EP-8000 Series Electro-Pneumatic Transducers

EP-8000 Series Electro-Pneumatic Transducers convert a voltage or current signal from an electronic controller into a pneumatic output pressure signal. An increase or decrease in the input signal proportionally increases or decreases (respectively) the output pressure signal from the EP-8000. Four models are available, which are grouped into two basic versions: low-volume output units (non-relay) and high-volume output units (relay).

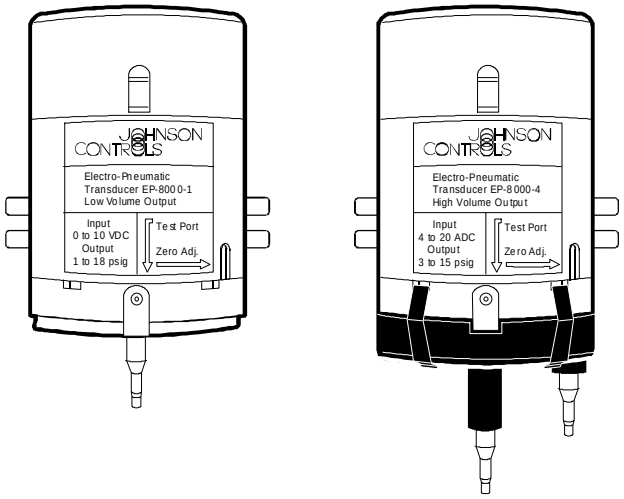


Figure 1: The EP-8000 Low Volume (Left) and the EP-8000 High Volume (Right)

Features and Benefits

❑ **Compact, Simple Design**	Eases installation on a variety of mounting surfaces, including direct mounting on pneumatic valve actuators
❑ **Choice of 0-10 VDC or 4-20 mA Input Range**	Interfaces with a wide range of controllers, making the unit ideal for retrofit installations
❑ **Hypodermic Needle Test Point**	Allows for fast and easy output pressure signal measurement
❑ **Factory Set, Fully Adjustable Zero and Span**	Facilitates field calibration, saving installation costs
❑ **High Accuracy with Low Hysteresis**	Provides many years of use with less time spent on maintenance

Part No. 24-85368-36, Rev. E
Code No. LIT-216370

Overview

The EP-8000 is designed to output a proportional pneumatic control signal in response to an electronic control signal. All units feature barbed air connections for 5/32 or 1/4 inch O.D. polytubing. Sequencing of pneumatic valve or damper actuators can be accomplished using a Johnson Controls V-9502 (Valve) or D-9502 (Damper) Actuator Positioner.

Operation

A change in the electrical input signal modulates the amount of air that exhausts from the leakport, producing an output pressure directly proportional to the input signal. Input and output pressure and flow relationships are detailed in Figures 3 through 5.

A potentiometer located next to the wiring terminal block is provided for field span adjustment, and a screw located on the side of the EP-8000 is provided for zero adjustment. (See Figure 2 for adjustment locations.)

The low-volume models are 1-pipe instruments, which require a 0.007 inch restrictor (R-3710 Series, ordered separately) in the supply air line.

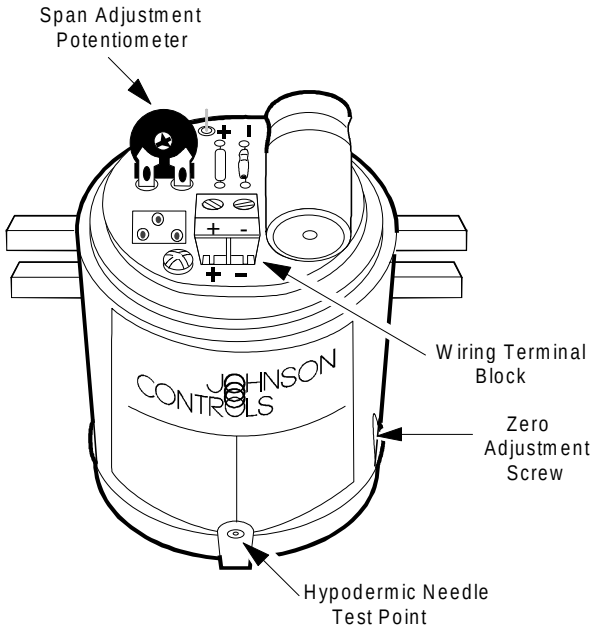


Figure 2: EP-8000-1 Adjustment Points (Cover Removed)

Input vs. Output Relationship

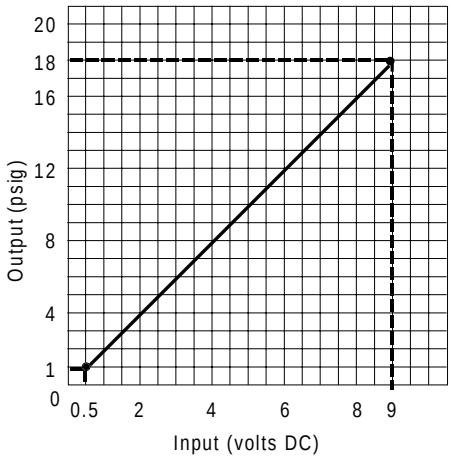


Figure 3: EP-8000-1 and -2: Input (volts DC) vs. Output (psig)

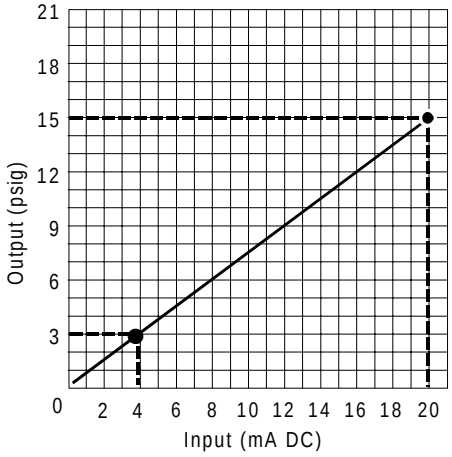


Figure 4: EP-8000-3 and -4: Input (mA DC) vs. Output (psig)

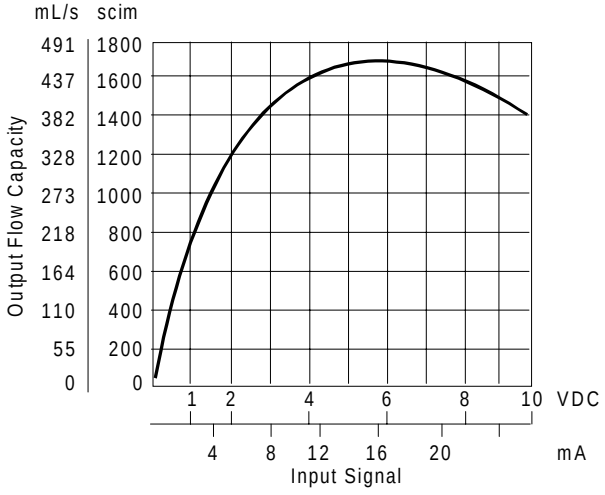


Figure 5: High-volume Models: Input Signal (volts DC and mA) vs. Output Flow Capacity (scim and mL/s)

Dimensions

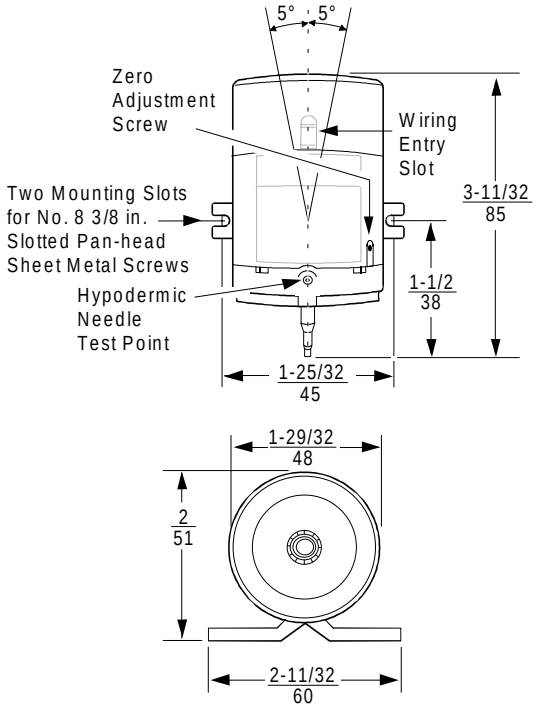


Figure 6: EP-8000 Low-volume Output Model Dimensions (in./mm)

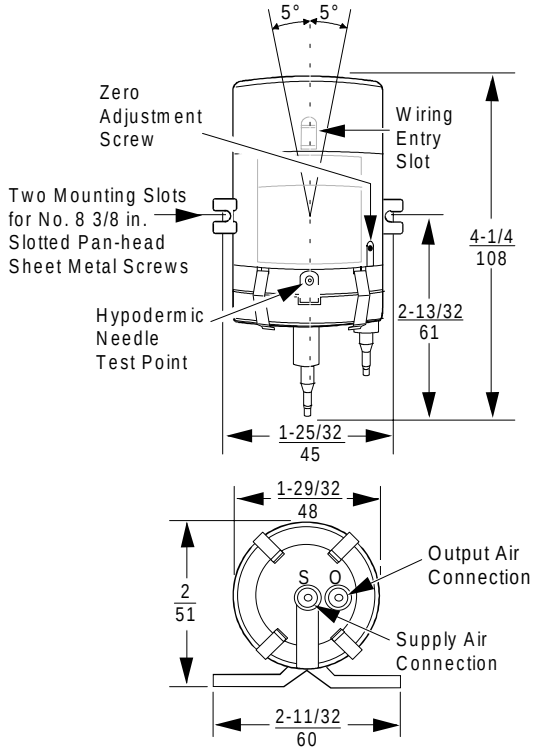


Figure 7: EP-8000 High-volume Output Model Dimensions (in./mm)

Installation

Parts Included

- EP-8000 Transducer
- No. 8 3/8 in. sheet metal screws (2)

Tools Needed

- flat-blade screwdrivers, 3/32 in. and 1/4 in.
- 5/32 in. drill bit and drill

Mounting

Regardless of the mounting method chosen, the EP-8000 must be mounted within 5° of vertical for proper operation. (Refer to Figures 6 and 7.) In most cases, the vertical position of the EP-8000 can be obtained by correctly positioning the transducer's mounting bracket and/or angle bracket. Do **not** mount an EP-8000 directly to a damper actuator.

To mount an EP-8000 on a pneumatic valve actuator, the EP-8000-101 Mounting Kit (ordered separately) must be used. The EP-8000, in conjunction with the EP-8000-101, can be mounted on the following actuators: 4R, 5R, 8R, V-400, V-500, or V-3000-1 Series Valve Actuator with or without a V-9502 Valve Actuator Positioner. (See Figure 8.) It can also be used with a V-3000-8001 Series Valve Actuator with or without a V-9502. (See Figure 9.)

Panel Mounting

Mount the EP-8000 on a flat, vibration-free surface, using the following steps:

1. Mark two mounting slots on the mounting surface using the integral mounting bracket as a template.
2. Drill a pilot hole at each of the marked locations.
3. Secure the EP-8000 in place using the two No. 8 screws provided.

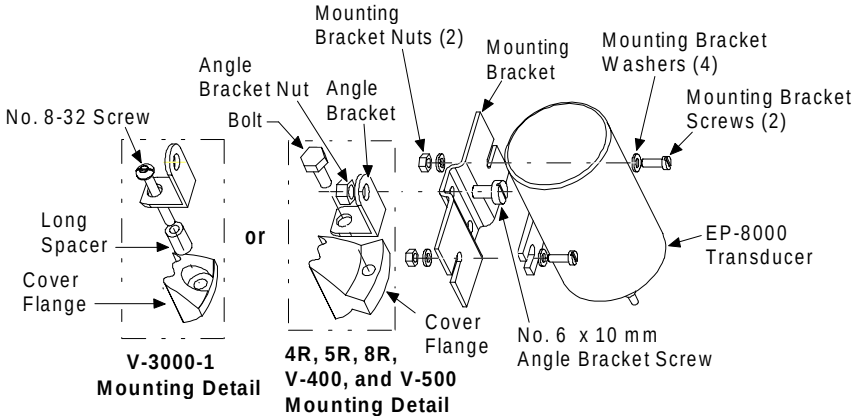
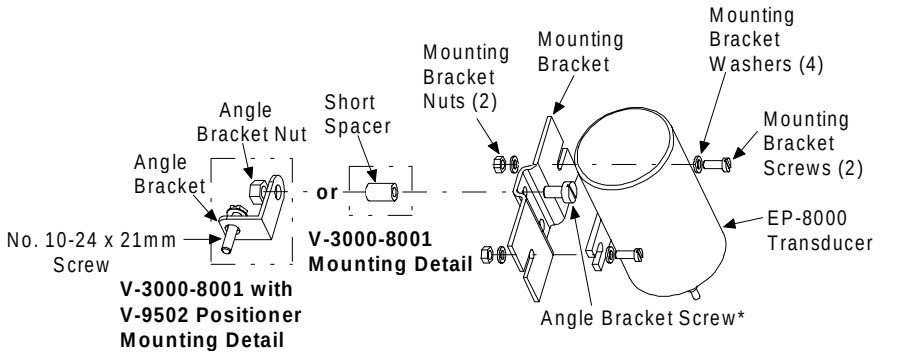


Figure 8: EP-8000-101 Mounting Kit for Installation of the EP-8000 to a 4R, 5R, 8R, V-400, V-500, or V-3000-1 Valve Actuator with or without a V-9502 Positioner



*Note: This is a No. 10-24 x 15 mm screw for the V-3000-8001, but a No. 6 x 10 mm screw for the V-3000-8001 with the V-9502 Positioner.

Figure 9: EP-8000-101 Mounting Kit for Installation of the EP-8000 to a V-3000-8001 Valve Actuator with or without a V-9502 Positioner

*W*iring and Pneumatic Connections

⚠ CAUTION:	**Electric Shock Hazard.** Disconnect all power supplies before wiring connections are made to avoid electrical shock or possible damage to the equipment.

IMPORTANT:	Make all wiring connections in accordance with the National Electrical Code and applicable local regulations.

IMPORTANT:	All EP-8000 Series transducers are designed for use only in conjunction with operating controls. Where an operating control failure would result in personal injury and/or loss of property, it is the responsibility of the installer to add safety devices or alarm systems that protect against, or warn of, control failure.

Observe the following guidelines when making wiring connections:

- Remove the cover of the EP-8000 by gently prying up on the two snap-in cover tabs.
- Observe the polarity as designated on the terminal block of the EP-8000.
- Provides adequate stress relief for the wiring. A wiring entry slot is molded into the cover for routing to an analog DC source.

Observe the following guidelines when making pneumatic connections:

- Use 5/32 or 1/4 in. polytubing.
- Use clean, dry, oil-free air.

IMPORTANT:	To avoid contamination of the unit, install an inline supply filter.

Note: For low-volume models, this inline filter must be installed in the supply air line before the 0.007 inch restrictor (see Figure 10).

Application Diagrams

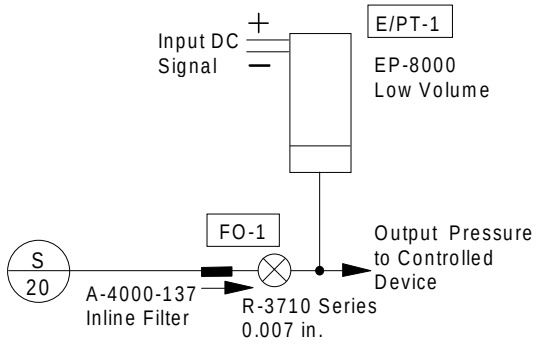


Figure 10: Low-volume Models Wiring/Tubing

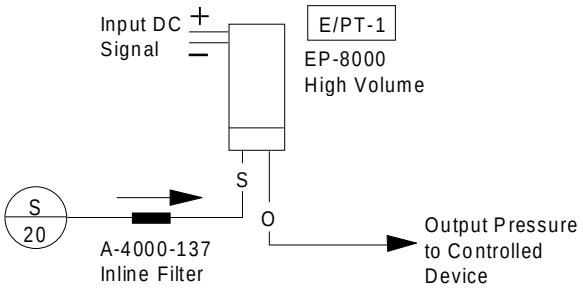


Figure 11: High-volume Models Wiring/Tubing

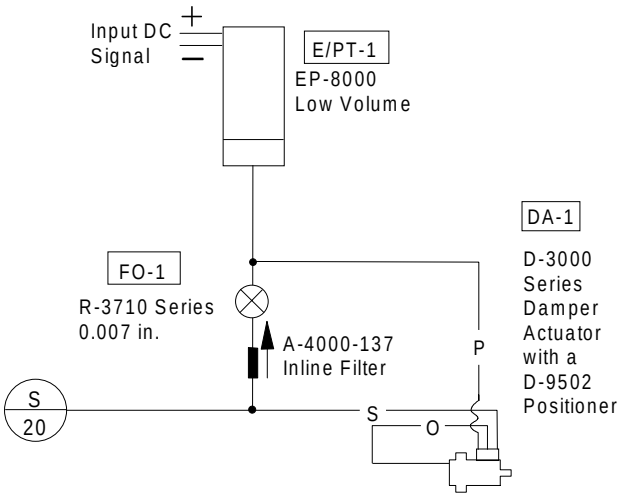


Figure 12: Application of a Low-volume EP-8000 with a D-9502 Positioner

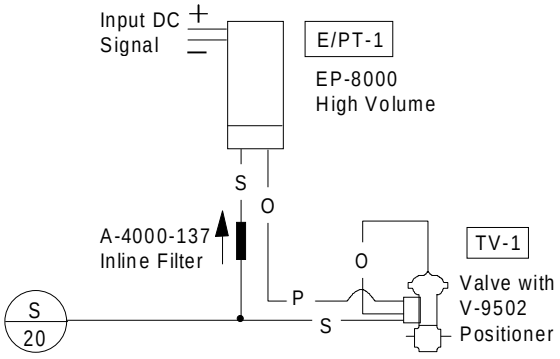


Figure 13: Application of a High-volume EP-8000 with a V-9502 Positioner

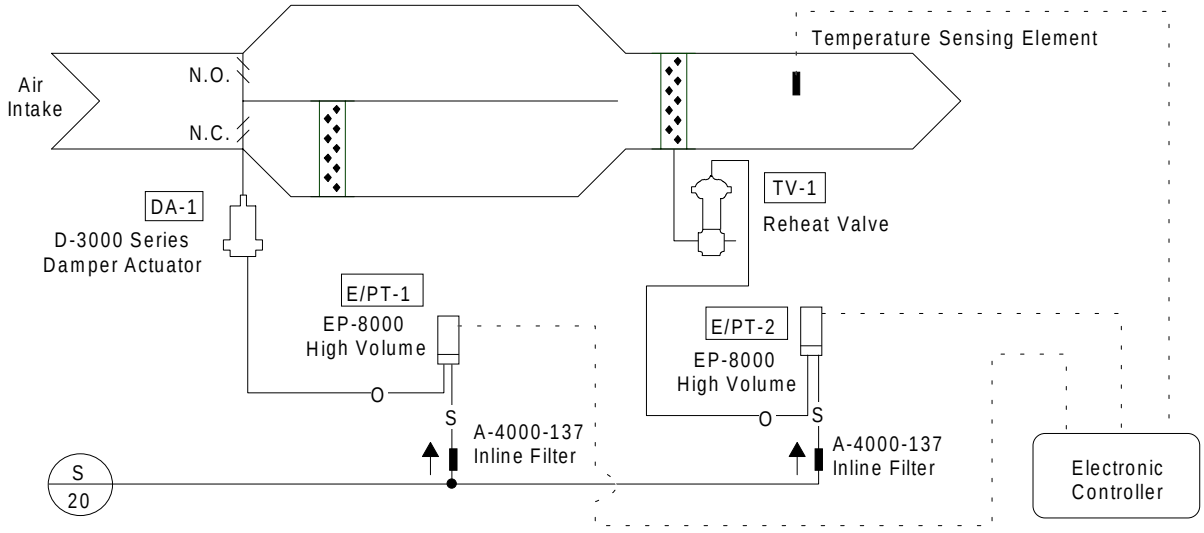


Figure 14: Application Using High-volume EP-8000s to Drive Valve and Damper Pneumatic Actuators

Calibration

To change the zero and span settings to values other than the factory settings (Table 1), see Figure 2 for adjustment locations and proceed as follows:

1. Determine the desired high pressure output (P_H) and, depending on the model chosen, determine the corresponding input voltage (V_H) or input current (I_H).
2. Determine the desired low pressure output (P_L) and the corresponding input voltage (V_L) or input current (I_L).
3. Calculate the sensitivity using one of the equations below:

   Voltage models: $S_V = \frac{P_H - P_L}{V_H - V_L}$

   Current models: $S_I = \frac{P_H - P_L}{I_H - I_L}$

4. Determine if the calculated sensitivity from Step 3 is within one of the ranges below:

   Voltage models: $1.33 \le S_V \le 2.33$

   Current models: $0.6 \le S_I \le 1.0$

If the calculated sensitivity does not fall within these limits, the desired span cannot be obtained. Reselect new desired values in Steps 1 and 2. Repeat Steps 3 and 4.

5. Determine if the zero setting is within one of the adjustment ranges below:

   Voltage models: $-6 \le P_L - (V_L \times S_V) \le +6$

   Current models: $-6 \le P_L - (I_L \times S_I) \le +6$

   If the zero setting does not fall within one of these limits, the device cannot be zeroed. Reselect new desired values in Steps 1 and 2. Repeat Steps 3 through 5.

6. Remove the cover from the unit by gently prying up on the two snap-in cover tabs.
7. Connect filtered 20 psig (140 kPa) supply pressure to the supply "S" connection on the unit. (Low-volume models require a 0.007 inch restrictor.)
8. Connect a JC 5361 Hypodermic Needle Test Probe Assembly with a 0 to 30 psig (0 to 210 kPa) G-2010 Series Air Pressure Gauge (both items ordered separately) to the hypodermic needle test point on the unit.

   Note: In areas where use of a hypodermic needle test probe is prohibited, an output test port can be installed on the output side of the unit.

9. Connect an input signal to the unit: 0 to 10 VDC for voltage models, 4 to 20 mA DC for current models.
10. Set the input signal to the desired low value (V_L or I_L).
11. Turn the zero adjustment screw to obtain the desired low pressure (P_L). Clockwise rotation increases the pressure; counterclockwise rotation decreases the pressure.
12. Set the input signal to the desired high value (V_H or I_H).
13. Turn the span adjustment potentiometer to obtain the desired high pressure (P_H).

IMPORTANT:	For voltage models, counterclockwise rotation decreases the pressure, and clockwise rotation increases the pressure. For current models, counterclockwise rotation increases the pressure, and clockwise rotation decreases the pressure.

14. Repeat Step 10 to check that the desired low value (P_L) has not changed after adjusting the span. If necessary, repeat Steps 11 through 13 to fine tune the unit.
15. Disconnect the test probe assembly and gauge from the unit.
16. Feed the input DC wires through the wiring entry slot molded in the transducer cover, and snap the cover into place.

Repair Information

Field repairs must not be made. For a replacement, see Table 1 in the *Ordering Information* section, and contact the nearest Johnson Controls representative.

Ordering Information

Table 1: EP-8000 Models Available

Product Code Number	Output	Input Range	Factory Output Range psig (kPa)
EP-8000-1	Low Volume (non-relay)	0.5 to 9 VDC	1 to 18 (7 to 126)
EP-8000-2	High Volume (relay)	0.25 to 9.5 VDC	0.5 to 19 (3.5 to 133)
EP-8000-3	Low Volume (non-relay)	4 to 20 mA DC	3 to 15 (21 to 105)
EP-8000-4	High Volume (relay)	4 to 20 mA DC	3 to 15 (21 to 105)

Table 2: Accessories Available

Product Code Number	Description
R-3710 Series	0.007 in. Restrictor (required for low-volume models)
EP-8000-101	Electro-Pneumatic Transducer Mounting Kit
A-4000-137	Inline Air Filter (required for all models)
JC 5361	Hypodermic Needle Test Probe Assembly
G-2010 Series	0 to 30 psig (0 to 210 kPa) Gauge

Specifications

Product	EP-8000 Series Electro-Pneumatic Transducers
Models	See Table 1.
Action	Proportional, direct acting
Supply Pressure	18 to 25 psig (126 to 175 kPa); nominal 20 psig (140 kPa); Air supply must be clean, dry, and oil free.
Supply Pressure Sensitivity	0.3 psig/psig (0.3 kPa/kPa)
Adjustments	Voltage models: 20 VDC maximum input; span adjustable from 7.5 to 15 VDC; factory set at approximately 10 VDC Current models: 30 mA DC maximum input; span adjustable from 10 to 20 mA DC; factory set at approximately 16 mA DC All models: Output can be shifted ± 9 psig (± 63 kPa) using zero adjustment screw.
Linearity	5% maximum of output span between 3 to 15 psig (21 to 103 kPa)
Hysteresis	0.5 psig (3.4 kPa) typical
Temperature Coefficient	0.05 psig/°F (0.62 kPa/°C)
Input Impedance	Voltage models: 1000 ohms minimum Current models: 350 ohms maximum
Air Flow Capacity at 20 psig Supply	Low-volume models: 45 scim (12.3 mL/s) maximum (value specified for dead-ended loads or with controlled devices/applications with a maximum air consumption of 10 scim [2.7 mL/s]) High-volume models: 1600 scim (437 mL/s) maximum; see Figure 5.
Air Consumption	Low and high-volume models: 45 scim (12.3 mL/s) maximum
Electrical Connections	Terminal block for 18 to 24 AWG wire
Air Connections	Barbed fittings for 5/32 or 1/4 in. O.D. polytubing
Materials	Body: Polysulphone Case and cover: UL 94 V-O rated Polycarbonate Enclosure protection: IP 42 according to DIN 40 050 and IEC 144 Air connections: Brass
Ambient Operating Conditions	41 to 122°F (5 to 50°C); 10 to 90% RH, non-condensing
Ambient Storage Conditions	-4 to 140°F (-20 to 60°C)
Mounting	Surface mounted or installed on a valve or pneumatic actuator using the EP-8000-101 Mounting Kit
Shipping Weight	EP-8000-1 and -3: 0.5 lb (227g) EP-8000-2 and -4: 0.6 lb (272g)

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

JOHNSON CONTROLS

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