Slim Pressure Sensor

E8EB

Ideal for Workpiece Position and Original Pressure Checking

- The 0 to 100 kPa model can be used for workpiece position checking.
- The 0 to 1MPa model is ideal for original pressure checking.
- Degree of protection conforms to IEC IP54.

⚠ Be sure to read *Safety Precautions* on page 6.

Ordering Information

Pressure range		ON/OFF output		Linear output
		NPN open collector	PNP open collector	
Positive pressure	0 to 1 MPa	**E8EB-10C**	**E8EB-10B**	1 to 5 V
Positive pressure	0 to 100 kPa	**E8EB-01C**	**E8EB-01B**	
Negative pressure	0 to –100 kPa	**E8EB-N0C2B**	**E8EB-N0B2B**	

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Ratings and Specifications

Item / Model	E8EB-10C	E8EB-10B	E8EB-01C	E8EB-01B	E8EB -N0C2B*	E8EB -N0B2B*
Power supply voltage	24 VDC ±10% with a ripple (p-p) of 5% max.					
Current consumption	20 mA max.					
Pressure type	Gauge pressure					
Permissible pressure range	0 to 1 MPa		0 to 100 kPa		0 to −100 kPa	
Pressure setting range	0 to 1 MPa		0 to 100 kPa		0 to −100 kPa	
Withstand pressure	2 MPa		290 kPa			
Applicable fluid	Noncorrosive and nonflammable gases					
Repeat accuracy (ON/OFF output)	±1% FS max.					
Accuracy (linear output)	±3% FS max.					
Hysteresis (linear output)	±1% FS max.					
Differential travel (ON/OFF output)	0.4 to 1.6% FS max.					
Linearity (linear output)	±1% FS max.					
Response time	5 ms max.					
Linear output	1 to 5 V with an output impedance of 20 Ω and a permissible resistive load of 10 kΩ min.					
ON/OFF output	NPN open collector	PNP open collector	NPN open collector	PNP open collector	NPN open collector	PNP open collector
ON/OFF output – Load current	80 mA max.					
ON/OFF output – Output applied voltage	30 VDC max.					
ON/OFF output – Residual voltage	NPN: 0.4 V max. (at the load current of 20 mA) and 1 V max. (at the load current of 80 mA) PNP: 1.5 V max. (at the load current of 20 mA) and 2 V max. (at the load current of 80 mA)					
Indicator	Operation indicator (red)					
Ambient temperature	Operating: −10°C to 55°C (with no icing) Storage: −25°C to 70°C (with no icing)					
Ambient humidity	Operating: 35% to 85% (with no condensation)					
Temperature influence	±0.12% FS/°C between 0°C and 50°C		±0.2% FS/°C between 0°C and 50°C			
	±0.2% FS/°C max. between −10°C and 0°C or 50°C and 55°C		±0.3% FS/°C max. between −10°C and 0°C or 50°C and 55°C			
Voltage influence	±1% FS max.					
Insulation resistance	100 MΩ min. (at 500 VDC) between current carry parts and case					
Dielectric strength	500 VAC for 1 min between current carry parts and case					
Vibration resistance	Destruction: 10 to 500 Hz, 1.5-mm double amplitude or 100 m/s^2 whichever is smaller, for 2 hours each in X, Y, and Z directions					
Shock resistance	Destruction: 1,000 m/s^2 3 times each in X, Y, and Z directions					
Degree of protection	IEC 60529 IP54					
Pressure inlet	Rc(PT)1/8					
Connection method	Pre-wired (standard cable length: 2 m)					
Weight (packed state)	Approx. 120 g					
Pressure port material	Zinc die-cast					
Accessories	Instruction manual					

* These models are negative-pressure models.

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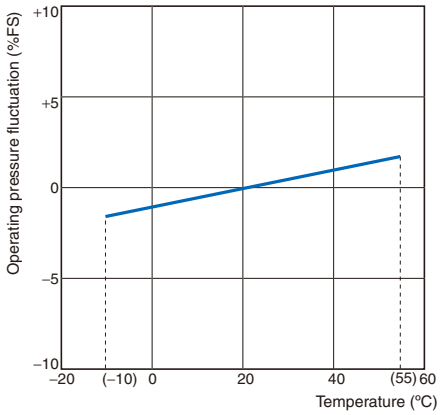
Engineering Data (Typical)

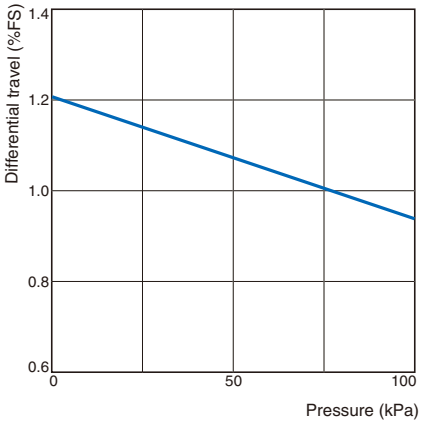
Operating Pressure Fluctuation vs. Temperature

E8EB-01C



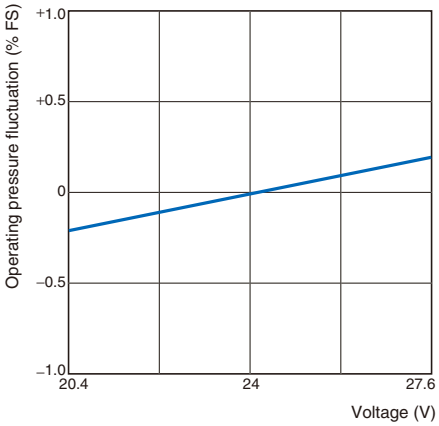
Differential Travel vs. Pressure

E8EB-01C



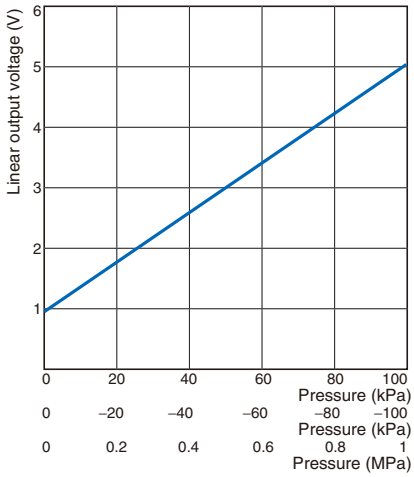
Operating Pressure Fluctuation vs. Voltage

E8EB-01C



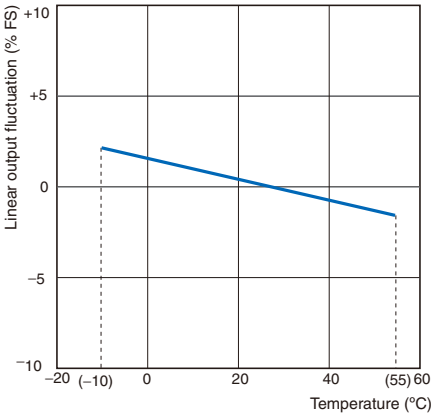
Linear Output Voltage vs. Pressure

E8EB



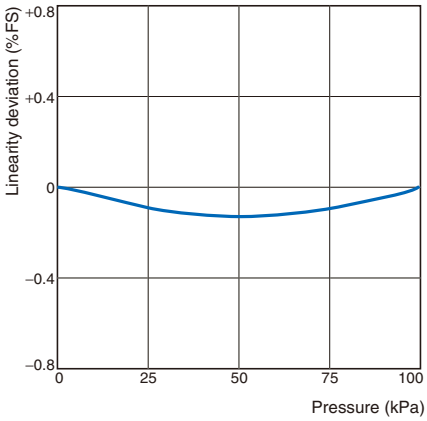
Linear Output Fluctuation vs. Temperature

E8EB-01C



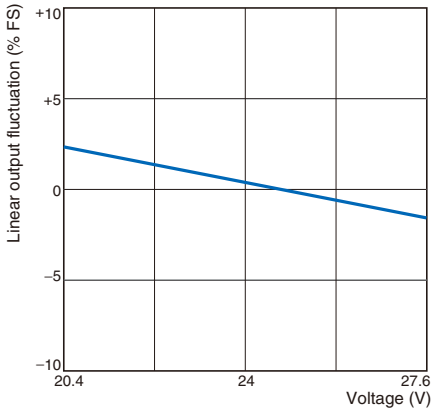
Linearity

E8EB-01C



Linear Output Fluctuation vs. Voltage

E8EB-01C



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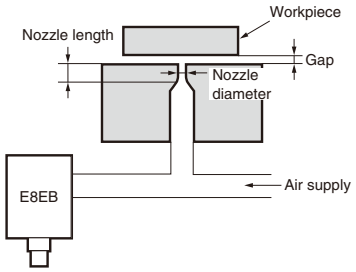
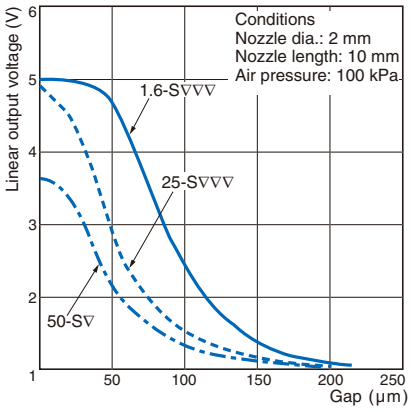
Gap Measurement

When checking the gap between the workpiece and the nozzle as shown in the illustration, the output of the E8EB varies with the surface roughness of the workpiece or the dimensions of the nozzle.



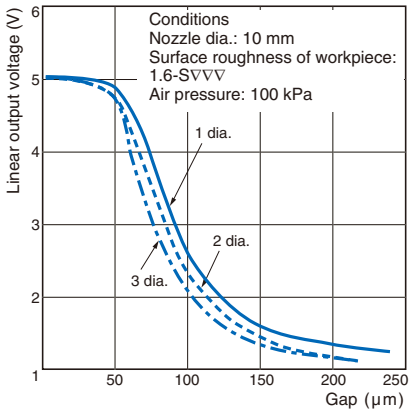
Examples with E8EB-01C (Typical)

Influence of Surface Roughness of Workpieces



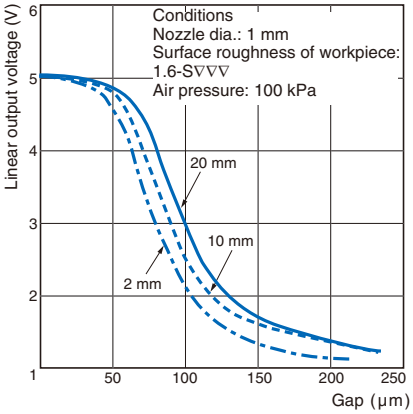
- The output varies with the surface roughness of the workpiece even though the gap is constant.
- The rougher the surface of the workpiece is, the more noticeable the variation of output is with a small gap. The variation rate versus gap change is not large in such cases.

Influence of Nozzle Diameter



- The larger the nozzle diameter is, the larger the variation rate of output versus gap change is.

Influence of Nozzle Length



- The smaller the nozzle length is, the larger the variation rate of output versus gap change is.

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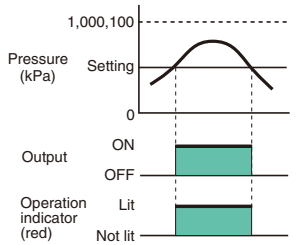
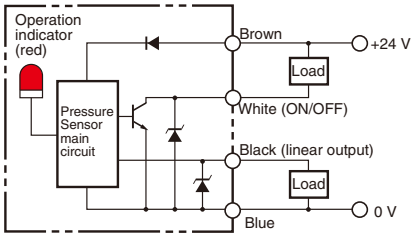
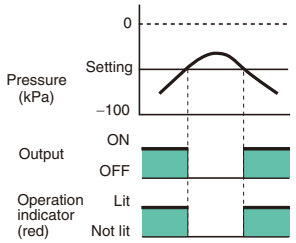
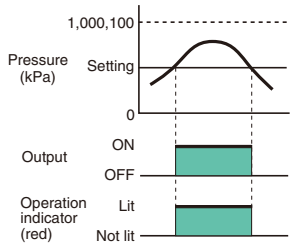
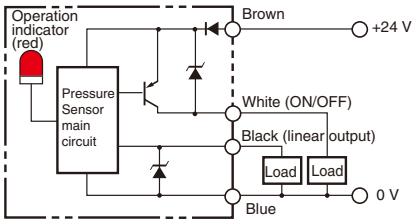
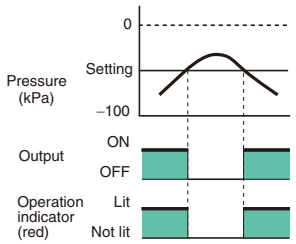
I/O Circuit Diagrams

NPN Output

Model	Timing Charts	Output Circuit
E8EB-10C E8EB-01C		
E8EB-N0C2B		

PNP Output

Model	Timing Charts	Output Circuit
E8EB-10B E8EB-01B		
E8EB-N0B2B		

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Safety Precautions

⚠ WARNING

This product is not designed or rated for ensuring safety of persons.
Do not use it for such purposes.

Precautions for Correct Use

Do not use the product in atmospheres or environments that exceed product ratings.

● Mounting

- If the diaphragm is damaged, the Pressure Sensor will not operate properly. Do not insert a screwdriver or steel wire into the interior of the pressure-sensitive parts through the pressure port.
- The pressure inlet has an R (PT) 1/8 taper screw and M5 female screw that conforms to JIS Standards. Apply sealing tape around the female taper screw so that no pressure leakage will occur.
- The most-suitable wrench is 17 mm in size.
- Make sure that the tightening torque of the M5 female screw is 9.8 N·m or less.

● Adjustment

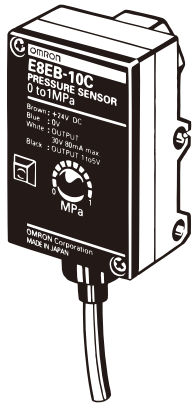
Pressure Setting

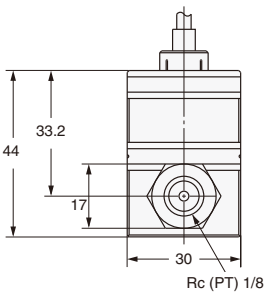
- After the pressure is set with the pressure adjuster, cover the adjuster with the rubber bushing so that no dust or any other foreign material will penetrate into the interior of the E8EB.

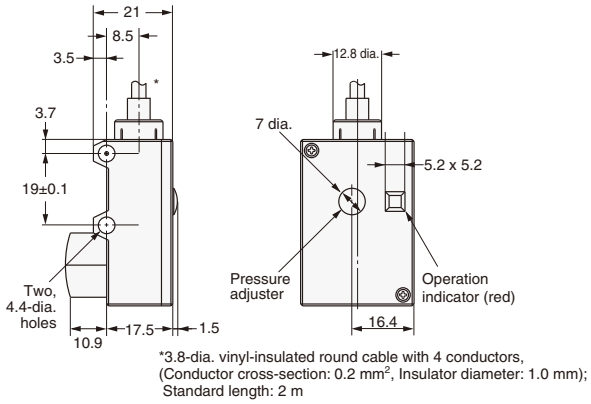
Dimensions

(Unit: mm)

E8EB







*3.8-dia. vinyl-insulated round cable with 4 conductors, (Conductor cross-section: 0.2 mm^2, Insulator diameter: 1.0 mm); Standard length: 2 m

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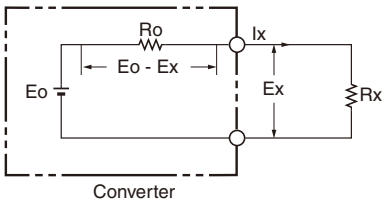
Output Impedance

1. Measuring the Output Impedance of Voltage Output Models

Figure 1



Ro : Output impedance
Rx : Load resistance
Eo : Output voltage (terminals open)
Ex : Output voltage (with load Zx connected)
Ix : Load current (with load Zx connected)

In Figure 1, the current (Ix) that flows when the load resistance (Rx) is connected is calculated as follows:

$$Ix = \frac{Ex}{Rx} = \frac{Eo - Ex}{R0} \quad .....(1)$$

The output impedance (Ro) in Equation (1) is calculated as follows:

$$Ro = Rx \left(\frac{Eo - Ex}{Ex} \right) .....(2)$$

The voltage (Eo) is measured when the output is open, followed by the voltage (Ex) when a load resistance (for example, the minimum value of the permitted load resistance of a transducer) is connected. The measured values Eo and Ex and the connected load resistance (Rx) are inserted into Equation 2 to calculate the output impedance (Ro) of the transducer.

2. Measuring the Output Impedance of Current Output Models

In Figure 2, the voltage (Ex) of the output terminals when the load resistance (Rx) is connected is calculated as follows:

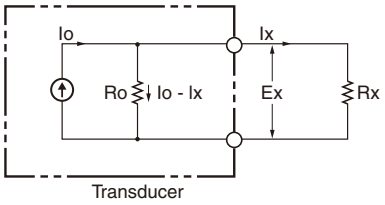
$$Ex = IxRx = (Io - Ix)\,Ro \quad .....(3)$$

The output impedance in Equation (3) is calculated as follows:

$$Ro = Rx \left(\frac{Ix}{Io - Ix} \right) .....(4)$$

Here, the current (Io) is measured with the output short-circuited.

Figure 2



Ro : Output impedance
Rx : Load resistance
Io : Output current (output terminal short-circuited)
Ix : Output current (with load Rx connected)
Ex : Output voltage (with load Rx connected)

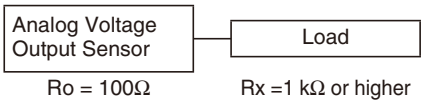
Next, the output current (Ix) is measured when a load resistance (for example, the maximum value of the permitted load resistance of a transducer) is connected. The measured values Io and Ix and the value of the connected load resistance (Rx) are inserted into Equation 4, and the output impedance (Ro) of the transducer is calculated. The output impedance of the transducer introduced here is the value for normal operation.

3. Desirable Output Impedance

In general, it is best to make the output impedance of a voltage output transducer as small as possible, i.e., as close to 0 W as possible, to minimize the effects of load fluctuations on the transducer.
For a current output transducer, the opposite is true: the higher the impedance (the closer to infinite impedance), the better.

4. Example of Calculation Using Impedance

$$\text{Error in analog voltage output} = \left(1 - \frac{Rx}{Ro + Rx} \right) \times 100\%$$



Rx	Error
1kΩ	Approximately 10%
10Ω	Approximately 1%

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General Precautions

For precautions on individual products, refer to the *Safety Precautions* in the individual product information.

⚠ WARNING

These products cannot be used in safety devices for presses or other safety devices used to protect human life. These products are designed for use in applications for sensing workpieces and workers that do not affect safety.

Precautions for Safe Use

Withstand Pressure

Do not apply a pressure higher than the rated withstand pressure. Applying a pressure higher than this may cause damage.

Operating Environment

Do not use the products in an environment where there are explosive or inflammable gases.

Power Supply Voltage

Do not use a voltage that exceeds the power supply voltage range. Using a voltage that exceeds the range may cause burning.

Load Short-circuiting

Do not short-circuit the load. Doing so may cause explosion or burning.

Incorrect Wiring

Be sure that the power supply polarity and other wiring is correct. Incorrect wiring may cause explosion or burning.

Precautions for Correct Use

- When using a Sensor that supports non-corrosive gas as the applicable fluid, use an air filter to remove moisture and oil from the gas.
- Do not insert any wire or other object into the pressure port. Doing so may damage the pressure elements and cause a malfunction.
- Do not use the Sensor alongside high-voltage lines or power lines.
- Mount the Sensor so that it is not subject to ultrasonic vibration.
- Do not apply a tensile force higher than 30 N to the cable or connector.
- The cable can be extended to a maximum of 10 m. For details, see the output impedance section on the previous page.

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- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

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