


## 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	<b>E8EB-10C</b>	<b>E8EB-10B</b>	1 to 5 V
Positive pressure	0 to 100 kPa	<b>E8EB-01C</b>	<b>E8EB-01B</b>	
Negative pressure	0 to -100 kPa	<b>E8EB-N0C2B</b>	<b>E8EB-N0B2B</b>	

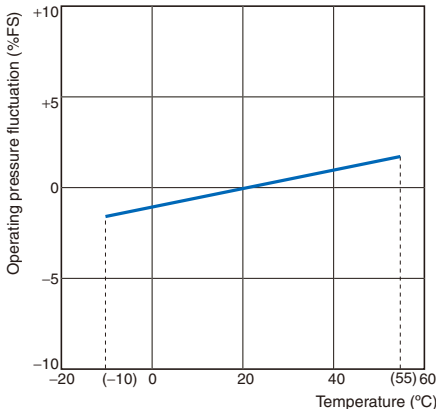
## Ratings and Specifications

Item	Model	E8EB-10C	E8EB-10B	E8EB-01C	E8EB-01B	E8EB -N0C2B*	E8EB -N0B2B*
Power supply voltage		24 VDC $\pm 10\%$ 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)		$\pm 1\%$ FS max.					
Accuracy (linear output)		$\pm 3\%$ FS max.					
Hysteresis (linear output)		$\pm 1\%$ FS max.					
Differential travel (ON/OFF output)		0.4 to 1.6% FS max.					
Linearity (linear output)		$\pm 1\%$ FS max.					
Response time		5 ms max.					
Linear output		1 to 5 V with an output impedance of 20 $\Omega$ and a permissible resistive load of 10 k $\Omega$ min.					
ON/OFF output		NPN open collector	PNP open collector	NPN open collector	PNP open collector	NPN open collector	PNP open collector
	Load current	80 mA max.					
	Output applied voltage	30 VDC max.					
	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		$\pm 0.12\%$ FS/ $^{\circ}\text{C}$ between 0°C and 50°C		$\pm 0.2\%$ FS/ $^{\circ}\text{C}$ between 0°C and 50°C			
		$\pm 0.2\%$ FS/ $^{\circ}\text{C}$ max. between -10°C and 0°C or 50°C and 55°C		$\pm 0.3\%$ FS/ $^{\circ}\text{C}$ max. between -10°C and 0°C or 50°C and 55°C			
Voltage influence		$\pm 1\%$ FS max.					
Insulation resistance		100 M $\Omega$ 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 <sup>2</sup> whichever is smaller, for 2 hours each in X, Y, and Z directions					
Shock resistance		Destruction: 1,000 m/s <sup>2</sup> 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					

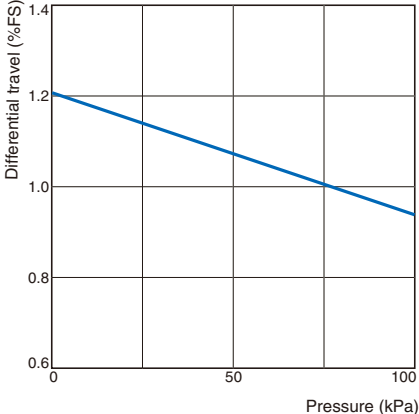
\* These models are negative-pressure models.

### Engineering Data (Typical)

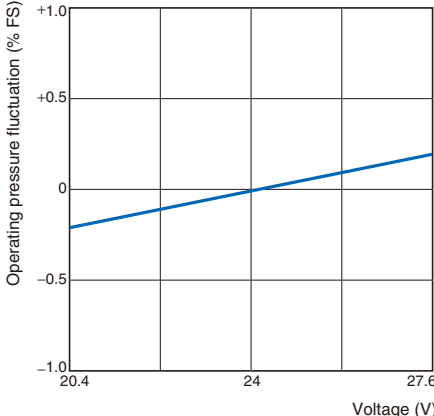
**Operating Pressure Fluctuation vs. Temperature**  
E8EB-01C



**Differential Travel vs. Pressure**  
E8EB-01C

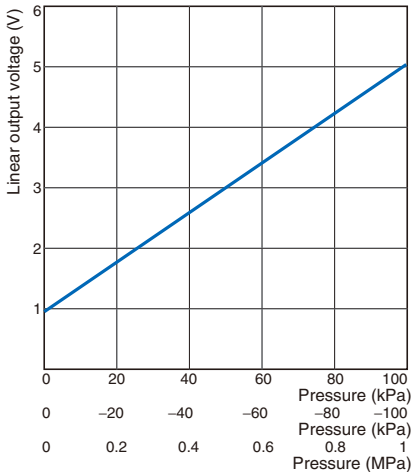


**Operating Pressure Fluctuation vs. Voltage**  
E8EB-01C

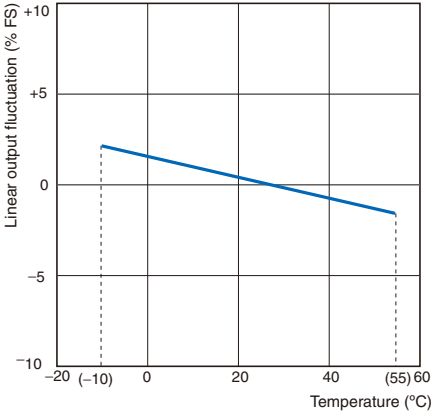


**Linear Output Voltage vs. Pressure**

E8EB

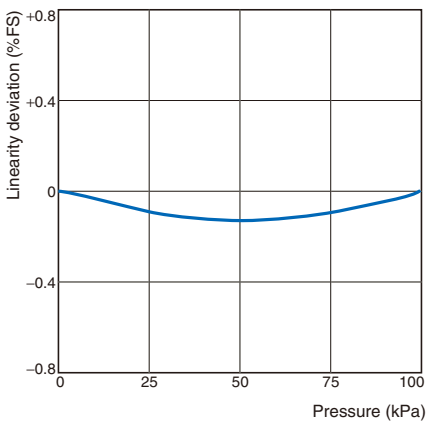


**Linear Output Fluctuation vs. Temperature**  
E8EB-01C

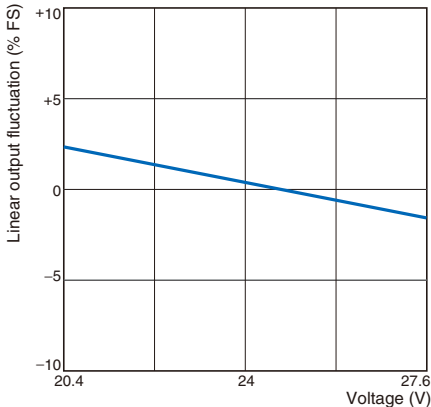


**Linearity**

E8EB-01C

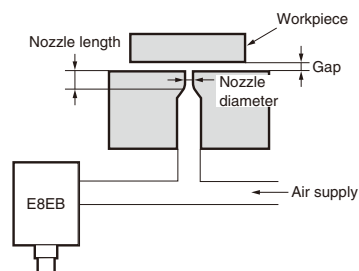


**Linear Output Fluctuation vs. Voltage**  
E8EB-01C

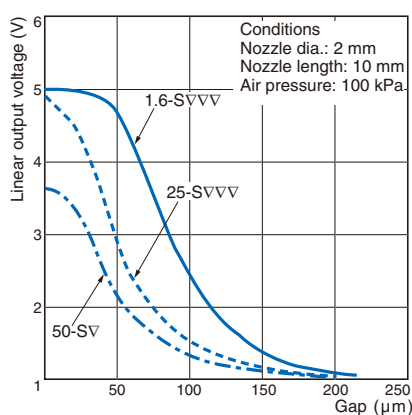


## Gap Measurement

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.

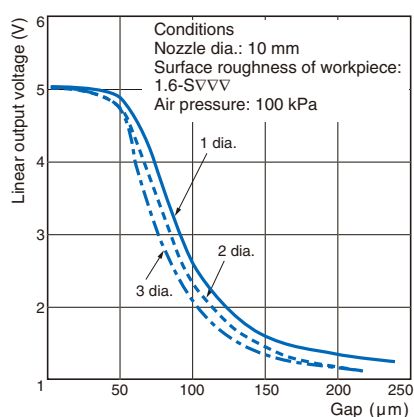


### Examples with E8EB-01C (Typical) Influence of Surface Roughness of Workpieces



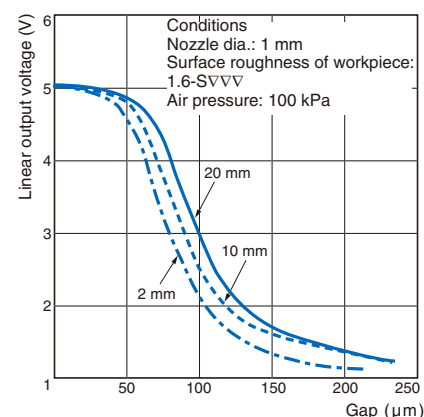
- The output varies with the surface roughness of the workpiece even though the gap is constant.
- The rougher the surface of the workpiece is, the more noticeable the variation of output is with a small gap. The variation rate versus gap change is not large in such cases.

### 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.

I/O Circuit Diagrams

NPN Output

Model	Timing Charts	Output Circuit
<p>E8EB-10C E8EB-01C</p>	<p>Pressure (kPa) graph: Y-axis from 0 to 1,000,100. A bell-shaped curve peaks at 'Setting'. Vertical dashed lines mark the start and end of the pulse. Below the graph, three rows show output states: 'Output' (ON during pulse, OFF otherwise), 'Operation indicator (red)' (Lit during pulse, Not lit otherwise).</p>	<p>Circuit diagram showing a pressure sensor main circuit connected to an NPN transistor. The transistor's emitter is grounded (0V). The collector is connected to a red LED (Operation indicator) and a brown terminal (+24V). The base is connected to a white terminal (ON/OFF). A load is connected between the brown terminal and 0V. A black terminal (linear output) is also shown, connected to a load and 0V. A blue terminal is also present.</p>
<p>E8EB-N0C2B</p>	<p>Pressure (kPa) graph: Y-axis from -100 to 0. A bell-shaped curve peaks at 'Setting'. Vertical dashed lines mark the start and end of the pulse. Below the graph, three rows show output states: 'Output' (ON during pulse, OFF otherwise), 'Operation indicator (red)' (Lit during pulse, Not lit otherwise).</p>	<p>Circuit diagram showing a pressure sensor main circuit connected to an NPN transistor. The emitter is grounded (0V). The collector is connected to a red LED (Operation indicator) and a brown terminal (+24V). The base is connected to a white terminal (ON/OFF). A load is connected between the brown terminal and 0V. A black terminal (linear output) is also shown, connected to a load and 0V. A blue terminal is also present.</p>

PNP Output

Model	Timing Charts	Output Circuit
<p>E8EB-10B E8EB-01B</p>	<p>Pressure (kPa) graph: Y-axis from 0 to 1,000,100. A bell-shaped curve peaks at 'Setting'. Vertical dashed lines mark the start and end of the pulse. Below the graph, three rows show output states: 'Output' (ON during pulse, OFF otherwise), 'Operation indicator (red)' (Lit during pulse, Not lit otherwise).</p>	<p>Circuit diagram showing a pressure sensor main circuit connected to a PNP transistor. The emitter is connected to a brown terminal (+24V). The collector is connected to a red LED (Operation indicator) and a white terminal (ON/OFF). The base is connected to a black terminal (linear output). A load is connected between the white terminal and 0V. A blue terminal is also present.</p>
<p>E8EB-N0B2B</p>	<p>Pressure (kPa) graph: Y-axis from -100 to 0. A bell-shaped curve peaks at 'Setting'. Vertical dashed lines mark the start and end of the pulse. Below the graph, three rows show output states: 'Output' (ON during pulse, OFF otherwise), 'Operation indicator (red)' (Lit during pulse, Not lit otherwise).</p>	<p>Circuit diagram showing a pressure sensor main circuit connected to a PNP transistor. The emitter is connected to a brown terminal (+24V). The collector is connected to a red LED (Operation indicator) and a white terminal (ON/OFF). The base is connected to a black terminal (linear output). A load is connected between the white terminal and 0V. A blue terminal is also present.</p>

## 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

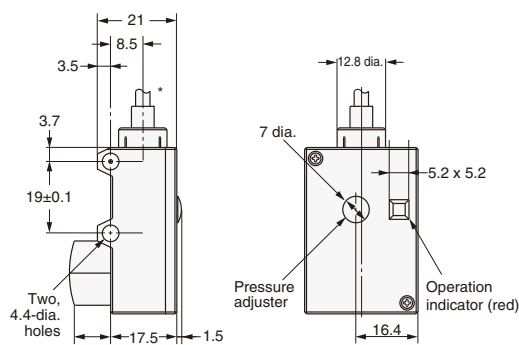
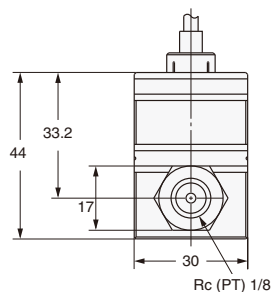
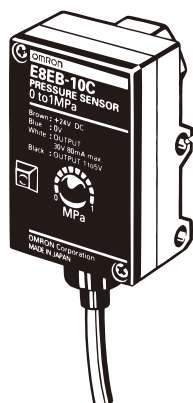
##### Pressure Setting

- 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



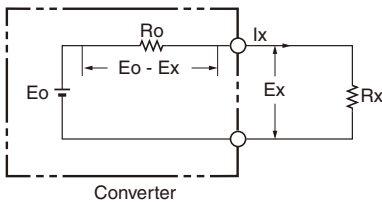
\*3.8-dia. vinyl-insulated round cable with 4 conductors, (Conductor cross-section: 0.2 mm<sup>2</sup>, Insulator diameter: 1.0 mm); Standard length: 2 m

## 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 Rx connected)
- Ix : Load current (with load Rx connected)

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

$$I_x = \frac{E_x}{R_x} = \frac{E_o - E_x}{R_o} \dots\dots(1)$$

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

$$R_o = R_x \left( \frac{E_o - E_x}{E_x} \right) \dots\dots(2)$$

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:

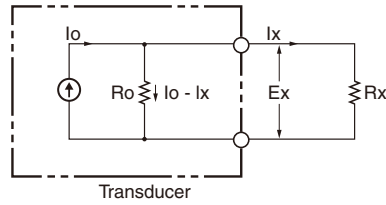
$$E_x = I_x R_x = (I_o - I_x) R_o \dots\dots(3)$$

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

$$R_o = R_x \left( \frac{I_x}{I_o - I_x} \right) \dots\dots(4)$$

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)

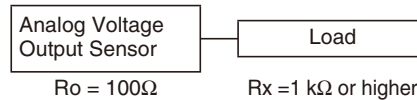
Next, the output current (Ix) is measured when a load resistance (for example, the maximum value of the permitted load resistance of a transducer) is connected. The measured values Io and Ix and the value of the connected load resistance (Rx) are inserted into Equation 4, and the output impedance (Ro)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

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



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

**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.

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