Diaphragm Air Cylinders

Features

- Low start up pressure
- Low breakaway force
- Extremely sensitive response
- Very smooth, "non-jarring" action
- Wide temperature range
- Very low friction
- No edge seals to replace
- No blow-by leakage
- Numerous varieties
- Low total cost

Description

Diaphragm Air Cylinders are actuators made from elastomers, engineered metals and fabrics. They require no lubrication, are virtually frictionless, and economical. They can be used to provide lifting, clamping, pushing, coining, turning, and other linear force or actuation motions in many applications.

The development of the long stroke rolling diaphragm for dynamic sealing proved to be the solution for many applications requiring low friction, no lubrication, low leakage, wide temperature variations, and low total cost. The popularity of the rolling diaphragm as a sealing means led to many requests for a standard line of "off the shelf" diaphragm cylinders; single and double acting, short and long stroke with a wide selection of effective areas. To meet these requests, the long stroke rolling diaphragm cylinder was developed and Bellofram has supplied many thousands of them since their 1965 introduction.

Applications

Diaphragm Air Cylinder applications are almost unlimited. They are replacing conventionally sealed cylinders and actuators where low cost and reliability are requirements. They can be used with vacuum and gaseous pressure systems. They are currently solving many unique problems, being used as:

- Expansion Chambers
- Accumulators
- Pumps
- Reservoirs
- Shock Mounts
- Impact Absorbers
- Weld Drivers
- Tensioners
- Dancer Rolls
- Valve Actuation
- Louver Controls

Standard Cylinders

Standard Bellofram Air Cylinders are available in eight sizes. Each size is available in both a spring-return and a double-acting variety, with one or two stroke variations (Series E or F).

Sizes 4 and 6 have impact-extruded aluminum shells. Larger sizes have steel shells. Rods are ground, polished and hard-chrome plated steel. Bearings are sintered bronze, molybdenum disulphite impregnated. Other components are high strength materials with suitable corrosion resistant treatment.

- Bellofram engineers will help you define your specific needs.
- All Standard cylinders can be ordered with either no spring, or no bearing, as standard options.
- Standard cylinders can be ordered with one of six different mounting options.
- Specifications for Standard cylinders are shown in the table on the next page.

Super Cylinders

Bellofram Super Cylinders are standard spring-return cylinders equipped with linear ball bearings and hardened steel rods. This refinement allows an absolute minimum of friction for applications where maximum sensitivity is needed.

Super Cylinders are available only in spring-return varieties and in Series F stroke variations.

All mounting options offered on standard cylinders are also available on super cylinders.

Cylinder Weights

Cat. No.	Lbs.	Cat. No.	Lbs.	Cat. No.	Lbs.	Cat. No.	Lbs.
S-4-F-BP	4	S-16-E-BP	13	D-4-F-BP	4	D-16-E-BP	14
S-4-BP-N	5	S-16-F-BP	14	D-4-BP-N	5	D-16-F-BP	16
S-6-F-BP	5	S-24-E-BP	18	D-6-F-BP	5	D-24-E-BP	20
S-6-BP-N	6	S-24-F-BP	25	D-6-BP-N	6	D-24-F-BP	28
S-9-F-BP	8	S-30-E-BP	25	D-9-F-BP	8	D-30-E-BP	26
S-9-BP-N	9	S-30-F-BP	31	D-9-BP-N	9	D-30-F-BP	33
S-12-E-BP	9	S-36-E-BP	28	D-12-E-BP	10	D-36-E-BP	29
S-12-F-BP	11	S-36-F-BP	36	D-12-F-BP	12	D-36-F-BP	39

Standard and Super Cylinder Specifications

Plant Air	Up to 145 PSIG (10 BAR)
Temperatures	-40˚ to 225˚F (-40˚ to 107˚C)
Materials of Construction	Body: Sizes 4 and 6 are impact-extruded aluminum shell. Larger sizes are made from a steel shell. Diaphragm: Neoprene® elastomer reinforced with Flex-Weave Dacron® fabric. Rods: Ground, polished and hard-chrome plated steel. Bearings: Sintered bronze, molybdenum disulphite impregnated. Other components are high strength materials with suitable corrosion resistant treatment.
Testing	All cylinders are leak-tested prior to shipment. However, the cylinder is not a bubble tight assembly

Standard and Super Cylinder Operating Data

Size (Effective Area) (Sq. Inches)	Equivalent Bore Diam. (Inches)	Spring Return						Double Acting	
		Stroke +.03/-.12 (Inches)	Stroke +.03/-.12 (Inches)	Approx. Spring Force - Zero Stroke (lbs.)		Approx. Increase Force Per Inches of Stroke (lbs.)		Stroke +.03/-.12 (Inches)	Stroke +.03/-.12 (Inches)
		Series E	Series F	Series E	Series F	Series E	Series F	Series E	Series F
4	2.3		1.80		6		3		1.3
6	2.8		2.40		9		4		1.9
9	3.4	2.20	3.00	17	12	4	4		2.5
12	3.9	2.30	3.60	18	18	6	6	1.8	3.1
16	4.5	2.62	4.20	24	24	8	8	2.1	3.7
24	5.5	2.60	5.24	36	36	11	11	2.0	4.6
30	6.3	3.07	6.00	45	54	13	14	2.4	5.4
36	6.8	3.55	6.00	54	54	16	14	2.9	5.4

Small Bore Cylinders

Bellofram's 0.38 and 1.7 sq. inch effective area diaphragm cylinders combine the performance of the diaphragm cylinder with small size. Two different stroke options are available in each size, with either flush or extended rods on 0.38 sq. inch cylinders. Only spring return varieties are available.

Specifications

0.38 sq. inch Cylinders have aluminum alloy shells and end caps, and carbon steel rods. 1.7 sq. inch Cylinders have die-cast aluminum shells and end caps, and chrome-plated carbon steel rods. All varieties have oil-impregnated bronze bearings, polyester fabric reinforced Nitrile diaphragms, and music wire springs. Optional foot mounts are available for the 1.7 sq. inch Cylinders.

External stroke limiters should be provided by the customer to limit the stroke in both directions on both single-acting and double-acting cylinders.

Installation and operation procedures furnished with each cylinder should be followed for maximum service life.

Marsh Bellofram offers very smooth, "Non-Jarring" action in a Low Cost Cylinder

Small Bore Cylinder Operating Data

Part Number	Size (Effective Area) Sq. In.	Stroke In.	Load @ 0 Stroke Lbs.	Spring Load @ Max. Stroke Lbs.	Equiv. Bore Dia. In.	Maximum Operating Press. PSI	Rod Type
908-013-000	0.384	0.70	2	7	0.7	125	Flush
908-034-000	0.384	0.70	2	7	0.7	125	3/4"
908-014-000	0.384	0.32	5	7	0.7	125	Flush
908-035-000	0.384	0.32	5	7	0.7	125	3/4"
980-008-000	1.7	1.0	4	8	1.5	125	–
980-077-000	1.7	1.75	4	11	1.5	125	–