






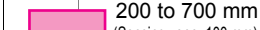
Sensing Distance Zone Setting for the Ultrasonic Beam

- Ensures the stable detection of a variety of objects regardless of the color, transparency, or material (metallic or non-metallic) of the objects.
- Narrow ultrasonic beam width of 8°, enable detecting minute objects as small as 20 × 20 mm.
- Detects objects smoothly while largely suppressing interference from background objects.

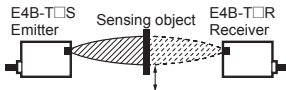
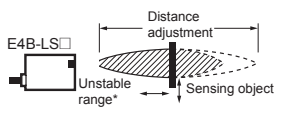
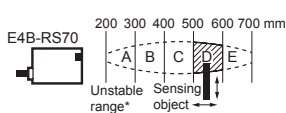


 Be sure to read *Safety Precautions* on page 5.

Ordering Information

Output configuration/ operating mode	Sensing method		Sensing distance	Model
NPN (normally open or closed selectable)	Through-beam		 500 mm	E4B-TS50E4
			 1 m	E4B-T1E4
	Reflective	Convergent reflective with adjustable distance	 50 to 200 mm	E4B-LS20E4
			 200 to 700 mm	E4B-LS70E4
		Convergent reflective with zone setting	 200 to 700 mm (Sensing zone: 100 mm)	E4B-RS70E4

Sensing Method

Through-beam		<p>Detects the attenuation or interrupted condition of the ultrasonic beam caused by the object passing between the Emitter and Receiver.</p> 
Reflective	Convergent reflective with adjustable distance	<p>Detects only the beam reflected from an object within the sensing distance zone set with the distance adjuster.</p> 
	Convergent reflective with zone setting	<p>Detects only the beam reflected from an object in the sensing zone set with the distance selector.</p> 

* An object may be detected due to multiple reflections if the object is in the unstable range where the distance adjuster is not effective. In this case, the detection of the object will not be stable. Do not attempt to use the E4B to detect an object in the unstable range.

Ratings and Specifications

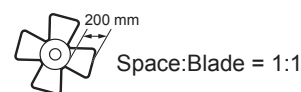
Model		E4B-TS50E4	E4B-T1E4	E4B-LS20E4	E4B-LS70E4	E4B-RS70E4
Item	Sensing method	Through-beam		Convergent reflective with adjustable distance		Convergent reflective with zone setting
		Sensing distance	500 mm	1 m	50 to 200 mm	200 to 600 mm (200 to 700 mm) *1
Standard sensing object	100 × 100 mm flat plate			40 × 40 mm flat plate		
Differential travel	---			20% max. of sensing distance		30 mm max.
Directional angle *2	±8° max.					
Supply voltage (operating voltage range)	12 to 24 VDC ±10% (10.8 to 26.4 VDC) with a max. ripple ±10% (p-p)					
Current consumption	12 VDC	Emitter: 155 mA max. Receiver: 30 mA max.	Emitter: 70 mA max. Receiver: 30 mA max.	100 mA max.		
	24 VDC	Emitter: 80 mA max. Receiver: 30 mA max.	Emitter: 50 mA max. Receiver: 30 mA max.	50mA max.		
Control output	100 mA (with a residual voltage of 1.5 V max.) and an output resistance of 4.7 kΩ					
Operating mode	Incident: Output element ON/OFF selection					
Ultrasonic oscillation frequency	Approx. 200 kHz					
Response frequency *4	50 Hz	10 Hz	50 Hz	20 Hz		
Indicators	Sensing indicator (red LED) and Stability indicator (green LED)					
Ultrasonic speed compensation	No					Yes
Ambient temperature	−10 to 55°C (with no icing)					
Ambient humidity	35% to 95%					
Temperature influence	±10% max. of sensing distance at 20°C in the temperature range of −10°C to 55°C					
Voltage influence	±5% of sensing distance at a voltage between 90% and 110% of the rated power supply voltage					
Insulation resistance	20 MΩ min. (at 500 VDC) between current-carrying parts and case					
Dielectric strength	1,000 VAC (50/60 Hz) for 1 min between current-carrying parts and case					
Vibration resistance	Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions					
Shock resistance	Destruction: 500 m/s ² , 3 times each in X, Y, and Z directions.					
Degree of protection *3	IEC IP66 (JEM IP66 water-resistive)					
Connection method	Pre-wired (standard length: 2 m)					
Weight (packed state)	Approx. 600 g (with Emitter and Receiver)			Approx. 300g		
Accessories	Mounting Bracket, Instruction manual					

*1. These are the available sensing distances at an ambient temperature range between 0 and 45°C.

*2. This is the half-value angle obtainable at a signal of −6 dB.

*3. The degree of protection indicates the degree of protection of the case, which will depend on the operating conditions.

*4. The response frequencies are values obtained with the E4B used for detecting a rotating propeller-shaped disk as shown on the right.

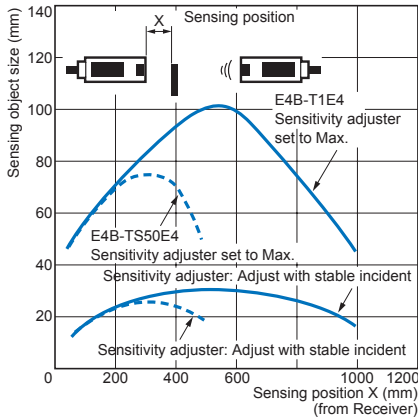


E4B

Engineering Data (Typical)

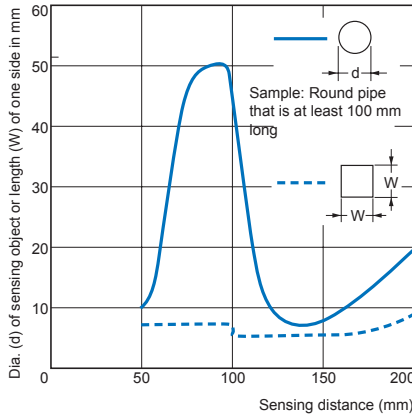
Sensing Object Size vs. Sensing Distance

E4B-TS50E4, E4B-T1E4



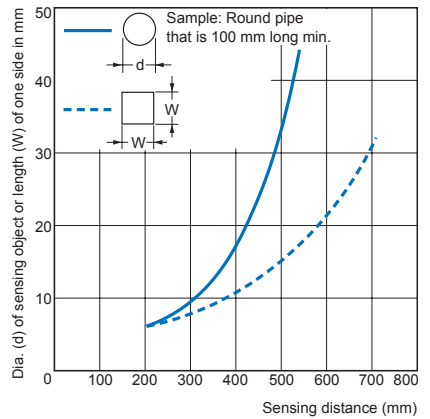
Note: The curve with the sensitivity adjuster set to maximum indicates the size of the sensing object.

E4B-LS20E4



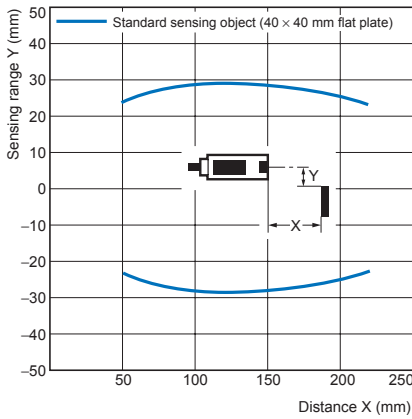
Note: The sensing method will change when the sensing distance exceeds 100 mm. As a result, the detectable diameter will change greatly.

E4B-RS70E4, E4B-RS70E4

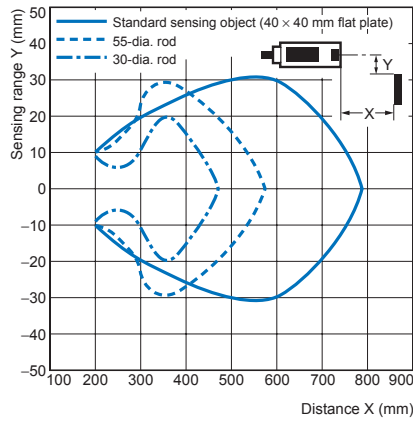


Operating Range Diagram

E4B-LS20E4

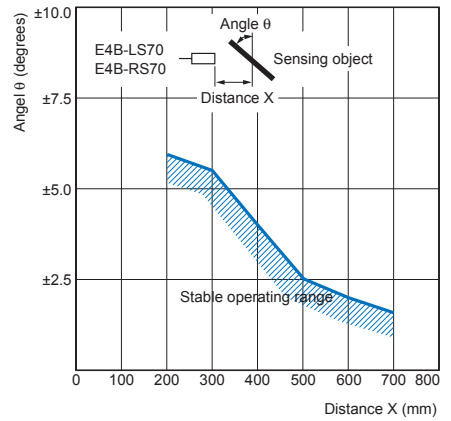


E4B-LS70E4, E4B-RS70E4



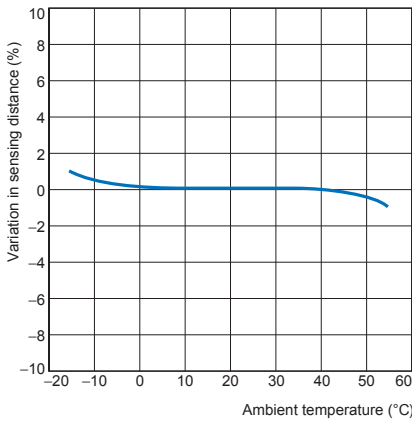
Sensing Object Angle vs. Sensing Distance

E4B-LS70E4, E4B-RS70E4



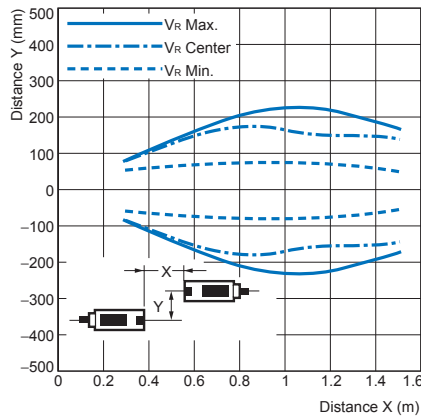
Variation in Sensing Distance vs. Ambient Temperature

E4B-LS70E4, E4B-RS70E4













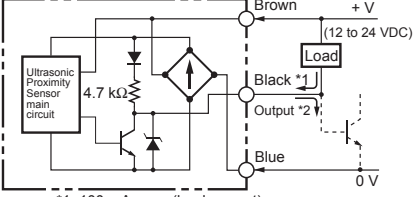










Parallel Movement Characteristics vs. Sensitivity Adjuster Position

E4B-T1E4



I/O Circuit Diagram

NPN Output

Model	Operating mode	Timing chart	Output circuit
E4B-TS50E4 E4B-T1E4 E4B-LS20E4 E4B-LS70E4 E4B-RS70E4	Incident ON	Incident-ON (Power supply polarity: Brown: +, Blue: 0 V) Incident sound  No incident sound  Sensing indicator (red) ON  OFF  Output transistor ON  OFF  Load Operate  (e.g., relay) Release  (Brown-Black) Output voltage (e.g., logic) H  L (Blue-Black) 	 <p>*1. 100 mA max. (load current) *2. Required when the transistor circuit is connected.</p>
	No-incident ON	No-incident-ON (Power supply polarity: Brown: 0 V, Blue: +) Incident sound  No incident sound  Sensing indicator (red) ON  OFF  Output transistor ON  OFF  Load Operate  (e.g., relay) Release  (Blue-Black) Output voltage (e.g., logic) H  L (Brown-Black) 	

E4B

Safety Precautions

Refer to *Warranty and Limitations of Liability* on page 7.

⚠ WARNING

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



Precautions for Correct Use

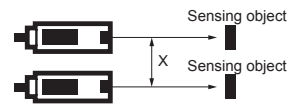
Do not use this product in atmospheres or environments that exceed product ratings.

● Designing the System

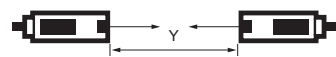
Mutual Interference

Maintain the distances shown in the following table for multiple Sensor installations.

Parallel Installation



Face-to-face Installation



(Unit: mm)

Model	Parallel (X)	Face-to-face (Y)
E4B-TS50E4 E4B-T1E4	0.3	3
E4B-LS20E4 E4B-LS70E4 E4B-RS70E4	0.2	3

● Adjustments

Indicators

(1) Stability Indicator (Green)

When this indicator is lit, the ultrasonic input into the Receiver is sufficient, or its interruption is small enough, to ensure the smooth operation of the E4B. Do not operate the E4B when this indicator is not lit.

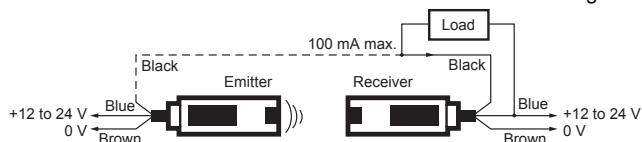
(2) Sensing Indicator (Red)

When this indicator is lit, the Receiver has an ultrasonic input.

Indicator of Through-beam Emitter

(1) Incident Indicator

Lit when there is an ultrasonic input. To use this indicator on the Emitter as a sensing indicator like the indicator on the Receiver, connect the black lead wires of the Emitter and Receiver together.



Note: Be sure not to make mistakes in polarity when connecting the above wires. Both brown lead wires must connect to +DCV or 0 V and both blue lead wires must connect to 0 V or +DCV. Otherwise, the indicator of the Emitter will be lit when the ultrasonic beam is interrupted.

(2) Power Indicator

Lit when the E4B is turned ON. If the above connections are not possible (e.g., the Receiver and Emitter use different power supplies), this indicator will be used as a power indicator.

Connections of Black Lead Wire of Emitter

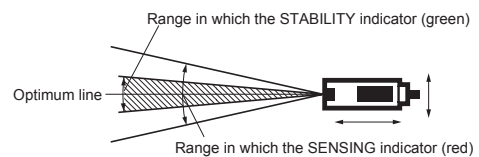
Power connection example	Short-circuited
Brown: +DCV Blue: 0 V	0 V blue
Brown: 0 V Blue: DCV	+DCV blue

Note: The indicator will not be lit if the above wires are not connected correctly.

Beam Axis, Sensitivity, and Distance Adjustments

E4B-T1 and E4B-TS50 Through-beam Models

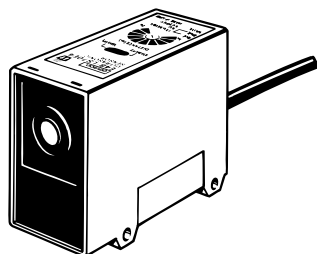
- Set the sensitivity adjuster of the Receiver to maximum.
- Move the Emitter and Receiver vertically and horizontally until the sensing indicator of the Receiver is lit and secure the Emitter and Receiver at the midpoint of the range within which the stability indicator is lit.



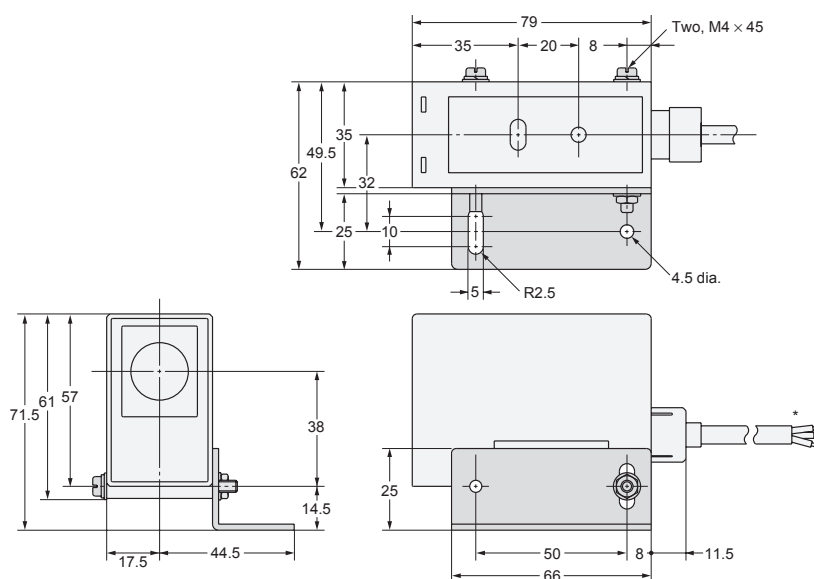
- Pass the sensing object through the sensing zone and adjust the sensitivity so that the sensing indicator turns ON and OFF according to the presence or absence of the sensing object while the stability indicator is lit continuously.
- If the stability indicator is not lit while the Sensor is in operation, this may indicate a possible operational error. Check or readjust the sensitivity.
- If the Emitter and Receiver are set at a distance shorter than the rated sensing distance, reduce the sensitivity to within the range in which the stability indicator is lit. This will increase the immunity of the Sensor against noise.
- The parallel movement characteristics (i.e., the mutual interference distance) and sensing object size vary with the sensitivity adjustment. Refer to *Engineering Data* on page 1098 and make the optimum adjustments.

Dimensions

E4B-TS50E4
 E4B-T1E4
 E4B-LS20E4
 E4B-LS70E4
 E4B-RS70E4



With Mounting Bracket



* 6-dia vinyl-insulated round cable with 3 conductors
 (conductor cross-section: 0.3 mm², insulator dia.: 1.85 mm),
 Standard length: 2 m

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