

Relays & Volume Boosters



Type 20

Type 20 HR

Type 20 EX HR

Type 72

Type 72 HR

Type 75

Type 75 HR

Type 79

Type 79 HR

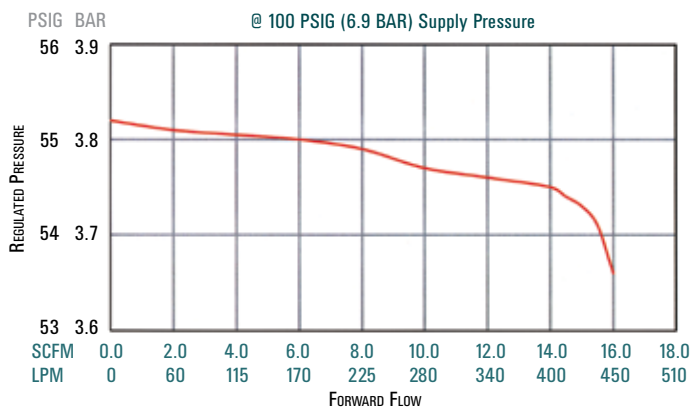


Relays - Volume Boosters

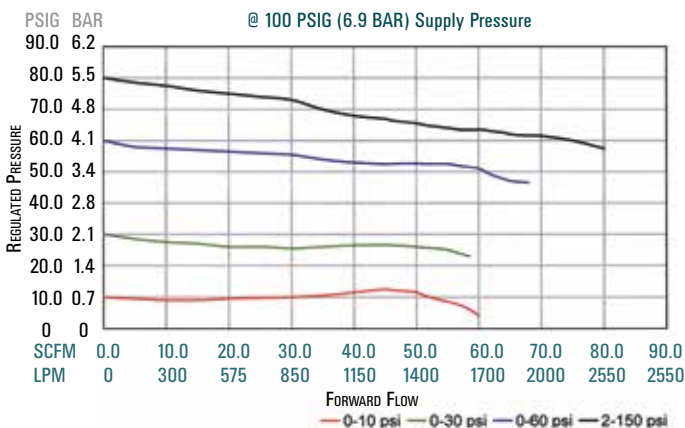
Comparison Chart

	Type 20	Type 20 HR	Type 20 EX HR
Maximum Supply Pressure	150 PSIG (10.3 BAR)	150 PSIG (10.3 BAR)	150 PSIG (10.3 BAR)
Sensitivity	1/8" H ₂ O (3.2mm)	1/8" H ₂ O (3.2mm)	1/8" H ₂ O (3.2mm)
Supply Pressure Sensitivity	0.005 PSIG (0.35 mBAR) per 25 PSIG (1.7 BAR) change in supply pressure	0.005 PSIG (0.35 mBAR) per 25 PSIG (1.7 BAR) change in supply pressure	0.005 PSIG (0.35 mBAR) per 25 PSIG (1.7 BAR) change in supply pressure
Flow Capacity	14 SCFM (400 LPM) @ 20 PSIG (1.4 BAR) signal and 100 PSIG (6.9 BAR) supply	14 SCFM (400 LPM) @ 20 psig (1.4 BAR) signal and 100 PSIG (6.9 BAR) supply	14 SCFM (400 LPM) @ 20 PSIG (1.4 BAR) signal and 100 PSIG (6.9 BAR) supply
Exhaust Capacity	2 SCFM (55 LPM) @ 5 PSIG (0.35 BAR) above a 20 PSIG (1.4 BAR) setpoint	10 SCFM (285 LPM) @ 5 PSIG (0.35 BAR) above a 20 PSIG (1.4 BAR) setpoint	15 SCFM (425 LPM) @ 5 PSIG (0.35 BAR) above a 20 PSIG (1.4 BAR) setpoint
Temperature Limits	-20 to 160 °F (-29 to 71 °C)	-20 to 160 °F (-29 to 71 °C)	-20 to 160 °F (-29 to 71 °C)
Air Consumption	8 SCFH (4 LPM)	8 SCFH (4 LPM)	8 SCFH (4 LPM)
Port Size	1/8", 1/4", 3/8" NPT, BSPP, BSPT	1/8", 1/4", 3/8" NPT, BSPP, BSPT	1/8", 1/4", 3/8" NPT, BSPP, BSPT
Output Pressure Range	2-120 PSIG (0.1 - 8.3 BAR)	2-120 PSIG (0.1 - 8.3 BAR)	2-120 PSIG (0.1 - 8.3 BAR)
Maximum Signal	120 PSIG (8.3 BAR)	120 PSIG (8.3 BAR)	120 PSIG (8.3 BAR)
Weight	1.4 lb. (0.6 kg.)	1.4 lb. (0.6 kg.)	1.4 lb. (0.6 kg.)
Ratio of Accuracy for a 12 PSIG span	<0.5%	<0.5%	<0.5%

Type 20, 20HR and 20 EXHR Flow Curve - 1/8"

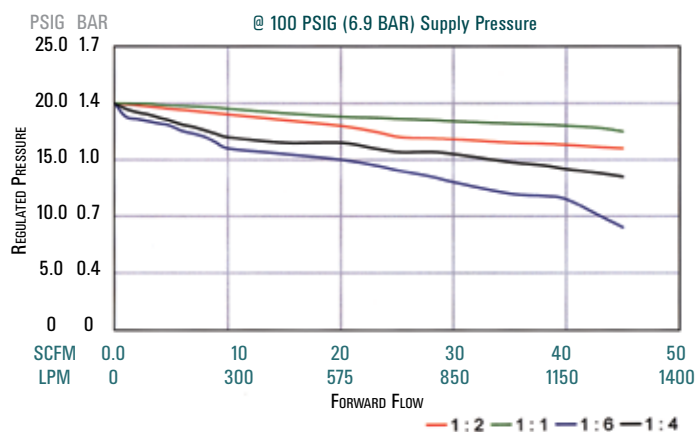


Type 72 and Typo 72 HR Flow Curves - 1/4"

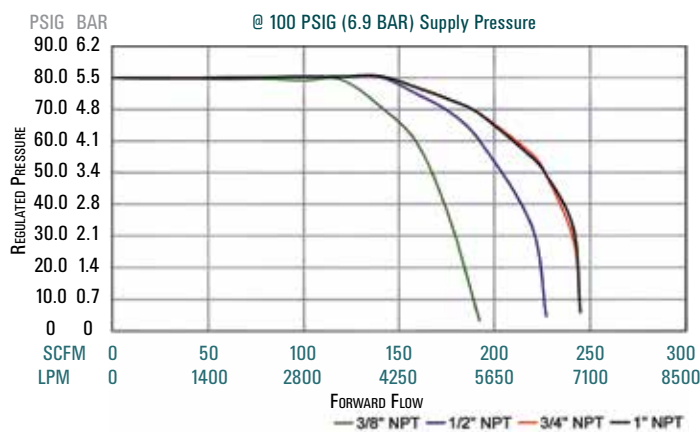


	Type 72	Type 72 HR	Type 75	Type 75 HR	Type 79/79V	Type 79HR
Maximum Supply Pressure	250 PSIG (17.2 BAR)	250 PSIG (17.2 BAR)	250 PSIG (17.2 BAR)	250 PSIG (17.2 BAR)	400 PSIG (27.6 BAR)	400 PSIG (27.6 BAR)
Sensitivity	1/4" H ₂ O (6.4mm)	1/4" H ₂ O (6.4mm)	1/4" H ₂ O (6.4mm)	1/4" H ₂ O (6.4mm)	1" H ₂ O (25mm)	1" H ₂ O (25mm)
Supply Pressure Sensitivity	< 0.6 PSIG (0.01 BAR) per 50 PSIG (1.4 BAR) change in supply pressure	< 0.6 PSIG (0.01 BAR) per 50 PSIG (1.4 BAR) change in supply pressure	< 0.6 PSIG (0.04 BAR) per 50 PSIG (6.9 BAR) change in supply pressure	< 0.6 PSIG (0.04 BAR) per 50 PSIG (3.5 BAR) change in supply pressure	<0.35 PSIG (0.02 BAR) per 100 PSIG (3.5 BAR) change in supply pressure	<0.35 PSIG (0.02 BAR) per 100 PSIG (3.5 BAR) change in supply pressure
Flow Capacity	40 SCFM (1150 LPM) @ 20 PSIG (1.4 BAR) signal and 100 PSIG (6.9 BAR) supply	40 SCFM (1150 LPM) @ 20 PSIG (1.4 BAR) signal and 100 PSIG (6.9 BAR) supply	40 SCFM (1150 LPM) @ 20 PSIG (1.4 BAR) signal and 100 PSIG (6.9 BAR) supply	40 SCFM (1150 LPM) @ 20 PSIG (1.4 BAR) signal and 100 PSIG (6.9 BAR) supply	>125 SCFM (3500 LPM) @ 20 PSIG (1.4 BAR) signal and 100 PSIG (6.9 BAR) supply	>125 SCFM (3500 LPM) @ 20 PSIG (1.4 BAR) signal and 100 PSIG (6.9 BAR) supply
Exhaust Capacity	6 SCFM (170 LPM) @ 10 PSIG (0.69 BAR) above a 20 PSIG (1.4 BAR) setpoint	15 SCFM (425 LPM) @ 10 PSIG (0.69 BAR) above a 20 PSIG (1.4 BAR) setpoint	6 SCFM (170 LPM) @ 10 PSIG (0.69 BAR) above a 20 PSIG (1.4 BAR) setpoint	15 SCFM (425 LPM) @ 10 PSIG (0.69 BAR) above a 20 PSIG (1.4 BAR) setpoint	31 SCFM (875 LPM) @ 5 PSIG (0.35 BAR) above a 20 PSIG (1.4 BAR) setpoint	39 SCFM (3500 LPM) @ 5 PSIG (0.35 BAR) above a 20 PSIG (1.4 BAR) setpoint
Temperature Limits	-40 to 200 °F (-40 to 93 °C)	-40 to 200 °F (-40 to 93 °C)	-40 to 200 °F (-40 to 93 °C)	-40 to 200 °F (-40 to 93 °C)	-40 to 200 °F (-40 to 93 °C)	-40 to 200 °F (-40 to 93 °C)
Air Consumption	<12 SCFH (5.7 LPM)	<12 SCFH (5.7 LPM)	<12 SCFH (5.7 LPM)	<12 SCFH (5.7 LPM)	<12 SCFH (5.7 LPM)	<12 SCFH (5.7 LPM)
Port Size	1/4", 3/8", 1/2" NPT, BSPP, BSPT	1/4", 3/8", 1/2" NPT, BSPP, BSPT	1/4", 3/8" NPT, BSPP, BSPT	1/4", 3/8", 1/2" NPT, BSPP, BSPT	3/8", 1/2", 3/4", 1" NPT, BSPP, BSPT	3/8", 1/2", 3/4", 1" NPT, BSPP, BSPT
Output Pressure Range	0-150 PSIG (0-10.3 BAR)	0-150 PSIG (0-10.3 BAR)	0-150 PSIG (0-10.3 BAR)	0-150 PSIG (0-10.3 BAR)	0-200 PSIG (0-13.8 BAR)	0-200 PSIG (0-13.8 BAR)
Maximum Signal	150 PSIG (10.3 BAR)	150 PSIG (10.3 BAR)	150 PSIG (10.3 BAR) for 1:1 ratio	150 PSIG (10.3 BAR) for 1:1 ratio	200 PSIG (13.8 BAR)	200 PSIG (13.8 BAR)
Weight	1.75 lb. (0.8 kg.)	1.75 lb. (0.8 kg.)	1.3 lb. (0.6 kg.)	1.3 lb. (0.6 kg.)	4.5 lb. (2.0 kg.)	4.5 lb. (2.0 kg.)
Ratio of Accuracy for a 12 psig span	< 2%	< 2%	< 2% (1:1)	< 2% (1:1)	<1.5%	<1.5%

Type 75: Regulated Pressure VS. Flow



Type 79 and 79 HR: Regulated Pressure VS. Flow



Type 20

Precision Air Relays

Features

- Extreme accuracy
- Positive and negative bias capability
- Small size
- Rugged and stable

Description

The Type 20 Air Relay is a compact, two-stage, pilot operated 1:1 relay with positive and negative bias adjustment capability. It accepts a signal pressure and combined with the bias adjustment, maintains a resulting output pressure with an accuracy and reliability unmatched by any other pressure relay in its price range.

Models

Type 20

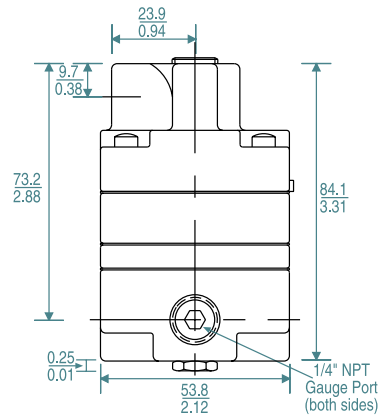
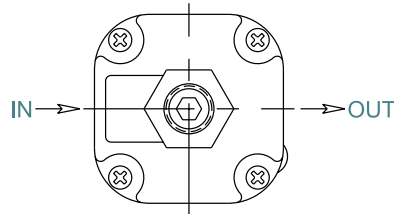
The basic relay is offered with a choice of three port sizes.

Type 20HR and Type 20EXHR

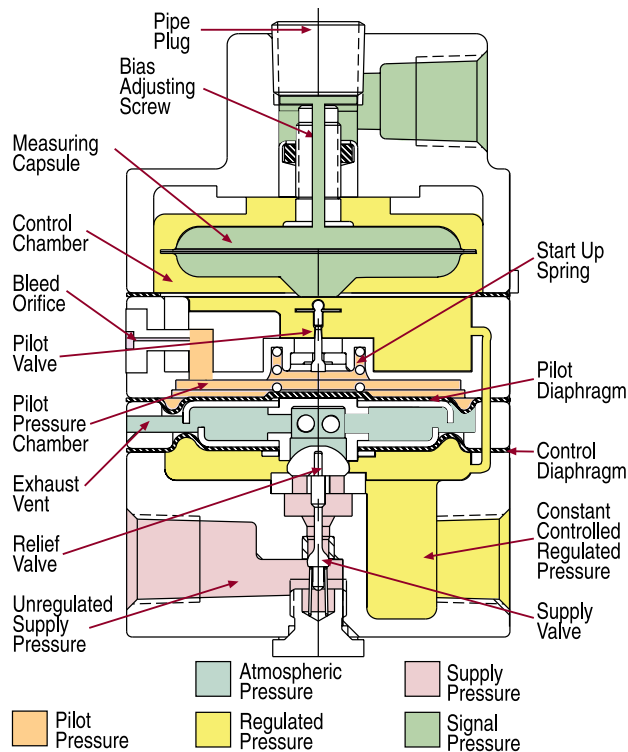
High Relief Relays - These relays provide extra fast "blowdown" for very rapid release of output pressure. The extra relief feature makes this relay suitable for cylinder return stroke actuation, air hoists, and similar applications requiring fast exhaust.

Applications

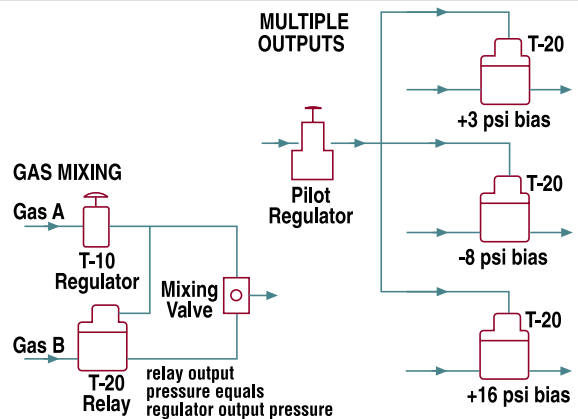
- Gate Actuators
- Air Hoists
- Disc and Shoe Brakes
- Remote Positioning Devices
- Valve Rotors
- Control Valves
- Tensioning Systems
- Web Tracking Systems



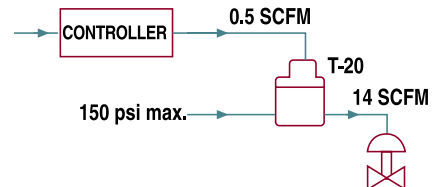
Type 20
Precision Air Relay



Type 20 Application Diagrams



VOLUME BOOSTING AND REMOTE LOADING



Type 72 & 72HR

Positive Bias Booster Relays

Features

- Four adjustable positive bias ranges, from 0-10 PSI (0-0.7 BAR) to 2-150 PSI (0.1-10.3 BAR)
- Flow capacity up to 50 SCFM
- Quick response to minute changes in downstream pressure
- Dampening action of aspirator tube maintains stable output pressure
- Output virtually unaffected by changes in supply pressure
- Internal rolling diaphragm designed for millions of cycles
- Honking and buzzing eliminated by action of integral baffle and aspirator tube
- Can be disassembled and serviced without removing from line
- Also available in a high relieving version (72HR)

Description

The Type 72 Relay features an adjustable bias pressure which enables users to obtain an output pressure which is the sum of a controlled input signal pressure plus the bias. The relay offers an exceptionally high flow capacity (up to 50 SCFM/1400 LPM) with minimal pressure drop.

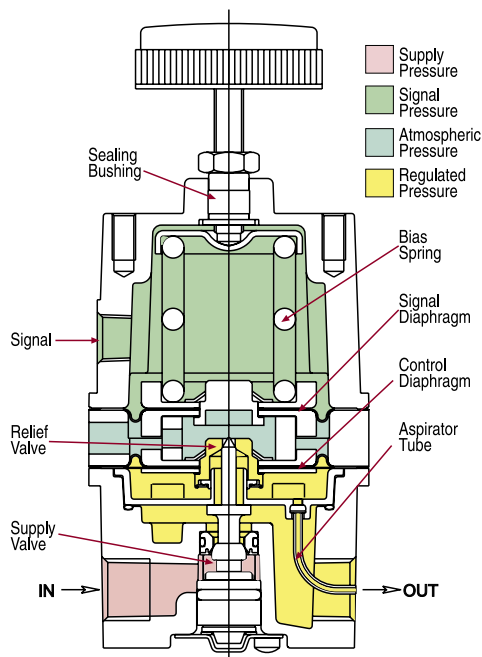
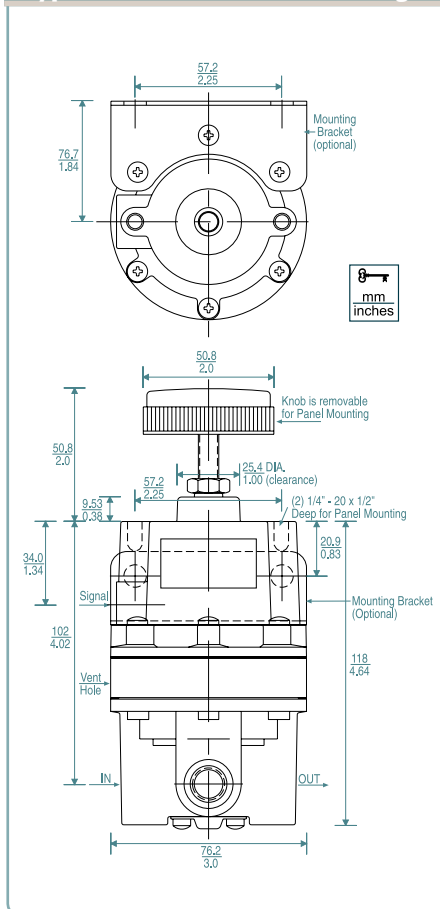
Output pressure is accurately maintained under varying flow conditions by means of an aspirator tube, which adjusts the air supply valve opening in proportion to flow velocity. A balanced supply valve utilizing a rolling diaphragm makes the relay virtually immune to changes in supply pressure. Simple design makes maintenance easy, and the relay can be serviced without removing it from the line. The standard signal-to-output ratio is 1:1, but 1:2, 1:4 and 1:6 ratios are available on special request.

Applications

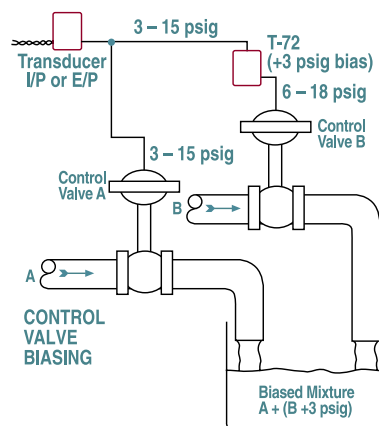
The Type 72 Relay is used when high flow capacity is required in conjunction with a positive output pressure bias. Typical applications include:

- Gas Flow Control
- Tensioning Control
- Clutch and Brake Controls
- Volume Boosting
- Dancer Roll Loading
- Calendar Roll Loading
- Cylinder Bucking Control
- Valve Motor Loading

Type 72 Dimensional Drawing



Type 72 Application Diagrams



Type 75 & 75 HR

Air Relays

Features

- Balanced valve design
- High flow capacity
- Field serviceable
- Multiple output ratios
- Negative biasing option

Description

The Type 75 relay uses signal pressure to accurately control output pressure over a wide range of flow and supply pressure variation.

Under varying flow conditions output pressure is maintained by use of an aspirator tube, which adjusts the air supply valve opening in accordance with the flow velocity. A balanced supply valve, utilizing a rolling diaphragm, makes the relay virtually immune to changes in supply pressure. Maintenance is simple due to the unit construction, and the relay can be serviced without removing it from the line. Signal to output pressure ratios of 1:1, 1:2, 1:4 and 1:6 are available. Maximum output is 150 PSIG (10.3 BAR).

Applications

- Volume Boosting
- Dancer Roll Loading
- Calendar Roll Loading
- Cylinder Bucking Control
- Clutch and Brake Controls
- Gas Flow Control
- Tensioning Control
- Valve Motor Loading

Models

Type 75

The basic relay offers excellent precision along with high forward flow rates.

Type 75 High Relief Relays

These relays provide extra fast "blowdown" for very rapid release of output pressure. The extra relief feature makes this relay suitable for cylinder return stroke actuation, air hoists, and similar applications requiring fast exhaust.

Type 75 Negative Bias

The Type 75 Relay is also available with a 4 ± 1 psig (0.3 ± 0.07 BAR) negative bias spring mounted internally. (See cross-sectional drawing on previous page.) This bias spring automatically subtracts 4 ± 1 psig (0.3 ± 0.07 BAR) from any signal pressure introduced. The relay then multiplies the net signal pressure by its ratio value to obtain final output pressure.

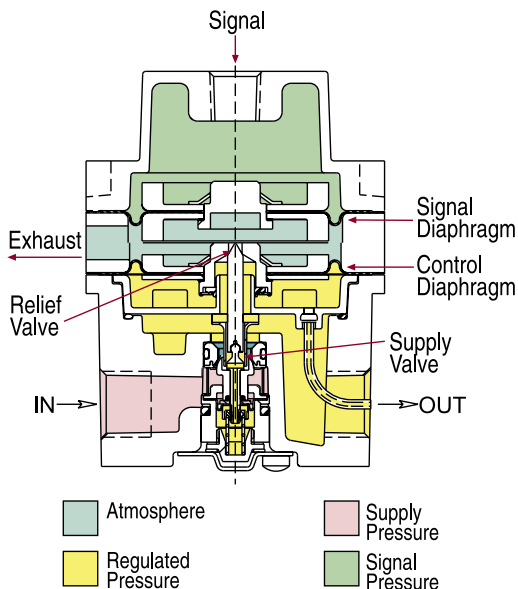
This option is particularly useful in obtaining zero pressure from pneumatic devices such as I/P transducers that normally cannot be adjusted this low, as well as obtaining higher outputs from such devices.

Typical applications of the Type 75 Relay with fixed negative bias include the electronic control of the applications listed for the standard Type 75 Relay.

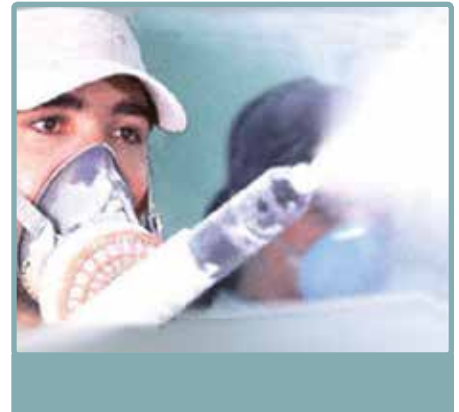
To calculate relay output:

Relay output = (signal pressure) - 4 PSI bias x (relay ratio factor) where the relay ratio factor is defined as follows:

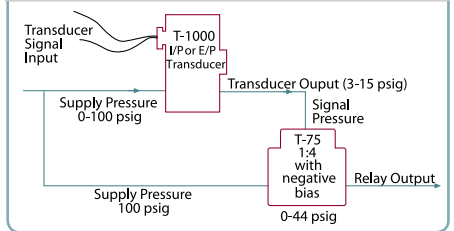
Relay Ratio	Factor
1:1	1
1:2	2
1:4	4
1:6	6



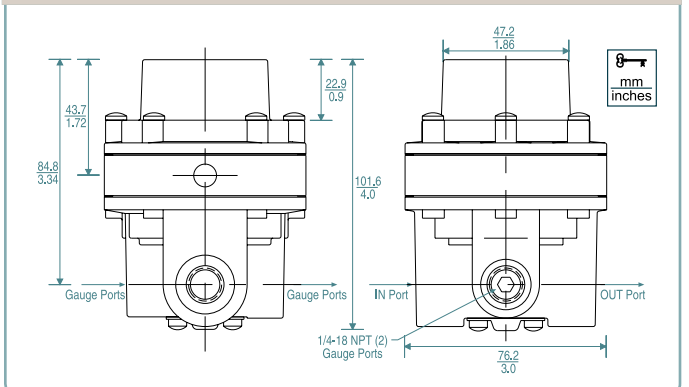
Type 75
Air Relay



Type 75 Application Diagrams



Type 75 Dimensional Drawing



Type 79

High Flow Air Relays

Features

- Balanced pintle
- High flow capacity
- Field serviceable
- Large port sizes available
- Air piloted or dome loaded
- 200 PSIG output
- Also available in a high relieving version (Type 79HR)

Description

The Type 79 1:1 Ratio High Flow Precision Air Relay brings additional precision and control to the Bellofram line of precision control products.

The Type 79 relay is designed for applications where a precise control of flow is needed. This regulator offers low droop, high accuracy and fine adjustment sensitivity. The use of a Bellofram rolling diaphragm provides greater sensitivity and improved accuracy. The balanced pintle minimizes output pressure changes caused by fluctuations in supply pressure.

Careful design and quality materials throughout assure long, trouble-free operation. The rugged die-cast zinc and aluminum housings are pressure tested to assure safe

operation. The Type 79 is designed to withstand harsh and abusive environments. This is attributed to a chemical conversion coating of all cast components, and a vinyl paint finish.

The Type 79 can achieve flow rates of well over 200 SCFM (5695 LPM). This relay can be pipe or bracket mounted.

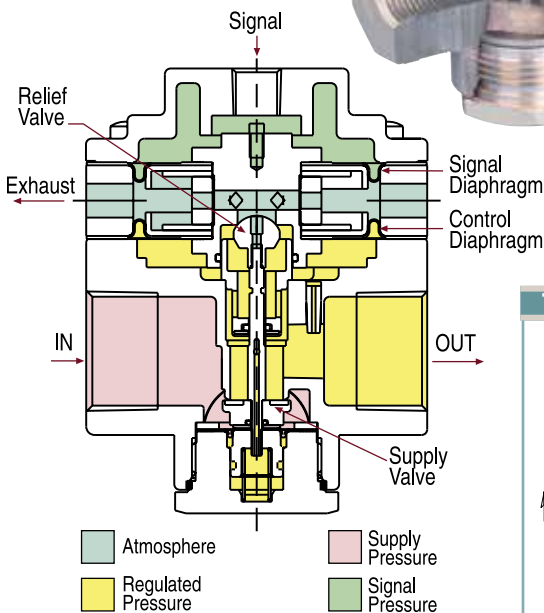
A version of the Type 79 for valve control applications is available. The Type 79V utilizes soft exhaust seats to minimize air consumption, increased deadband to ignore valve oscillations, and an integral bypass valve that can be 'tuned' for optimum valve response.

Applications

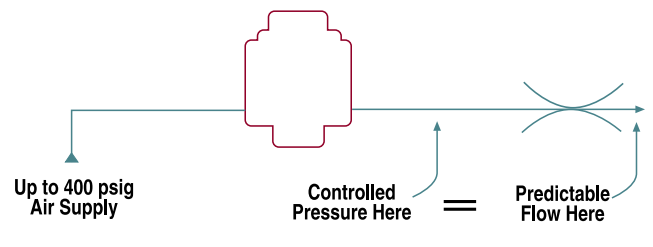
- Clutch and Brake Controls
- Gas Flow Control
- Cylinder Bucking Control
- Tension Control
- Dancer (Calendar) Roll Loading
 - Volume Boosting
 - Valve Motor Loading



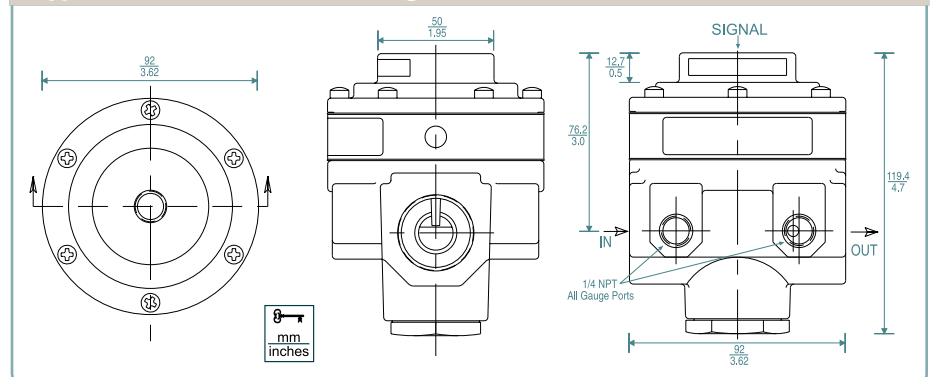
Type 79
High Flow Air Relay



Type 79 Application Diagrams



Type 79 Dimensional Drawing



Volume Booster Ordering Information

	Ratio	Port Size (NPT)	Set Point Range		Part Number
			BAR	PSIG	
Type 20 Precision Relay	1:1	1/8	0.1-8.3	2-120	961-004-000
		1/4	0.1-8.3	2-120	961-005-000
		3/8	0.1-8.3	2-120	961-006-000
Type 20HR Precision Relay High Relief Capacity	1:1	1/8	0.1-8.3	2-120	961-001-000
		1/4	0.1-8.3	2-120	961-002-000
		3/8	0.1-8.3	2-120	961-003-000
Type 20 EXHR	1:1	1/8	0.1-8.3	2-120	961-009-000
		1/4	0.1-8.3	2-120	961-010-000
		3/8	0.1-8.3	2-120	961-011-000
Type 72 Positive Bias Booster Relay	1:1	3/8	0-0.7	0-10	961-062-000
		3/8	0-2.1	0-30	961-063-000
		3/8	0.07-4.1	1-60	961-064-000
		3/8	0.1-10.3	2-150	961-065-000
		1/4	0-0.7	0-10	961-052-000
		1/4	0-2.1	0-30	961-053-000
		1/4	0.07-4.1	1-60	961-054-000
		1/4	0.1-10.3	2-150	961-055-000
Type 72 HR High Relief Positive Bias Booster Relay	1:1	3/8	0-0.7	0-10	961-182-000
		3/8	0-2.1	0-30	961-183-000
		3/8	0.07-4.1	1-60	961-184-000
		3/8	0.1-10.3	2-150	961-185-000
		1/4	0-0.7	0-10	961-178-000
		1/4	0-2.1	0-30	961-179-000
		1/4	0.07-4.1	1-60	961-180-000
		1/4	0.1-10.3	2-150	961-181-000
Type 75 Precision Relay	1:1	1/4	0-10.3	0-150	961-058-000
	1:1	3/8	0-10.3	0-150	961-066-000
	1:2	1/4	0-10.3	0-150	961-059-000
	1:2	3/8	0-10.3	0-150	961-067-000
	1:4	1/4	0-10.3	0-150	961-060-000
	1:4	3/8	0-10.3	0-150	961-068-000
	1:6	1/4	0-10.3	0-150	961-045-000
	1:6	3/8	0-10.3	0-150	961-069-000
Type 75 Precision Relay Fixed Negative Bias (4 PSI)	1:1	1/4	0-10.3	0-150	961-090-000
	1:1	3/8	0-10.3	0-150	961-091-000
	1:2	1/4	0-10.3	0-150	961-092-000
	1:2	3/8	0-10.3	0-150	961-093-000
	1:4	1/4	0-10.3	0-150	961-094-000
	1:4	3/8	0-10.3	0-150	961-095-000
	1:6	1/4	0-10.3	0-150	961-096-000
	1:6	3/8	0-10.3	0-150	961-097-000
Type 75HR Precision Relay	1:1	1/4	0-10.3	0-150	961-144-000
	1:1	3/8	0-10.3	0-150	961-145-000
	1:1	1/2	0-10.3	0-150	961-146-000
	1:2	1/4	0-10.3	0-150	961-147-000
	1:2	3/8	0-10.3	0-150	961-148-000
	1:2	1/2	0-10.3	0-150	961-149-000
Type 75HR Precision Relay Fixed Negative Bias (4 PSI)	1:1	1/4	0-10.3	0-150	961-150-000
	1:1	3/8	0-10.3	0-150	961-151-000
	1:1	1/2	0-10.3	0-150	961-152-000
	1:2	1/4	0-10.3	0-150	961-153-000
	1:2	3/8	0-10.3	0-150	961-154-000
	1:2	1/2	0-10.3	0-150	961-155-000
Type 79 High Flow Capacity	1:1	3/8	0-13.8	0-200	961-156-000
		1/2	0-13.8	0-200	961-157-000
		3/4	0-13.8	0-200	961-158-000
		1	0-13.8	0-200	961-159-000
Type 79 HR High Relief High Flow Capacity	1:1	3/8	0-13.8	0-200	962-378-000
		1/2	0-13.8	0-200	962-378-100
		3/4	0-13.8	0-200	962-378-200
		1	0-13.8	0-200	962-378-300
Type 79V	1:1	3/8	0-13.8	0-200	961-200-000
		1/2	0-13.8	0-200	961-201-000
		3/4	0-13.8	0-200	961-202-000
		1	0-13.8	0-200	961-203-000

Type 20 Option Ordering Matrix

Replace last three digits of part number with digits from table below.

Option	8
8 Pressure Gauge	008

Type 72 Option Ordering Matrix

Replace last three digits of part number with digits from table below.

Option	3	5	7	8	9
3 Square Head	003	053	073	083	
5 Epoxy Finish		005	075	085	095
7 Mounting Bracket			007	087	097
8 Pressure Gauge				008	098
9 Tamper-Resistant Cover					009

Type 75 Option Ordering Matrix

Replace last three digits of part number with digits from table below.

Option	5	7	8
5 Epoxy Finish	005	075	085
7 Mounting Bracket		007	087
8 Pressure Gauge			008

Type 79 Option Ordering Matrix

Replace last three digits of part number with digits from table below.

Option	1	2	5	6	7
1 Low Bleed	001		051	061	071
2 Non-Relieving		002	052	062	072
5 Epoxy Finish			005	065	075
6 Tapped Vent				006	076
7 Tapped Supply Port					007

Relay Options and Accessories

Pressure Gauge

Dual scale (English and Metric) 2 inch (50.8 mm) gauges are available

Epoxy Finish - Gray epoxy coating for greater corrosion resistance.

Mounting Bracket

Zinc-plated steel bracket for side mounting.
(For Type 79 order part number 607-293-000)
(For Type 75 order part number 607-000-047)

Tamper Resistant Cover

A cover placed over the adjusting screw to prevent ordinary hand adjustments.

Low Bleed

Reduces steady-state air consumption by approximately 50%.

Non-Relieving

Used in applications where it is desirable to relieve pressure downstream of the relay. Non-relieving relays should not be used for low or no flow applications.

Tapped Vent (Exhaust)

1/4 NPT tapped port to allow for installation of plumbing to capture exhaust air.

Tapped Supply Gauge Port

1/4 NPT tapped port is offered as a pressure tap for monitoring the inlet or upstream pressure supplied to the regulator. (Type 79 only)

BSPP or BSPT

British Standard Threads can be ordered by adding either "BSPT" or "BSPP" to the end of the part number.

Diaphragm Air Cylinders



Small bore
Cylinders

Standard
Cylinders

Super
Cylinders



Air Cylinders

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.



Diaphragm Air Cylinder



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	<p>Body: Sizes 4 and 6 are impact-extruded aluminum shell. Larger sizes are made from a steel shell.</p> <p>Diaphragm: Neoprene® elastomer reinforced with Flex-Weave Dacron® fabric.</p> <p>Rods: Ground, polished and hard-chrome plated steel.</p> <p>Bearings: Sintered bronze, molybdenum disulphite impregnated.</p> <p>Other components are high strength materials with suitable corrosion resistant treatment.</p>
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		
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.



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

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.



Small Bore Cylinder Operating Data

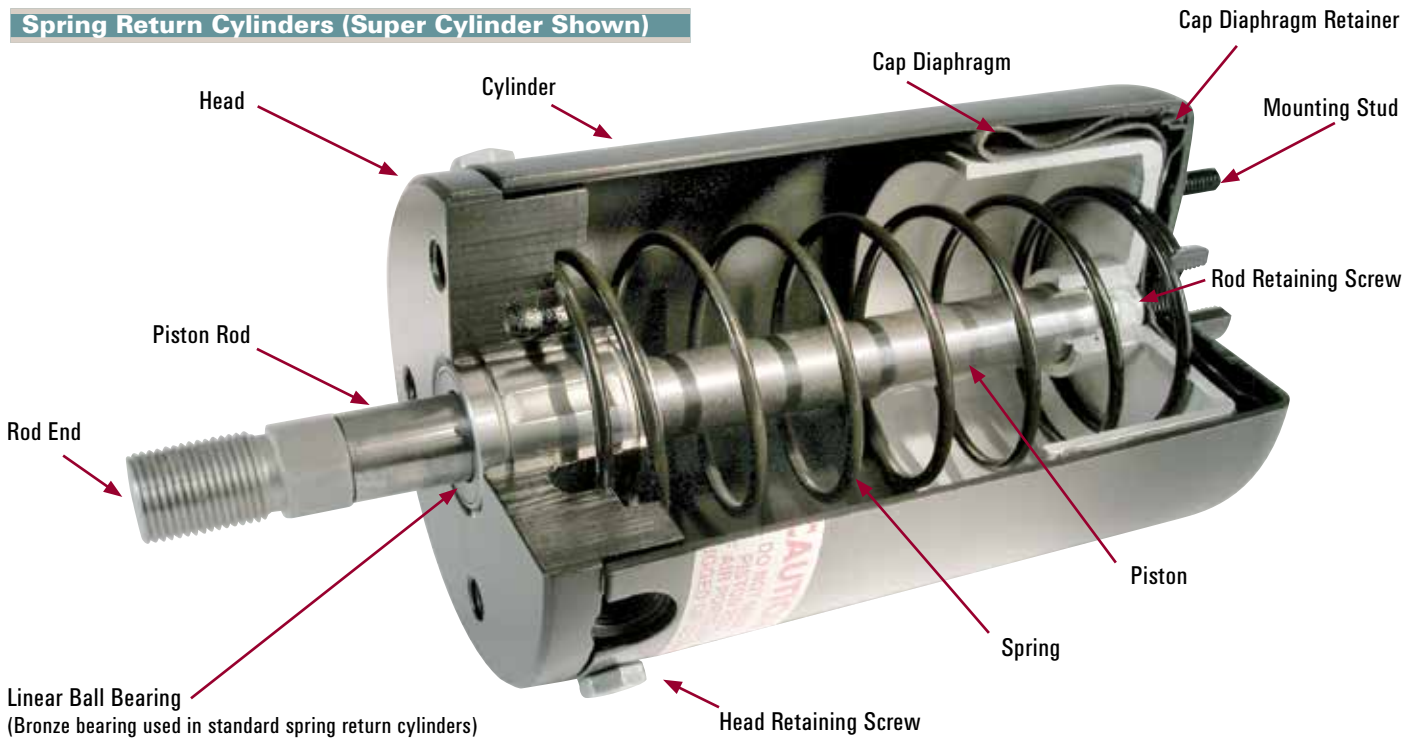
Part Number	Size (Effective Area) Sq. In.	Stroke In.	Load @ 0 Stroke Lbs.	Spring Load @ Max. Stroke Lbs.	Equiv. Bore Dia. In.	Maximum Operating Press. PSI	Rod Type
908-013-000	0.384	0.70	2	7	0.7	125	Flush
908-034-000	0.384	0.70	2	7	0.7	125	3/4"
908-014-000	0.384	0.32	5	7	0.7	125	Flush
908-035-000	0.384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

Cylinder Replacement Parts

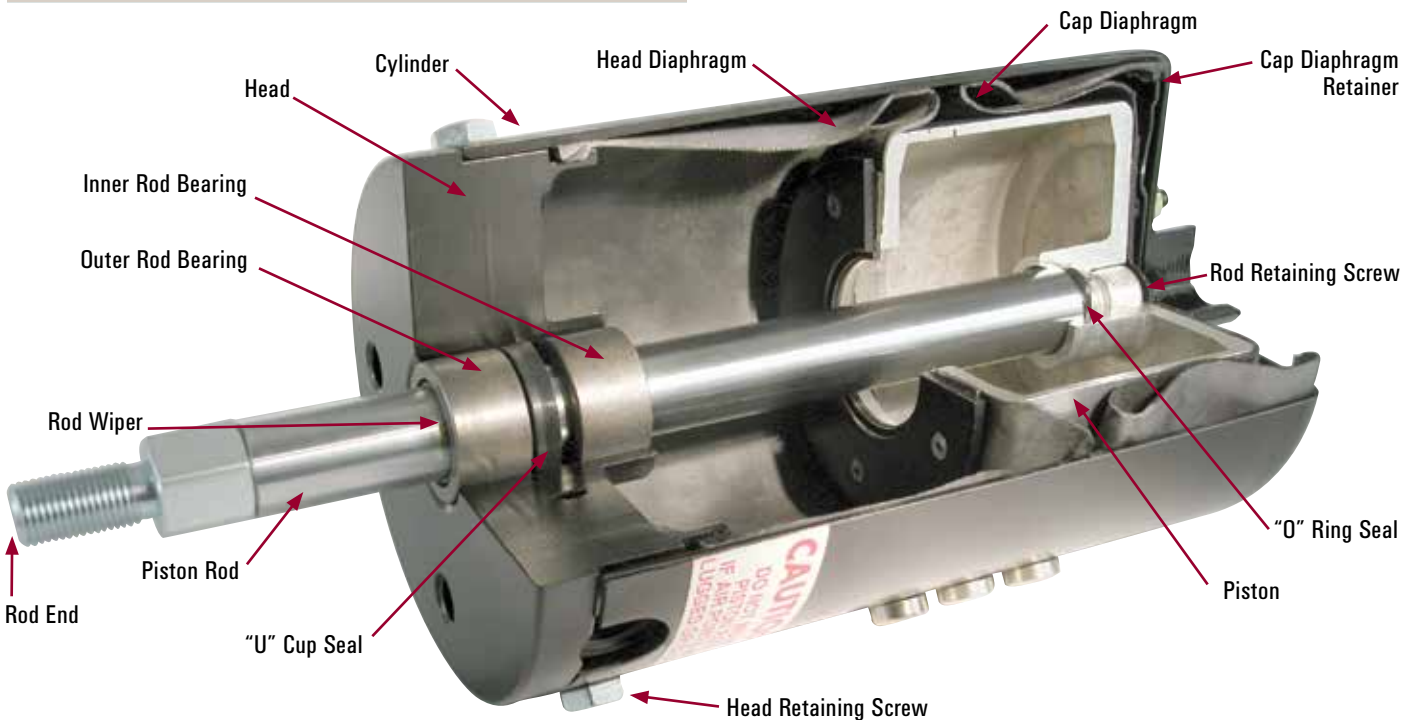
When ordering replacement parts, provide nomenclature of part from photographs in addition to the following information from the nameplate on the cylinder: Type, Size, Series, and Rod type.

Complete kits are available for replacement of diaphragm or bearings.

Spring Return Cylinders (Super Cylinder Shown)



Double Acting Cylinders



Standard Cylinders Ordering Information

↑	↑	↑	↑	↑	↑	Type
S						Spring Return
D						Double Acting
						Size
	04					4 Square Inches
	06					6 Square Inches
	09					9 Square Inches
	12					12 Square Inches
	16					16 Square Inches
	24					24 Square Inches
	30					30 Square Inches
	36					36 Square Inches
						Series
		E				Determines Stroke
		F				Make a selection from Operating Data Table on pg. 47
						Rod
			BP			Bellofram Product Standard
			SM			National Fluid Power Assoc. Standard
						Make a selection from dimensional data tables on pgs. 51-54
						Mounting
				N		Nose Mount
				UM		Universal Mount
				FM		Foot Mount
				CFM		Cap Flange Mount
				HFM		Head Flange Mount
				CBM		Clevis Bracket Mount
				CBS		Clevis Bracket Stud
						Standard Options
					NS	No Spring
					NB	No Bearing
					NBS	No Bearing or Spring
						No Standard Option Requested

Example: D-12-F-BP-CBM is a Double Acting, 12 sq. in., 3.1" Stroke, BP Rod End Cylinder with Clevis Bracket Mount.

Super Cylinders Ordering Information

SS	↑	F	↑	↑	↑	Type
SS						Super Cylinders
						Size
	04					4 Square Inches
	06					6 Square Inches
	09					9 Square Inches
	12					12 Square Inches
	16					16 Square Inches
	24					24 Square Inches
	30					30 Square Inches
	36					36 Square Inches
						Series
		F				Determines Stroke
						Rod
			BP			Bellofram Product Standard
			SM			National Fluid Power Assoc. Standard
						Make a selection from dimensional data table on pgs. 51-54
						Mounting
				UM		Universal Mount
				FM		Foot Mount
				CFM		Cap Flange Mount
				HFM		Head Flange Mount
				CBM		Clevis Bracket Mount
				CBS		Clevis Bracket Stud
						Standard Options
					NS	No Spring
						No Standard Option Requested

Example: SS-12-F-SM-HFM is a Single Acting Super Cylinder, 12 sq. in., 3.6" stroke, SM Rod End Cylinder with a Head Flange Mount.

Repair Kits

Repair Kits are available to permit user in-plant maintenance without delay and expense of returning parts to the factory. Each kit includes installation instructions. Nameplate data of the cylinder must accompany order to insure receipt of correct parts.

The following is included in the repair kits:

Spring Return Diaphragm Kit

1. Diaphragm, Cap
2. Adhesive, Cap
3. Nuts, Cap Retainer
4. Instructions

Spring Return Bearing Kit

1. Inner Bearing
2. Outer Bearing
3. Rod Wiper
4. Instructions

Double Acting Diaphragm Kit

1. Diaphragm, Cap
2. Diaphragm, Head
3. Adhesive, Cap
4. Adhesive, Head
5. Rivets, Blind (or Screws)
6. Nuts, Cap Retainer
7. Seal "O" Ring
8. Instructions

Double Acting Bearing Kit

1. Inner Bearing
2. Outer Bearing
3. Rod Wiper
4. U-Cup Seal
5. Instructions

Breather Vents

Breather vents are available for use on Bellofram Spring Return Air Cylinders.

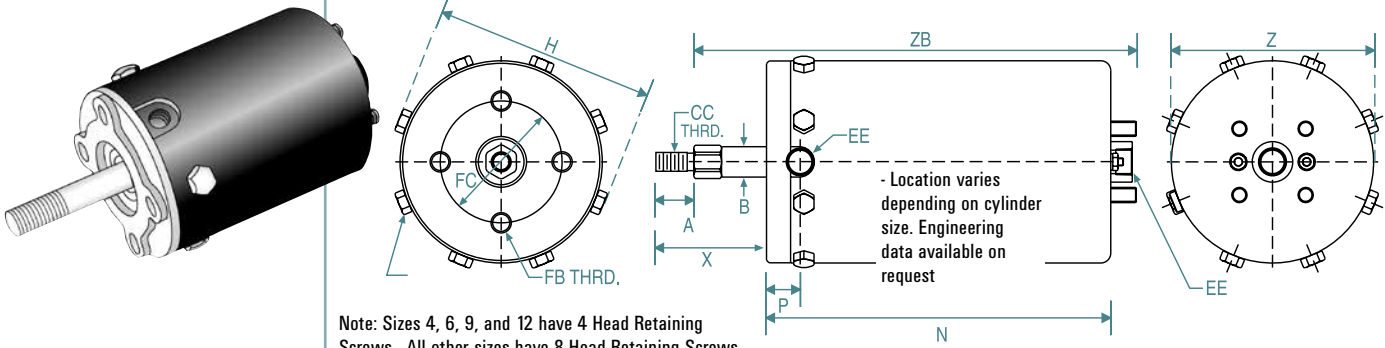
The Breather, which contains a 40 micron bronze filter, is simply threaded into the air relief port of the cylinder head. It prevents foreign matter from being drawn into the cylinder on the return stroke of the piston, and also acts as a snubber. The snubbing reduces the piston speed and impact at the end of the stroke in both directions.

Breather Vents Ordering Data

Breather Vent for 1/4" Pipe Tap
(Fits cylinder sizes 4, 6, 9)
Part No. 661-000-001

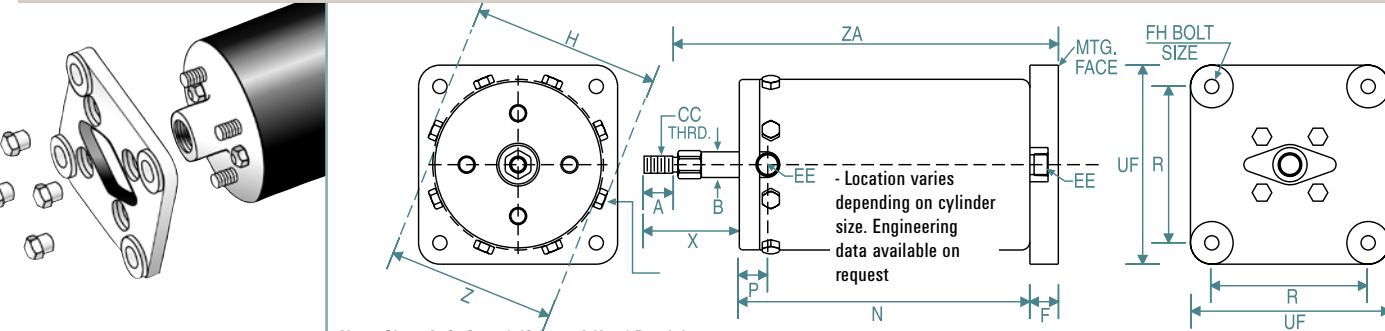
Breather Vent for 3/8" Pipe Tap
(Fits cylinder sizes 12, 16, 24, 30, 36)
Part No. 661-000-002

Universal Mount



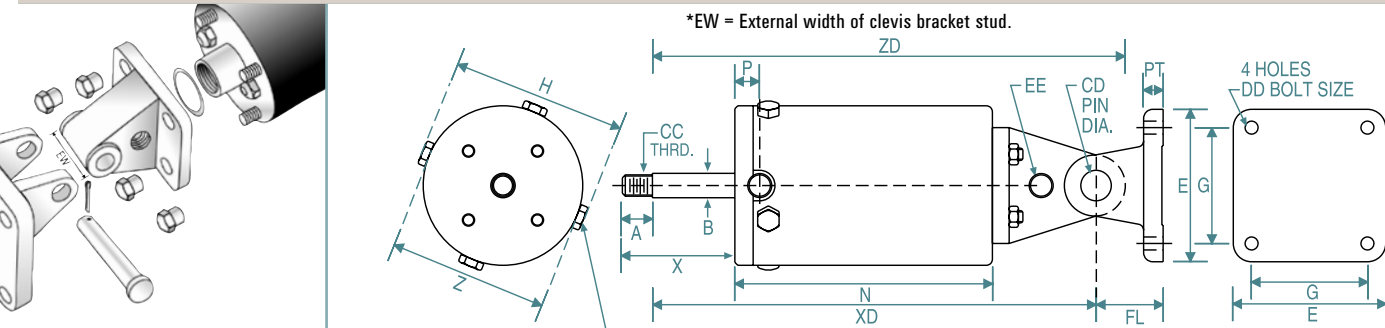
Note: Sizes 4, 6, 9, and 12 have 4 Head Retaining Screws. All other sizes have 8 Head Retaining Screws

Cap Flange Mount



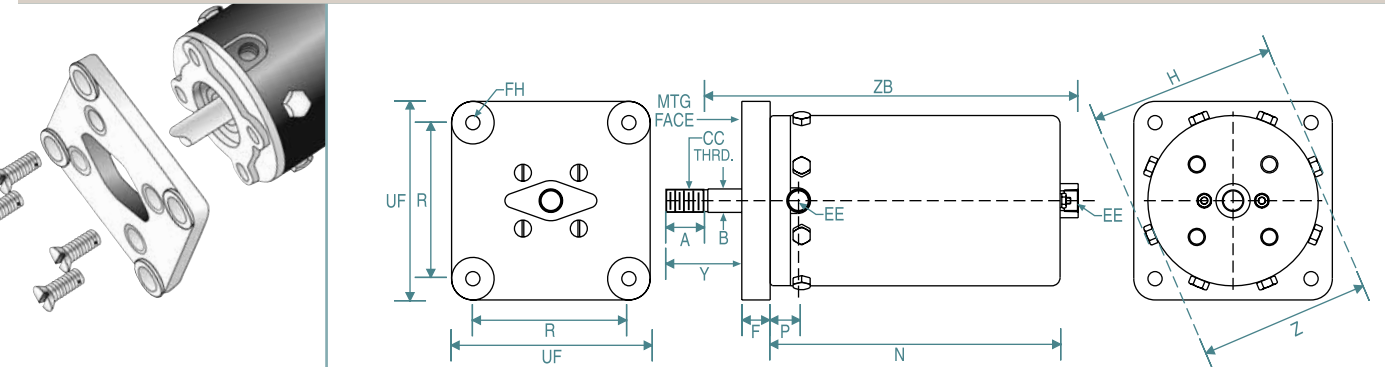
Note: Sizes 4, 6, 9, and 12 have 4 Head Retaining Screws. All other sizes have 8 Head Retaining Screws

Clevis Bracket Mount (or Stud)



Note: Sizes 4, 6, 9, and 12 have 4 Head Retaining Screws. All other sizes have 8 Head Retaining Screws

Head Flange Mount



Standard Cylinders - Universal, Cap Flange, Clevis Bracket, Head Flange Mounts — Dimensions - Inches

Size	Series	Z	H	N	EE	FC	FB	B	P	F	R	UF	FH	CD	DD	E	FL	EW	PT	G
4	F	2.71	3.02	4.34	1/4 NPT	2.00	1/4 - 20	1/2	.50	.781	2.81	3.62	1/4	.625	1/4	3.12	1.38	.93	3/8	2.38
6	F	3.27	3.58	5.28	1/4 NPT	2.00	1/4 - 20	1/2	.51	.781	2.81	3.62	1/4	.625	1/4	3.12	1.38	.93	1/2	2.38
9	E	3.84	4.25	5.31	1/4 NPT	3.00	7/16-14	3/4	.75	.690	4.38	5.50	7/16	.750	1/4	3.75	1.69	.99	1/2	3.0
	6.34																			
12	E	4.38	4.79	5.31	3/8 NPT	3.00	7/16-14	3/4	.75	.690	4.38	5.50	7/16	.750	1/2	4.00	1.75	1.24	1/2	3.0
	7.28																			
16	E	4.99	5.40	6.03	3/8 NPT	3.00	1/2-13	3/4	.87	.690	4.38	5.50	1/2	.750	1/2	4.00	1.75	1.24	1/2	3.0
	8.38																			
24	E	6.16	6.57	6.28	3/8 NPT	4.75	5/8-11	3/4	1.00	.656	6.00	7.50	1/2	1.00	1/2	5.12	2.00	1.49	5/8	4.0
	10.22																			
30	E	6.88	7.29	7.00	3/8 NPT	4.75	5/8-11	1	1.00	.656	6.00	7.50	1/2	1.00	1/2	5.12	2.00	1.49	5/8	4.0
	11.44																			
36	E	7.38	7.79	7.69	3/8 NPT	4.75	5/8-11	1	1.00	.656	6.00	7.50	1/2	1.00	1/2	5.12	2.00	1.49	5/8	4.0
	11.47																			

Size	Series	BP Rod End*								SM Rod End†					
		X	Y	A	ZA	ZD	XD	ZB	CC	A	ZA	ZD	XD	ZB	CC
4	F	2.73	1.95	.75	7.10	9.07	8.45	6.72	3/8-24	1.00	6.85	8.82	8.19	6.47	7/16-20
6	F	2.69	1.91	.75	8.00	9.97	9.35	7.63	3/8-24	1.00	7.75	9.72	9.09	7.38	7/16-20
9	E	2.92	2.23	1.00	7.92	10.73	9.98	7.63	1/2-20	1.12	7.80	10.61	9.86	7.56	3/4-16
	F	2.69	2.00		8.72	11.55	10.80	8.44			8.60	11.42	10.67	8.32	
12	E	2.92	2.23	1.00	7.92	10.98	10.23	7.78	1/2-20	1.12	7.80	10.86	10.11	7.66	3/4-16
	F	2.95	2.26		9.91	12.98	12.23	9.78			9.80	12.86	12.11	9.66	
16	E	3.06	2.37	1.00	8.18	11.84	11.09	8.64	1/2-20	1.12	8.66	11.72	10.97	8.52	3/4-16
	F	2.78	2.09		10.85	13.91	13.16	10.71			10.73	13.78	13.03	10.59	
24	E	2.86	2.17	1.00	8.53	11.78	10.78	8.73	1/2-20	1.12	8.71	12.16	11.16	8.59	3/4-16
	F	2.44	1.78		12.35	16.22	15.22	12.08			12.23	15.68	14.68	12.03	
30	E	2.83	2.14	1.25	9.27	12.70	11.70	9.26	5/8-18	1.50	8.02	12.89	11.89	9.30	1-14
	F	3.05	2.36	1.50	13.68	17.11	16.11	13.53	1-12		13.68	17.11	16.11	13.53	
36	E	2.83	2.14	1.25	9.96	13.31	12.31	9.82	5/8-18	1.50	9.71	13.60	12.60	10.00	1-14
	F	3.05	2.36	1.50	13.71	17.13	16.13	13.54	1-12		13.71	17.13	16.13	13.54	



Air Cylinders

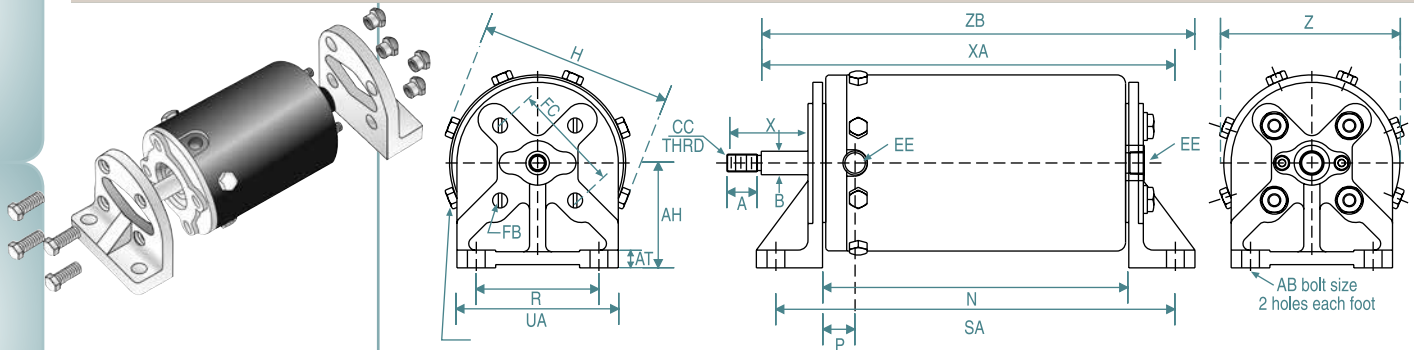
Standard Cylinders - Universal, Cap Flange, Clevis Bracket, Head Flange Mounts — Dimensions - Millimeters

Size	Series	Z	H	N	FC	B	P	F	R	UF	FH	CD	DD	E	FL	EW	PT	G
4	F	68.83	76.71	110.24	50.80	12.70	12.70	19.84	71.37	91.95	6.35	15.88	6.25	79.25	35.05	23.62	9.53	60.45
6	F	83.06	90.93	134.11	50.80	12.70	12.95	19.84	71.37	91.95	6.35	15.88	6.25	79.25	35.05	23.62	12.70	60.45
9	E	97.52	107.95	134.87	76.20	19.05	19.05	17.53	111.25	139.70	11.11	19.50	6.25	95.25	42.93	25.15	12.70	76.20
	161.04																	
12	E	11.25	121.67	134.87	76.20	19.05	19.05	17.53	111.25	139.70	11.11	19.50	12.70	101.60	44.45	31.50	12.70	76.20
	184.91																	
16	E	126.75	137.16	153.16	76.20	19.50	22.10	17.53	111.25	139.70	12.70	19.50	12.70	101.60	44.45	31.50	12.70	76.20
	212.85																	
24	E	156.46	166.88	159.51	120.65	19.50	25.40	16.66	152.40	190.50	12.70	25.40	12.70	130.05	50.80	37.85	15.88	101.60
	259.59																	
30	E	174.75	185.17	177.80	120.65	25.40	25.40	16.66	152.40	190.50	12.70	25.40	12.70	130.05	50.80	37.85	15.88	101.60
	290.58																	
36	E	187.45	197.87	195.33	120.65	25.40	25.40	16.66	152.40	190.50	12.70	25.40	12.70	130.05	50.80	37.85	15.88	101.60
	291.34																	

Size	Series	BP Rod End*								SM Rod End†				
		X	Y	A	ZA	ZD	XD	ZB	A	ZA	ZD	XD	ZB	
4	F	69.34	49.53	19.05	180.34	230.38	244.63	170.69	25.40	173.99	224.03	208.03	164.34	
6	F	68.33	48.51	19.05	203.20	253.24	237.49	193.80	25.40	196.85	246.89	230.89	187.45	
9	E	74.17	56.64	25.40	201.17	272.54	253.49	193.80	28.45	198.12	269.49	250.44	192.02	
	F	68.33	50.80		221.49	293.37	274.32	214.38		218.44	290.07	271.02	211.33	
12	E	74.17	56.64	25.40	201.17	278.89	259.84	197.61	28.45	198.12	275.84	256.79	194.56	
	F	74.93	57.40		251.97	329.69	310.64	257.41		248.92	326.64	307.59	245.36	
16	E	77.72	60.20	25.40	207.77	300.74	281.69	219.46	28.45	219.93	279.69	278.64	216.41	
	F	70.61	53.09		275.59	353.31	334.26	272.03		272.54	350.01	330.96	268.99	
24	E	72.64	55.12	25.40	216.66	299.21	273.81	221.74	28.45	221.23	308.86	283.46	218.19	
	F	61.98	45.21		313.69	411.99	286.59	306.83		310.64	398.27	372.87	305.56	
30	E	71.88	54.36	31.75	235.46	322.58	297.18	235.20	38.10	203.71	327.41	302.00	236.22	
	F	77.47	59.94	38.10	347.47	434.59	409.19	343.66		347.47	434.59	409.19	343.66	
36	E	71.88	54.36	31.75	252.98	338.07	312.67	249.43	38.10	246.63	345.44	320.04	254.00	
	F	77.47	59.94	38.10	248.23	435.10	409.70	343.92		248.23	435.10	409.70	343.92	



Foot Mount



Note: Sizes 4, 6, 9, and 12 have 4 Head Retaining Screws. All other sizes have 8 Head Retaining Screws

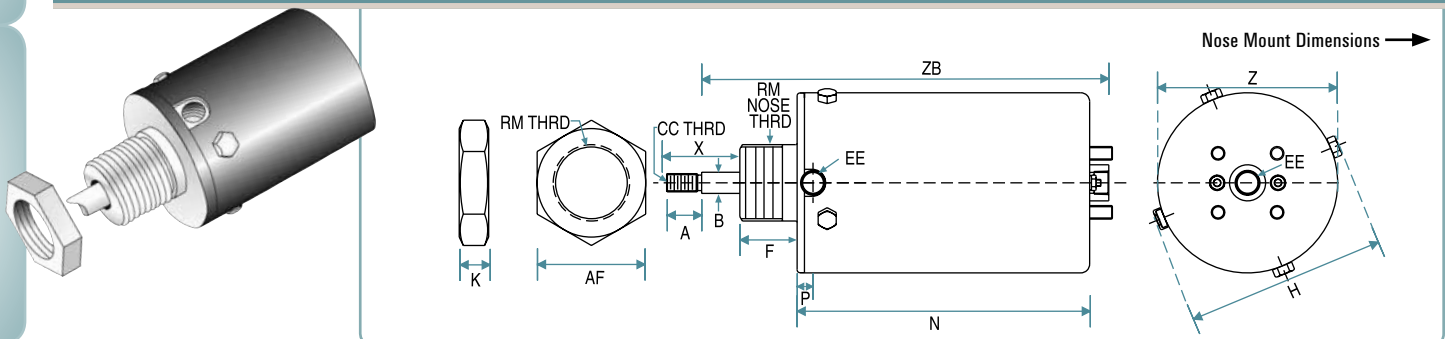
Standard Cylinders with Foot Mount Dimensions - Inches

Size	Series	Z	H	N	EE	FC	FB	B	P	AT	AH	UA	R	SA	AB	X	BP Rod End*				SM Rod End†			
																	A	XA	ZB	CC	A	XA	ZB	CC
4	F	2.71	3.02	4.34	1/4 NPT	2.00	1/4 - 20	1/2	.50	.38	1.88	2.62	2.00	6.59	1/4	2.41	.75	7.44	7.82	3/8-24	1.00	7.19	7.57	7/16-20
6	F	3.27	3.58	5.28	1/4 NPT	2.00	1/4 - 20	1/2	.51	.38	1.88	2.62	2.00	7.53	1/4	2.38	.75	8.35	8.72	3/8-24	1.00	8.10	8.47	7/16-20
9	E	3.84	4.25	5.31	1/4 NPT	3.00	7/16-14	3/4	.75	.56	2.75	4.00	3.00	8.56	1/2	2.24	1.00	8.86	9.55	1/2-20	1.12	8.74	9.43	3/4-16
	F			9.59										10.29				9.55	10.16					
12	E	4.38	4.79	5.31	3/8 NPT	3.00	7/16-14	3/4	.75	.56	2.75	4.00	3.00	8.56	1/2	2.30	1.00	8.86	9.56	1/2-20	1.12	8.73	9.44	3/4-16
	F			10.53										11.56				10.73	11.36					
16	E	4.99	5.40	6.03	3/8 NPT	3.00	1/2-13	3/4	.87	.56	2.75	4.00	3.00	9.28	1/2	2.31	1.00	9.72	10.42	1/2-20	1.12	9.59	10.22	3/4-16
	F			11.62										12.41				11.66	12.28					
24	E	6.16	6.57	6.28	3/8 NPT	4.75	5/8-11	3/4	1.00	.68	4.00	6.25	4.75	10.16	5/8	2.23	1.00	10.09	10.86	1/2-20	1.12	9.94	10.63	3/4-16
	F			14.09										14.29				13.10	13.79					
30	E	6.88	7.29	7.00	3/8 NPT	4.75	5/8-11	1	1.00	.68	4.00	6.25	4.75	10.88	5/8	2.20	1.25	10.52	11.20	5/8-18	1.50	10.26	10.95	1-14
	F			15.31										15.61				14.92	15.69					
36	E	7.38	7.79	7.69	3/8 NPT	4.75	5/8-11	1	1.00	.68	4.00	6.25	4.75	11.56	5/8	2.20	1.25	11.22	11.91	5/8-18	1.50	10.97	11.66	1-14
	F			15.34										15.62				14.94	15.62					

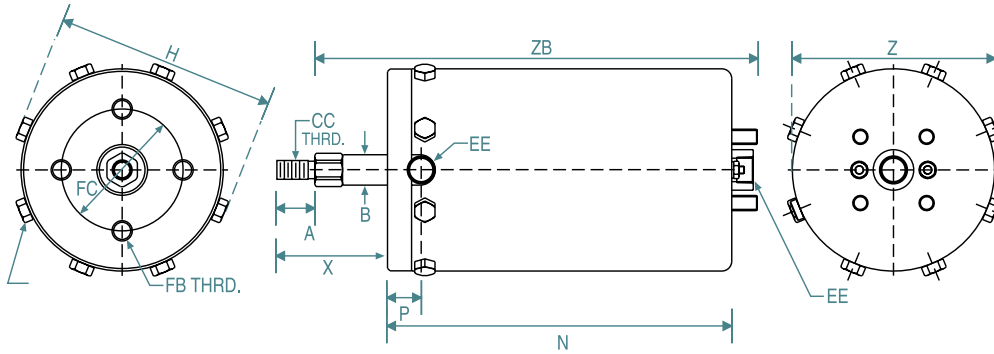
Standard Cylinders with Foot Mount Dimensions - Millimeters

Size	Series	Z	H	N	FC	B	P	AT	AH	UA	R	SA	AB	X	BP Rod End*				SM Rod End†		
															A	XA	ZB	CC	A	XA	ZB
4	F	68.83	76.71	110.24	50.80	12.70	12.70	9.65	47.75	66.65	50.80	167.39	6.35	61.21	19.05	188.98	198.63	25.40	182.63	192.28	
6	F	83.06	90.93	134.11	50.80	12.70	12.95	9.65	47.75	66.55	50.80	191.26	6.35	60.45	19.05	212.09	221.49	25.40	205.74	215.14	
9	E	97.54	107.95	134.87	76.20	19.05	19.05	14.22	69.85	101.60	76.20	273.41	12.70	56.90	25.40	225.04	242.57	28.45	222.00	239.52	
	F			161.04																	243.59
12	E	111.25	121.67	134.87	76.20	19.05	19.05	14.22	69.85	101.60	76.20	273.41	12.70	58.42	25.40	225.04	242.82	28.45	221.74	239.78	
	F			184.91																	267.46
16	E	126.75	137.16	153.16	76.20	19.05	22.10	14.22	69.85	101.60	76.20	235.71	12.70	58.67	25.40	246.89	264.67	28.45	243.59	259.59	
	F			212.85																	295.15
24	E	156.46	166.88	159.51	120.65	19.05	25.40	17.27	101.60	158.75	120.65	258.06	15.88	56.64	25.40	256.29	275.84	28.45	252.48	270.00	
	F			259.59																	357.89
30	E	174.75	185.17	177.80	120.65	25.40	25.40	17.27	101.60	158.75	120.65	276.35	15.88	55.88	31.75	267.21	284.48	38.10	260.60	278.13	
	F			290.58																	388.87
36	E	187.45	197.8	195.33	120.65	25.40	25.40	17.27	101.60	158.75	120.65	293.62	15.88	55.88	31.75	284.99	302.51	38.10	278.64	296.16	
	F			291.34																	389.64

Nose Mount



Super Cylinder



Standard Cylinders with Foot Mount Dimensions - Inches

Size	Series	Z	H	N	EE	FC	FB	B	P	X	BP Rod End*			SM Rod End†		
											A	ZB	CC	A	ZB	CC
4	F	2.71	3.02	4.34	1/4 NPT	2.00	1/4 - 20	1/2	.50	3.10	.75	7.09	3/8-24	1.00	6.85	7/16-20
6	F	3.27	3.58	5.28	1/4 NPT	2.00	1/4 - 20	1/2	.51	2.16	.75	7.09	3/8-24	1.00	6.85	7/16-20
9	F	3.84	4.25	6.34	1/4 NPT	3.00	7/16-14	3/4	.75	3.50	1.00	9.25	1/2-20	1.12	9.13	3/4-16
12	F	4.38	4.79	7.28	3/8 NPT	3.00	7/16-14	3/4	.75	2.57	1.00	9.38	1/2-20	1.12	9.26	3/4-16
16	F	4.99	5.40	8.38	3/8 NPT	3.00	1/2-13	3/4	.87	3.78	1.00	11.69	1/2-20	1.12	11.57	3/4-16
24	F	6.16	6.57	10.22	3/8 NPT	4.75	5/8-11	3/4	1.00	2.00	1.00	11.75	1/2-20	1.12	11.75	3/4-16
30	F	6.88	7.29	11.44	3/8 NPT	4.75	5/8-11	1	1.00	3.05	1.50	13.52	1-12	1.50	13.52	1-14
36	F	7.38	7.79	11.47	3/8 NPT	4.75	5/8-11	1	1.00	3.05	1.50	13.55	1-12	1.50	13.55	1-14

Standard Cylinders with Foot Mount Dimensions - Millimeters

Size	Series	Z	H	N	FC	B	P	X	BP Rod End*		SM Rod End†	
									A	ZB	A	ZB
4	F	68.83	76.71	110.24	50.80	12.70	12.70	78.74	19.05	180.09	25.40	173.99
6	F	83.06	90.93	134.11	50.80	12.70	12.95	54.86	19.05	180.09	25.40	173.99
9	F	97.54	107.95	161.04	76.20	19.05	19.05	88.90	25.40	234.95	28.45	231.90
12	F	111.25	121.67	184.91	76.20	19.05	19.05	65.28	25.40	238.25	28.45	235.20
16	F	126.75	137.16	212.85	76.20	19.05	22.10	96.01	25.40	296.93	28.45	293.88
24	F	156.46	166.88	259.59	120.65	19.05	25.40	50.80	25.40	298.45	28.45	298.45
30	F	174.75	185.17	290.58	120.65	25.40	25.40	77.47	38.10	343.41	38.10	343.41
36	F	187.45	197.80	195.33	120.65	25.40	25.40	77.47	38.10	344.17	38.10	344.17

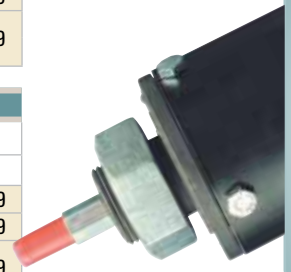
Super Cylinders are equipped with linear ball bearings and hardened steel rods.

Nose Mount Dimensions - Inches

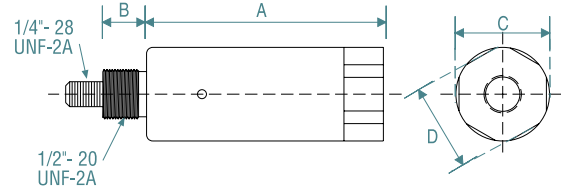
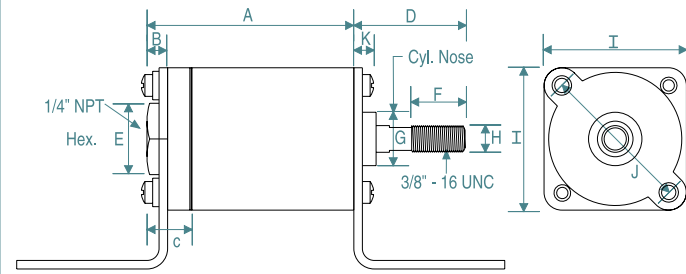
Size	Series	Z	H	N	EE	F	RM	B	X	BP Rod End*			SM Rod End†			AF	K	P
										A	ZB	CC	A	ZB	CC			
4	F	2.71	3.02	4.34	1/4 NPT	1.25	1-3/8 - 12	1/2	1.48	.75	6.72	3/8 - 24	1.00	6.47	7/16 - 20	2.06	.78	.59
6	F	3.27	3.58	5.28	1/4 NPT	1.25	1-3/8 - 12	1/2	1.44	.75	7.63	3/8 - 24	1.00	7.06	7/16 - 20	2.06	.78	.59
9	E	3.84	4.15	5.16	1/4 NPT	1.25	1-5/8 - 12	3/4	1.83	1.00	7.65	1/2 - 20	1.12	7.53	3/4 - 16	2.44	.91	.59
	F			1.61					8.45		8.33							

Nose Mount Dimensions - Millimeters

Size	Series	Z	H	N	F	B	X	BP Rod End*		SM Rod End†		AF	K	P
								A	ZB	A	ZB			
4	F	68.83	76.71	110.24	31.75	12.70	37.59	19.05	170.69	25.40	164.34	52.32	19.81	14.99
6	F	83.06	91.93	134.11	31.75	12.70	36.58	19.05	193.80	25.40	179.32	52.32	19.81	14.99
9	E	97.54	105.41	131.06	31.75	19.05	46.48	25.40	194.31	28.45	191.26	61.98	23.11	14.99
	F			40.89			214.63		211.58					



Small Bore Cylinder



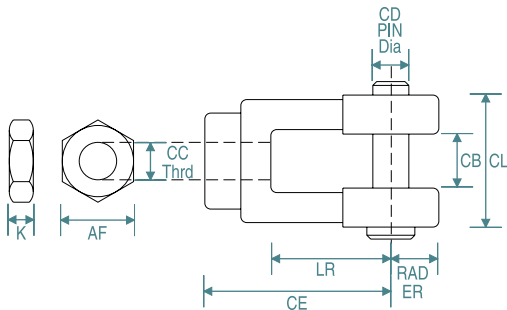
Small Bore Cylinder Dimensions - Inches

Part Number	A	B	C	D	E	F	G	H	I	J	K	Part Number	A	B	C	D
980-008-000	2-29/32	13/64	5/8	19/16	13/16	3/4	3/4	3/8	2	2-1/8	5/16	980-013-000	2.36	0.448	15/16	7/8
												980-034-000				
980-077-000	3-21/32	13/64	5/8	19/16	13/16	3/4	3/4	3/8	2	2-1/8	5/16	980-014-000	1.90	0.244	15/16	7/8
												980-035-000				

Small Bore Cylinder Dimensions - Millimeters

Part Number	A	B	C	D	E	F	G	H	I	J	K	Part Number	A	B	C	D
980-008-000	73.8	5.2	15.9	39.6	20.6	19.1	19.1	9.5	50.8	54.0	7.9	980-013-000	60	11.4	23.8	22.2
												980-034-000				
980-077-000	92.9	5.2	15.9	39.6	20.6	19.1	19.1	9.5	50.8	54.0	7.9	980-014-000	48.3	6.2	23.8	22.2
												980-035-000				

Rod Clevis and Jam Nut



Rod Clevis and Jam Nut Ordering Information

↑	↑	↑	↑	
				Size
04				Area in Square Inches: 04, 06, 09, 16, 24, 30, or 36
				Series
E				Determines Stroke: Make a selection from Operating Data Table on pg. 47
F				Rod
BP				Bellofram Product Standard
SM				National Fluid Power Assoc. Standard
				Make a selection from dimensional data table on pgs. 51-54
				Rod Clevis
RC				Rod Clevis

Example: 36-F-BP-RC is a Rod Clevis for a size 36 sq. in. cylinder with a 1-12 rod thread.

Rod Clevis and Jam Nut Dimensions - Inches

Size	Rod End	Rod End CC Thrd.	Series	CB	CD Pin Dia.	CE	CL	Rad. ER	LR	AF	K
4	BP	3/8-24	F	.56	3/8	1-7/8	1.38	.53	1.25	9/16	7/32
	SM	7/16-20			7/16					11/16	1/4
6	BP	3/8-24	F	.56	3/8	1-7/8	1.38	.53	1.25	9/16	7/32
	SM	7/16-20			7/16					11/16	1/4
9	BP	1/2-20	E or F	.56	1/2	1-7/8	1.38	.53	1.25	3/4	5/16
	SM	3/4-16		.88	3/4	2-3/8	2.12	.75		1-1/8	27/64
12	BP	1/2-20	E or F	.56	1/2	1-7/8	1.38	.53	1.25	3/4	5/16
	SM	3/4-16		.88	3/4	2-3/8	2.12	.75		1-1/8	27/64
16	BP	1/2-20	E or F	.56	1/2	1-7/8	1.38	.53	1.25	3/4	5/16
	SM	3/4-16		.88	3/4	2-3/8	2.12	.75		1-1/8	27/64
24	BP	1/2-20	E or F	.56	1/2	1-7/8	1.38	.53	1.25	3/4	5/16
	SM	3/4-16		.88	3/4	2-3/8	2.12	.75		1-1/8	27/64
30 and 36	BP	1-12	F	1.50	1	3-1/2	3.50	1.00	1.50	1-1/2	35/64
	SM	3/4-16									

BP Rod End – Bellofram Products Co. Standard, SM Rod End – National Fluid Power Assoc. Standards

Rod Clevis and Jam Nut Dimensions - Millimeters

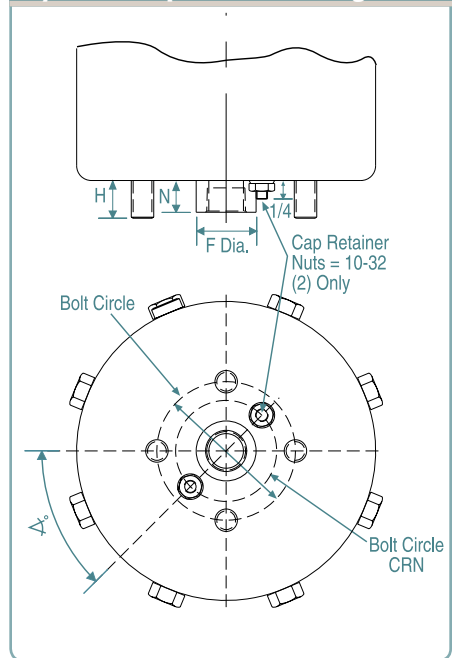
Size	Rod End	Series	CB	CD Pin Dia.	CE	CL	Rad. ER	LR	AF	K
4	BP	F	14.22	9.53	47.63	35.05	13.46	31.75	14.29	5.56
	SM			11.11					17.46	6.36
6	BP	F	14.22	9.53	47.63	35.05	13.56	31.75	14.29	5.56
	SM			11.11					17.46	6.35
9	BP	E or F	14.22	12.70	47.63	35.05	13.56	31.75	19.05	7.94
	SM		22.35	19.05	60.33	53.85	19.05		18.58	10.72
12	BP	E or F	14.22	12.70	47.63	35.05	13.56	31.75	19.05	7.94
	SM		22.35	19.05	60.33	53.85	19.05		28.58	10.72
16	BP	E or F	14.22	12.70	47.63	35.05	13.56	31.75	19.05	7.94
	SM		22.35	19.05	60.33	53.85	19.05		28.59	10.72
24	BP	E or F	14.22	12.70	47.63	35.05	13.56	31.75	19.05	7.94
	SM		22.35	19.05	60.33	53.85	19.05		28.59	13.89
30 and 36	BP	E	14.22	14.29	47.63	35.05	13.46	31.75	33.34	9.53
	BP	F	38.1	25.4	88.90	88.90	25.4	38.1	38.1	13.89
	SM									
	SM	E or F	38.1	25.4	88.90	88.90	25.4	38.1	38.1	13.89

Cylinder Cap End Mounting Studs Dimensions - Inches

Size	Number of Studs	Size of Stud	H (Approx.)	Bolt Circle	F (Boss)	N	Bolt Circle CRN	<°
4	2	1/4-20	5/8	1-5/16	11/16	13/32	1-3/8	90
6	2	1/4-20	5/8	1-1/2	11/16	13/32	1-3/8	90
9	4	1/4-20	5/8	2	11/16	13/32	1-3/8	45
12	4	1/4-20	5/8	2-5/16	1	17/32	1-11/16	45
16	4	3/8-16	5/8	2-5/16	1	17/32	1-11/16	45
24	4	3/8-16	9/16	3-1/8	1	17/32	1-11/16	45
30	4	1/2-13	11/16	4	1	17/32	1-11/16	45
36	4	1/2-13	11/16	4	1	17/32	1-11/16	45



Cylinder Cap End Mounting Studs



All Diaphragm Cylinders feature Bellofram Rolling Diaphragms for low friction and increased sensitivity!

Diaphragm Cylinders Part Numbers

Type S (Spring Return)

Series		E				F			
Rod		BP		SM		BP		SM	
Mount		UM	N	ZB	N	UM	N	UM	N
Size (sq. in.)	4					900-002-000	900-006-000	900-004-000	900-008-000
	6					900-010-000	900-014-000	900-012-000	900-016-000
	9	900-018-000	900-022-000	900-020-000	900-024-000	900-026-000	900-030-000	900-028-000	900-032-000
	12	900-034-000		900-036-000		900-038-000		900-040-000	
	16	900-042-000		900-044-000		900-046-000		900-048-000	
	24	900-050-000		900-052-000		900-054-000		900-056-000	
	30	900-058-000		900-060-000		900-062-000		900-064-000	
	36	900-066-000		900-068-000		900-070-000		900-072-000	

All cylinders are supplied with cap mounting studs. Consult factory for cylinders required without cap mounting studs. Select part numbers from non-shaded areas only.

Type D Cylinders (Double Acting)

Series		E		F			
Rod		BP	SM	BP		SM	
Mount		UM	UM	UM	N	UM	N
Size (sq. in.)	4			902-002-000	902-006-000	902-004-000	902-008-000
	6			902-010-000	902-014-000	902-012-000	902-016-000
	9			902-018-000	902-022-000	902-020-000	902-024-000
	12	902-026-000	902-028-000	902-030-000		902-032-000	
	16	902-034-000	902-036-000	902-038-000		902-040-000	
	24	902-042-000	902-044-000	902-046-000		902-048-000	
	30	902-050-000	902-052-000	902-054-000		902-056-000	
	36	902-058-000	902-060-000	902-062-000		902-064-000	

All cylinders are supplied with cap mounting studs. Consult factory for cylinders required without cap mounting studs. Select part numbers from non-shaded areas only.

Type SS (Super Cylinders)

Series		F	
Rod		BP	SM
Mount		UM	UM
Size (sq. in.)	4	903-074-000	903-001-000
	6	903-076-000	903-011-000
	9	903-078-000	903-021-000
	12	903-080-000	903-031-000
	16	903-082-000	903-041-000
	24	903-084-000	903-051-000
	30	903-086-000	903-061-000
	36	903-088-000	903-071-000

Repair Kits

Spring Return Cylinders				Double Acting Cylinders				Super Cylinders	
Diaphragm Kits		Bearing Kits		Diaphragm Kits		Bearing Kits		Bearing Kits	
Kit No.	Part No.	Kit No.	Part No.	Kit No.	Part No.	Kit No.	Part No.	Kit No.	Part No.
S4FN	970-041-000	SB46S	970-058-000	D4S	970-014-000	DB46S	970-064-000	SSB46S	970-134-000
S6FN	970-042-000	SB924S	970-060-000	D6S	970-018-000	DB924S	970-066-000	SSB924S	970-133-000
S9EN	970-043-000	SB36FB	970-062-000	D9S	970-020-000	DB36FB	970-068-000	SSB36FB	970-135-000
S9FN	970-044-000			D12ES	970-022-000				
S12E	970-045-000			D12FS	970-024-000				
S12F	970-046-000			D16ES	970-026-000				
S16E	970-047-000			D16FS	970-028-000				
S16F	970-048-000			D24ES	970-030-000				
S24E	970-049-000			D24FS	970-032-000				
S24F	970-050-000			D30ES	970-034-000				
S30E	970-051-000			D30FS	970-036-000				
S30F	970-052-000			D36ES	970-038-000				
S36E	970-053-000			D36FS	970-040-000				
S36F	970-054-000								

Mounting Kits

Size	FM	CFM	HFM	CBM	CBS
4	904-001-000	904-012-000	904-008-000	904-026-000	904-019-000
6	904-002-000	904-013-000	904-008-000	904-027-000	904-020-000
9	904-003-000	904-014-000	904-009-000	904-028-000	904-021-000
12	904-004-000	904-015-000	904-009-000	904-029-000	904-022-000
16	904-005-000	904-016-000	904-010-000	904-030-000	904-023-000
24	904-006-000	904-017-000	904-011-000	904-031-000	904-024-000
30	904-007-000	904-018-000	904-011-000	904-032-000	904-025-000
36	904-007-000	904-018-000	904-011-000	904-032-000	904-025-000

Rod Clevis Mounts

Rod		BP	SM
Size (sq. in.)	4	904-033-000	904-037-000
	6	904-033-000	904-037-000
	9	904-034-000	904-038-000
	12	904-034-000	904-038-000
	16	904-034-000	904-038-000
	24	904-034-000	904-038-000
	30 and 36 (E stroke)		904-039-000
	30 and 36 (F stroke)	904-036-000	904-039-000