.69	psi
atmosphere	1.013	bar
atmosphere	1.033	Kg/cm^2
atmosphere	101.3	kPa
bar	14.50	psi
kilogram/sq. cm	14.22	psi
kiloPascal	0.145	psi

Facilities: Brazil, Canada, France, Germany, Italy, Japan, Mexico, Netherlands, Singapore, Spain, United Kingdom, United States

Masoneilan DRESSER

Masoneilan North American Operations
Dresser Valve and Controls Division
Dresser Industries, Inc.
Marketing Services
15112 Morales Road
P.O. Box 60078 (77205-0078)
Houston, Texas 77032
Tel: (713) 986-6500
Fax: (713) 986-6569

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