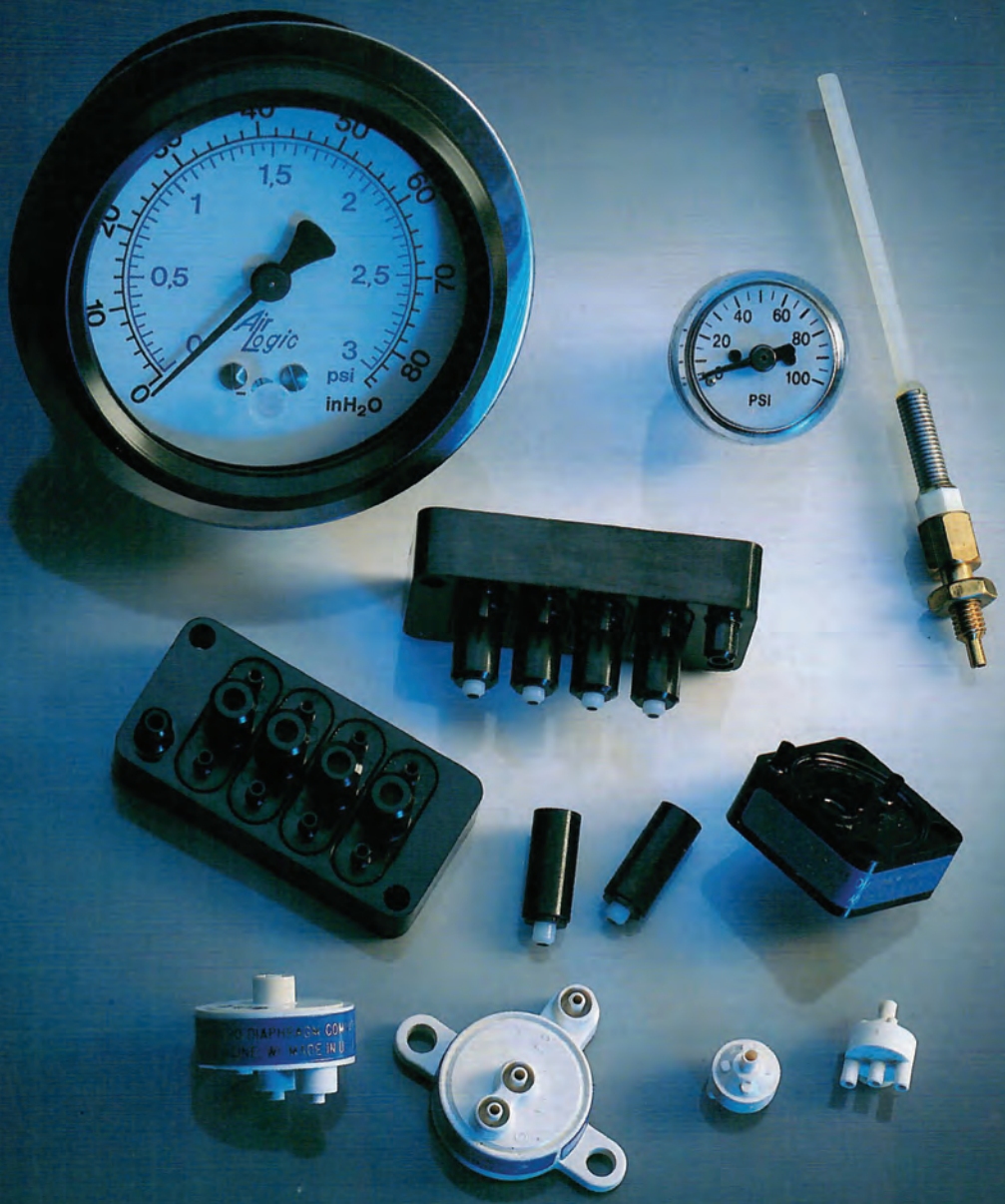
Air Logic®

Pneumatic Components and Systems



Interface Devices

Introduction to Air Logic

The Air Logic Division of Fred Knapp Engraving Company designs and manufactures a comprehensive line of pneumatic and vacuum control equipment - including Input Elements, Output Interface Devices and Sensing Elements. The various devices include both fluidic and moving diaphragm control components, each to be used where its own advantages are needed.

The Input and Output devices include Pressure and Vacuum Gauges, Test Point Indicators, Diaphragm Amplifiers and Diaphragm Comparators.

The Pressure and Vacuum Gauges are used for the measurement of pressure 0-160 PSI or vacuum 0-30″ Hg. The Subminiature Pressure Gauges are available in four ranges: 30 PSI, 60 PSI, 100 PSI, and 160 PSI. The gauges feature a 7/8″ dial and 2% accuracy.

The Standard Pressure Gauges are available in various ranges: 3 PSI, 5 PSI, 10 PSI, 15 PSI, 30 PSI, 60 PSI, and 100 PSI.

The Standard Vacuum Gauges are available in one range, 30″Hg.

The Test Point Indicator is a simple low pressure on-off indicator which actuates at 4″ H_2O. The Diaphragm Amplifier provides the same function as a low pressure 3-way piloted valve. A low pressure pneumatic signal applied to the input controls the output up to 35 PSI. The Diaphragm Comparators are universal pneumatic components that enable you to compare, ramp, add or subtract pressure signals.

The Sensing Elements include Sensor Venturi and a Spring Sensor. The Sensor Venturi senses and converts a back pressure signal to a fully "on" or "off" pressure signal.

The Venturi can also be used as a Vacuum Generator. The Vacuum Generator produces a vacuum output of 15″ mercury.

The Spring Sensor is a limit contact sensor that senses the presence of an object when contacted.

Air Logic manufactures a comprehensive and sophisticated line of pneumatic and vacuum components. Air Logic has a strong reputation for immediate service, quality and dependability. For special applications and requirements, call Air Logic.

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F-2913-80
Test Point Indicator

The Test Point Indicator is a small, simple on-off indicator. The Test Point Indicator has a spring loaded plunger which returns to normal regardless of the mounting position. Pressure as low as 4 inches water gauge will shift the plunger out. The Indicator may be permanently installed in fluidic systems for observing logic sequencing in routine operating.

FEATURES

- Miniature Size
- Minimum Sensing Pressure

SPECIFICATIONS

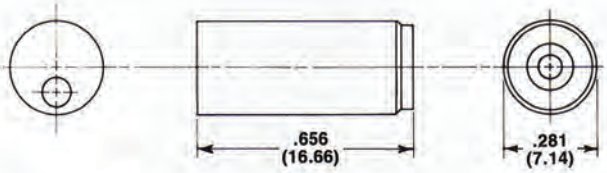
Actuating Pressure: 4″ H_2O (0.14 PSI)
Maximum Pressure: 3 PSI
Leakage Flow: 0.006 SCFM Maximum @ 4″
Speed of Response: 25 Hz
Temperature Limits: 40° to 150°F. (4° to 65°C.)

MATERIALS

Housing: Polysulfone
Plunger: Celcon
Spring: Stainless Steel

ORDERING INFORMATION

Model Number: F-2913-80



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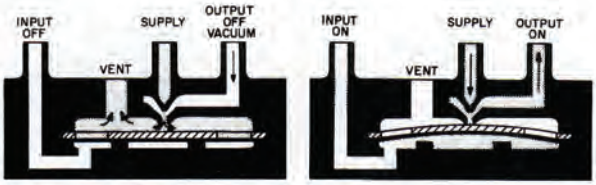
F-4014 Series
Diaphragm Amplifier

The F-4014-Series Diaphragm Amplifiers are miniature interface devices which perform the same function as a piloted three-way valve, but at low outlet flow rates. Pneumatic signals of several inches water gauge applied to the input will control the output pressure up to 35 PSI in both digital and analog systems.

Diaphragm Amplifiers are very suitable for providing pneumatic signals to air-piloted valves and for powering small cylinders. They are also used at fluidic signal levels for providing isolation and in timing circuits.



Operation

Typical Operation of the Diaphragm Amplifier

With the input signal below the actuating level, a flat spring holds the pilot diaphragm away from the opening between the output chamber and the vented chamber. A jet of supply air passes through the output chamber into the vented chamber, drawing air with it from the output chamber and causing the output pressure to be slightly negative.

With the input signal above the actuating level, the diaphragm seals the opening between the output chamber and the vented chamber. The total supply flow passes to the output port. A dead-ended load will receive the full supply pressure level with no further supply air consumption.

Inserting a restrictor into the vent port shifts the turn-on pressure to a higher value and introduces hysteresis into the characteristic. It also causes the turn-on to be snap-acting. The vent port is sized to accommodate F-2815-Series Orifice Restrictors with a press fit.

Air Logic F-4014-Series Diaphragm Amplifiers are available in five models, with either 0.012″ or 0.016″ diameter supply orifice and with either 3″ or 8″ water gauge actuating pressure. The larger supply orifice consumes more flow in the unactuated state and delivers more flow in the actuated state. (See Typical Supply Characteristics.)

For the F-4014-163 and -168 units, output flow passes through an orifice of 0.016″ diameter, and exhaust flow passes through the equivalent of a 0.020″ diameter orifice. For the F-4014-123 and -128 units, output flow passes through a 0.012″ orifice and exhaust flow passes through the equivalent of a 0.016″ orifice. Maximum output flows are shown in the Typical Supply Characteristics.

Please Read Warranty on Page 8.

FEATURES

- Fast Response
- Snap-Action
- Miniature Size

SPECIFICATIONS

Supply Flow: SEE TYPICAL SUPPLY CHARACTERISTICS
Maximum Input Pressure: 5 PSI
Input Leakage @ 1 PSI: Less than 0.003 SCFM
Temperature Limits: 40° to 120°F. (4° to 49°C.)
Recommended Filtration: 10 Micron

MATERIALS

Body: Polysulfone
Diaphragm: Polyurethane
Spring: Beryllium Copper

MOUNTING

Panel Mount: Two No. 6 Screws

PORT CONNECTIONS

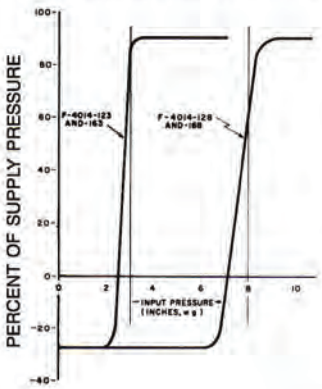
Straight port connections for 1/16″ I.D. flexible tubing

ORDERING INFORMATION (Order by model number.)

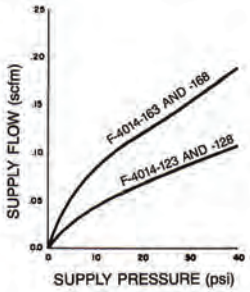
Model Number	Actuating Pressure*	Supply Orifice	Supply Pressure
F-4014-123	3″ ± 2″ H_2O	0.012″	0-35 PSI
F-4014-128	8″ ± 3″ H_2O		
F-4014-161	1″ ± 1″ H_2O	0.016″	0-25 PSI
F-4014-163	3″ ± 2″ H_2O		
F-4014-168	8″ ± 3″ H_2O		

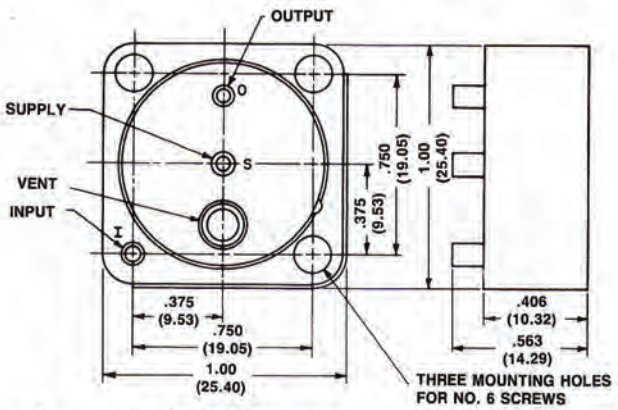
*Input pressure for which the output pressure is one-half the supply pressure, i.e., mid span.

Input-Output Characteristics



Supply Characteristics





( ) = Metric Dimensions

Check Chemical Compatibility of Polysulfone.

F-4103 Series
Diaphragm Comparator

The F-4103-20 & 25 Diaphragm Comparator is a versatile control circuit component for both fluidic and pneumatic signal levels. It performs many functions including those of an analog pressure comparator, an analog pressure repeater and a digital signal isolator.

Referring to Fig. 1, port 1 is a center leakport with a 0.020 inch diameter. The two other ports provide a means of applying pressure to either side of a rubber diaphragm. Port 2, on the left side of the diaphragm, is a dead-ended input. Port 0 is an input for applying pressure to the right side of the diaphragm. The two most common F-4103-20 & 25 circuit configurations are the comparator and the repeater.

Comparator Function

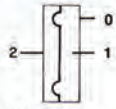


Fig. 1

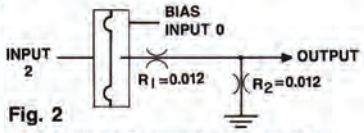


Fig. 2

Note: Bleed through R_2 required for dead ended output load.

Comparator Function

When connected as shown in Fig. 2, the F-4103-20 & 25 compares two analog pressure signals. In this configuration, the diaphragm shifts when the pressure on one side becomes greater than the pressure on the other. An output signal from port 1 indicates that input 0 is greater than input 2. No output indicates that input 2 is greater than input 0. The F-4103-20 in this configuration can be used to compare an analog signal to a reference pressure as required in a Schmitt Trigger circuit.

Repeater Function

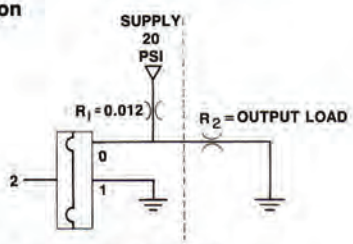


Fig. 3

Repeater Function

When connected as shown in Fig. 3, the F-4103-20 & 25 produces an output pressure which is equal to its input pressure. The pressure on the right side of the diaphragm is held equal to the pressure on the left side of the diaphragm over a wide range of output flow changes. The diaphragm isolates the input from the output so that flow changes on the output side have no effect on the input pressure. As the output flow decreases, the diaphragm shifts away from the center leakport and allows more air to bleed to atmosphere. As the output flow increases, the diaphragm moves toward the center leakport and allows less air to bleed to atmosphere. In this manner, the output pressure is held equal to the input over a wide range of output flow changes.

Applying the F-4103-20 & 25 in a repeater configuration prevents contamination from entering an analog or digital fluidic circuit.

Please Read Warranty on Page 8.

FEATURES

- Fast Response
- Snap-Action
- Miniature Size

SPECIFICATIONS

Operating Pressure: 0.5 to 25 PSI Maximum
Bleed Port: 0.020 Inch
Temperature Limits: 40° to 120°F. (4.4° to 49°C.)
Recommended Filtration: 5 Micron

MATERIALS

Housing: Polysulfone
Diaphragm: Silicone

MOUNTING

F-4103-20: Inline
F-4103-25: Panel Mounted

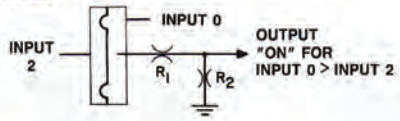
PORT CONNECTIONS

Straight ports for 1/16" I.D. flexible tubing

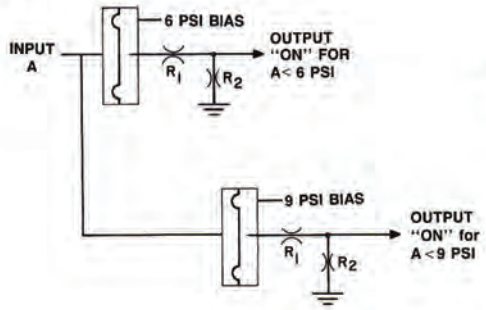
ORDERING INFORMATION (Order by model number.)

Model Numbers: F-4103-20 - Inline
F-4103-25 - Panel Mount

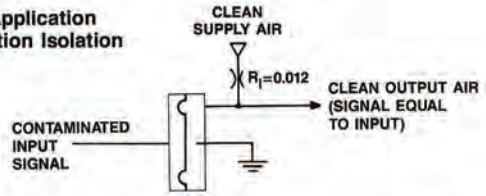
Comparator Application
Comparing Two Variables

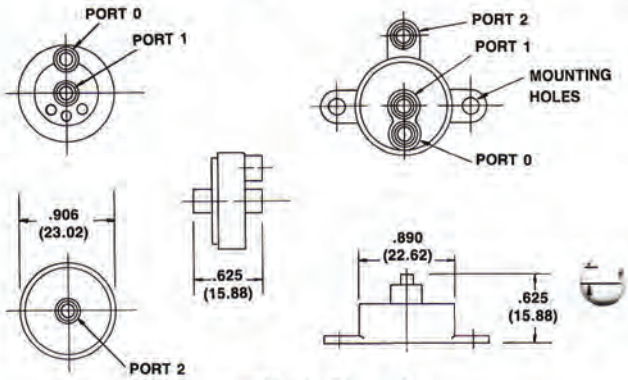


Comparator Application
Comparing a Variable to Two Constants



Repeater Application
Contamination Isolation





( )= Metric Dimensions

Check Chemical Compatibility of Polysulfone.

Subminiature Pressure Gauges

The Submimiature Pressure Gauges are used for the measurement of pressure, 0-160 PSI. Four pressure ranges are available: 30 PSI, 60 PSI, 100 PSI and 160 PSI.

The inside case of the gauge is constructed of a polished brass. The one piece lens cover is molded out of polycarbonate. The gauge has a brass geared movement with a "C" shape copper-alloy bourdon tube. The center back connection is 1/8-27 NPT brass male threads. The accuracy of the gauge is 2% in the mid-third of the pressure range.

FEATURES

- Miniature Size
- 2% Accuracy
- Low Cost

SPECIFICATIONS

Pressure Ranges: 30 PSI, 60 PSI, 100 PSI, 160 PSI
Maximum Supply: 50% over the pressure of the operating range
Operating Temperature: 0 to 160°F. (-17.8° to 71°C.)
Recommended Filtration: 5 micron
Accuracy: 2% mid-third of scale

MATERIALS

Housing: Brass polished finished inside case
Cover: One piece polycarbonate lens cover
Back Connection: Brass
Geared Movement: Brass
Bourdon Tube: "C" shape copper-alloy

BACK CONNECTION

1/8-27 NPT center back, male threads

DIMENSIONS

7/8" dial diameter
1"case diameter
1 1/4" front to back depth

ORDERING INFORMATION (Order by model number.)

Model Number	Range	Dial Size	Port Connection
G-030	0-30 PSI	7/8" Dial Diameter	1/8-27 NPT Center Back
G-060	0-60 PSI		
G-100	0-100 PSI		
G-160	0-160 PSI		

Pressure Gauges

The Air Logic Pressure Gauges are steel case gauges for measurement of pressure 0-100 PSI. Panel mount design, U-clamp center back connection.

ORDERING INFORMATION (Order by model number.)

Model Number	Range	Dial Size	Port Connection
G-242	0-30 PSI	1½" Stem Mounted	1/8" NPT
G-240 G-442 G-444 G-448	0-15 PSI 0-30 PSI 0-60 PSI 0-100 PSI	2" PANEL MOUNTED	1/8" NPT
G-040 (Dual Scale)	0-85"w.g. 0-3 PSI	2½" PANEL MOUNTED	1/4" NPT
G-141	0-5 PSI	2½" PANEL MOUNTED	1/8" NPT
G-142	0-10 PSI		1/4" NPT
G-042	0-30 PSI		1/8" NPT

Vacuum Gauges

The V-300 Series Vacuum Gauges are steel case gauges for measurement of vacuum 0 to 30" of mercury. Constructed of phosphor bronze bourdon tube, with brass socket. 2% accuracy. Panel-mount design, U-clamp center back connection.

ORDERING INFORMATION (Order by model number.)

Model Number	Range	Dial Size	Port Connection
V-305	0-30" Hg	1½"	1/8" NPT
V-310		2"	1/4" NPT
V-315		2"	1/8" NPT
V-320		2½"	1/4" NPT

V-4417 Series
Vacuum Generator

The V-4417 Series Vacuum Generator is designed to produce a low-flow vacuum using the venturi principle. The vacuum generator converts compressed air to a vacuum consuming 4.9 SCFH with a 13 PSI supply.

When air is allowed to flow through the generator, the high velocity of the air passing through the center port draws a vacuum through the side ports. Two red vinyl caps are provided to cap the unused output port.

FEATURES

- Miniature Size
- Low Cost

SPECIFICATIONS

Vacuum Range: 0" Hg to 15" Hg at 13 PSI supply
Vacuum Flow: 1 SCFH
Maximum Supply: 20 PSI
Operating Temperature: 0° to 180°F. (–18° to 82°C.)
Recommended Filtration: 5 Micron
Air Consumption: 4.9 SCFH

MATERIALS

Housing: Polysulfone

MOUNTING

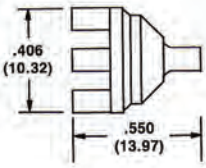
Inline

PORT CONNECTIONS

Straight ports for 1/16" I.D. flexible tubing

ORDERING INFORMATION

Model Number: V-4417-10
Vacuum Range: 0-15" Hg



FLOW PATTERN

( )= Metric Dimensions

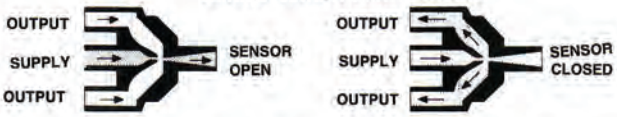
Please Read Warranty on Page 8.

F-4417 Series
Sensor Venturi

The F-4417 Series Sensor Venturis are fluidic devices that convert flow changes through bleed type fluidic sensors to fully on and fully off pressure signals. The F-4417-10 and -15 Sensor Venturis are single units designed for two different supply pressure ranges. The F-4417-40 Sensor Venturi is a conveniently mounted composite of four Sensor Venturis with a single supply connection that can be panel mounted. The output state of each venturi shows on black and white indicator.

The Sensor Venturi allows a high velocity of air to pass through the center port drawing a vacuum through the two side output ports producing a definite off signal. For entirely free flow, the output level will be a vacuum typically equal to 20% of the supply pressure. When sensor flow is obstructed completely, full supply pressure is diverted to the two side output ports. Two output ports are provided on each unit; cap the unused connection with a vinyl cap when required.

Sensor Venturi Flow Patterns



FEATURES

- Definite OFF signal
- No Moving Parts
- Small Size
- Low Cost

SPECIFICATIONS

Recommended Filtration: 5 Micron

MATERIALS

Body: Polysulfone
Indicators: Celcon
Spring: Stainless Steel

MOUNTING

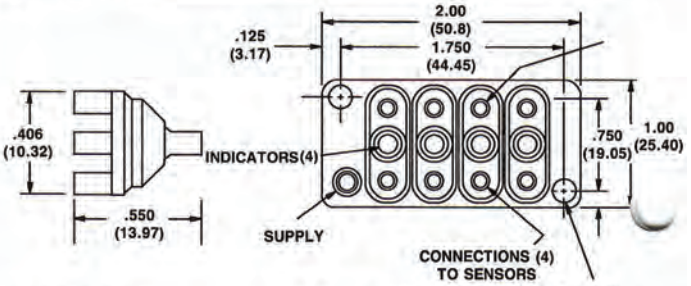
Inline or panel mounted

PORT CONNECTIONS

Straight ports for 1/16" I.D. flexible tubing

ORDERING INFORMATION (Order by model number.)

Model Number	F-4417-10	F-4417-15	F-4417-40
Supply Pressure	2 - 20 PSI	0 - 3 PSI	0.5 - 10 PSI
Supply Flow	Equivalent to 0.016" Dia. Orifice		Equivalent to 0.032" Dia. Orifice
Operating Temperature	0° to 180°F. (-18° to 82°C.)		40° to 120°F. (4.4° to 49°C.)



F-4417-10 & 15 F-4417-40

Check Chemical Compatibility of Polysulfone.

F-4419-120
Spring Sensor

The F-4419-120 Spring Sensor is a limit sensor designed for simple and reliable operation and easy mounting. Functioning like a whisker valve, it is composed of a nylon deflection rod and a tightly wound coil spring. When the nylon rod is deflected 6° or more, the coils of the spring separate and allow free air flow. In application, the deflection of the nylon rod should not be allowed to exceed 45°. Greater than 45° deflection of the rod may cause permanent damage to the coil spring. The air connection should be made with 1/16" I.D. tubing, and a dropping Restrictor or Sensor Venturi must be installed upstream of the Spring Sensor. The nylon rod may be trimmed as required. In the normal undeflected position, the sensor offers a high resistance to air flow. Thus, the Spring Sensor can be used for various functions such as sensing the end of a cylinder stroke or sensing the presence of a part or machine element.

FEATURES

- Reliable Operation
- Easy Mounting
- Fast Response

SPECIFICATIONS

Supply Pressure: 0 to 30 PSI
Deflection Angle: 6° minimum and 45° maximum
Deflection Force: Approximately 1 ounce at end of rod
Minimum Undeflected Output Signal: 40% of supply pressure when using 0.010" diameter dropping restrictor
Temperature Limits: 0° to 150°F. (–17° to 65°C.)

MATERIALS

Body: Brass
Spring: Stainless Steel
Rod: Nylon
10-32 Fitting: Nylon

MOUNTING

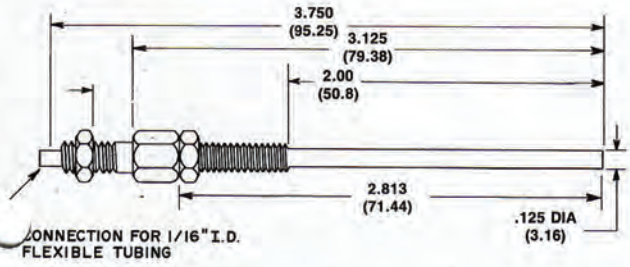
Panel Mount - 10-32 UNF hole

PORT CONNECTIONS

Straight ports for 1/16" I.D. flexible tubing

ORDERING INFORMATION

Model Number: F-4419-120



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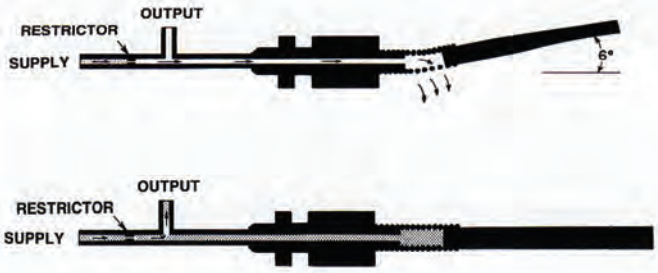
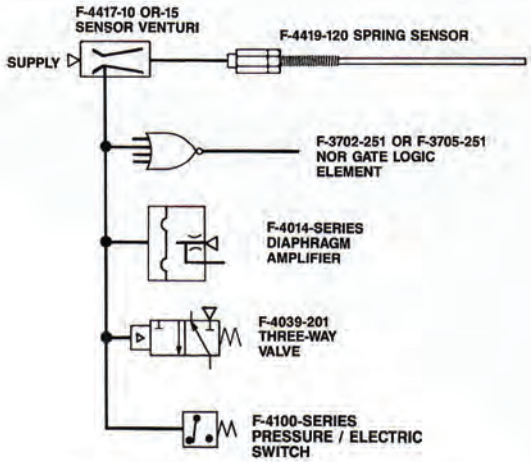
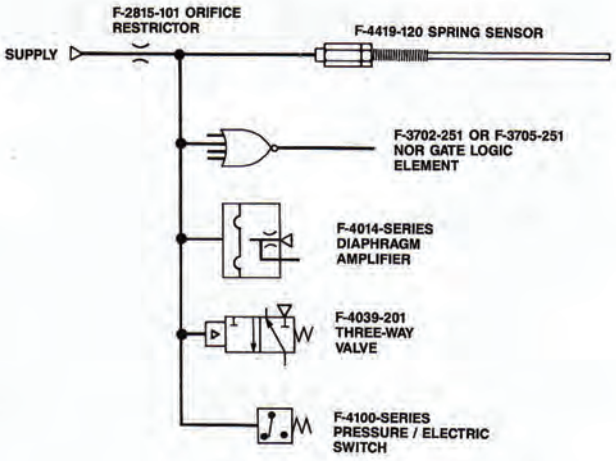


F-4419-120 Spring Sensor Flow Patterns Deflected (Top) and Undeflected (Bottom)



Typical Application Using Sensor Venturi with F-4419-120 Spring Sensor



Typical F-4419-120 Application Using Upstream Orifice Restrictor

Check Chemical Compatibility of Polysulfone.