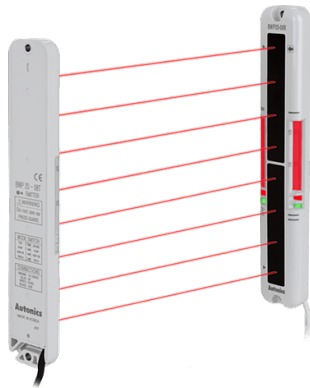


# Slim Plastic Single-Beam Area Sensors



## BWP Series PRODUCT MANUAL

**For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.**

The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

### Features

- Flat body (13 mm) area sensors with Fresnel lens
- High strength PC / ABS plastic body
- High-speed response time under 7ms
- 4 configurations (optical axis : 8 to 20, detection area : 140 to 380 mm)
- Operation test (emitter stop) function, mutual interference prevention function, Job indicator ON/FLASHING switch, Light ON/Dark ON operation mode switch
- Bright LED indicators on emitter and receiver
- IP40 protection structure (IEC standard)

### Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

**⚠ Warning** Failure to follow instructions may result in serious injury or death.

**01. Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)**

Failure to follow this instruction may result in personal injury, economic loss or fire.

**02. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**

Failure to follow this instruction may result in explosion or fire.

**03. Do not connect, repair, or inspect the unit while connected to a power source.**

Failure to follow this instruction may result in fire.

**04. Check 'Connections' before wiring.**

Failure to follow this instruction may result in fire.

**05. Do not disassemble or modify the unit.**

Failure to follow this instruction may result in fire.

**06. This product is not safety sensor and does not observe any domestic nor international safety standard.**

Do not use this product with the purpose of injury prevention or life protection, as well as in the place where economic loss maybe present.

**⚠ Caution** Failure to follow instructions may result in injury or product damage.

**01. Use the unit within the rated specifications.**

Failure to follow this instruction may result in fire or product damage.

**02. Use a dry cloth to clean the unit, and do not use water or organic solvent.**

Failure to follow this instruction may result in fire.

**03. Do not use a load over the range of rated relay specification.**

Failure to follow this instruction may result in fire, relay broken, contact melt, insulation failure or contact failure.

### Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
- 12 - 24 VDC $\Rightarrow$  power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Use the product, 1 sec after supplying power. When using separate power supply for the sensor and load, supply power to sensor first.
- When using switching mode power supply to supply the power, ground F.G. terminal and connect a condenser between 0 V and F.G. terminal to remove noise.
- When connecting a DC relay or other inductive load, remove surge by using diodes or varistors.
- Wire as short as possible and keep away from high voltage lines or power lines, to prevent surge and inductive noise.
- This unit may be used in the following environments.
  - Indoors (in the environment condition rated in 'Specifications')
  - Altitude max. 2,000 m
  - Pollution degree 2
  - Installation category II

## Cautions during Installation

- Be sure to install this product by following the usage environment, location, and specified ratings. Consider the listed conditions below.
  - Installation environment and background (reflected light)
  - Sensing distance and sensing target
  - Direction of target's movement
  - Feature data
- If the installation environment has reflected light from the wall or floor, a interval distance of at least 0.3 m is required.
- When installing multiple sensors closely, it may result in malfunction due to mutual interference. Install it by referring to the interference protection and the installation method in the manual.
- Do not use in places where the light-receiving sensor is exposed to direct sunlight or where the ambient illumination is higher than the specification.
- Do not impact with a hard object or bend the cable excessively. That could decrease the product's water resistance.
- Use this product after the test. Check whether the indicator works appropriately for the positions of the detectable object.

## Ordering Information

This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website.

**BWP 20** - ① ②

### ① Number of optical axes

Number: Number of optical axes

### ② Control output

No-mark: NPN open collector output  
P: PNP open collector output

## Product Components

- Product
- Instruction manual

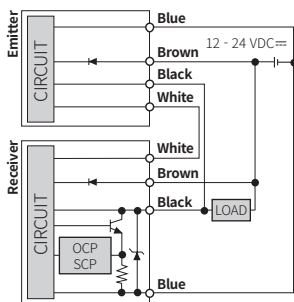
## Sold Separately

- Flat bracket (BK-BWP-ST)
- L-shaped bracket (BK-BWP-L)
- Protection bracket (BK-BWP-P□)

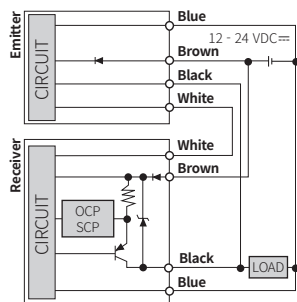
## Connections

Blue	0 V	Brown	+V	Black	JOB (emitter) / OUT (receiver)	White	SYNC
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### NPN open collector output



### PNP open collector output



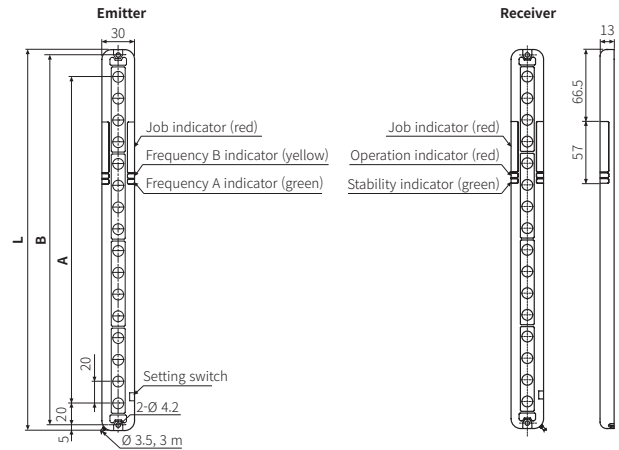
- If the receiver OUT (black) line and the emitter JOB (black) line are not connected each other, the job indicator of the emitter is not operated and maintains the light status.
- OCP (over current protection), SCP (short circuit protection)

## Setting Switch

Switch	No.	Function	Setting	
			ON	OFF
	①	Selection of transmission frequency	Frequency B	Frequency A
	②	Selection of Light ON / Dark ON	Dark ON	Light ON
	③	Selection of ON / flashing for Job indicator	Flashing	ON
	④	Selection of JOB / TEST	TEST mode	NORMAL mode

## Dimensions

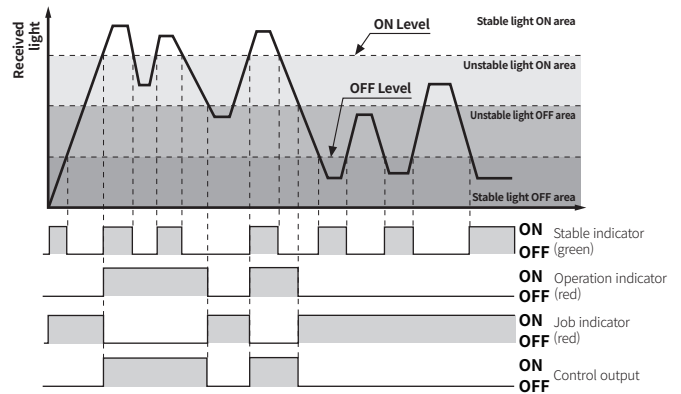
- Unit: mm, For the detailed drawings, follow the Autonics website.
- When installing, use M4 bolts for mounting screws and tighten with a torque of 2 N·m or less.



Model	Sensing height (A)	B	Product length (L)
BWP20-08(P)	140	180	190
BWP20-12(P)	220	260	270
BWP20-16(P)	300	340	350
BWP20-20(P)	380	420	430

## Operation Timing Chart

### Light ON mode



- In Dark ON mode, the waveforms are reversed.

## Operation Indicator

ON	●	Flashing at 0.3 sec interval	▶◀	Cross-flashing at 0.3 sec interval
OFF	○	Flashing simultaneously at 0.3 sec interval	▶◀	

Item	Emitter			Receiver			Control output
	Indicator	Green	Yellow	Job indicator	Green	Red	
Power ON	☀	●		-	-	-	-
Frequency A operation	☀	●		-	-	-	-
Frequency B operation	☀	☀		-	-	-	-
TEST input	▶	◀	☀	☀	●	☀	OFF
Stable light ON	-	-	●	☀	☀	●	ON
Unstable light ON	-	-	●	●	☀	●	ON
Unstable light OFF	-	-	☀	●	●	☀	OFF
Stable OFF	-	-	☀	☀	●	☀	OFF
Flashing func. ON	-	-	◐	☀	●	◐	OFF
Synchronous line malfunction	-	-	☀	▶	◀	☀	OFF
Over current	-	-	☀	▶	◀	☀	OFF

- The operation of 'Operation indicator (red)', 'Job indicator (red)', 'Control output' is for Light ON, in case of Dark ON, it is opposite operation against Light ON.
- Malfunction of synchronous line and over current, control output is OFF regardless of the mode.

Specifications				
<b>Model</b>	<b>BWP20-08(P)</b>	<b>BWP20-12(P)</b>	<b>BWP20-16(P)</b>	<b>BWP20-20(P)</b>
<b>Sensing method</b>	Through-beam			
<b>Light source</b>	Infrared LED (850 nm modulated light)			
<b>Sensing distance</b>	0.1 to 5.0 m			
<b>Sensing target</b>	Opaque material			
<b>Min. sensing target</b>	≥ Ø 30 mm			
<b>Number of optical axes</b>	8	12	16	20
Sensing height	140 mm	220 mm	300 mm	380 mm
Optical axis pitch	20 mm			
<b>Response time</b>	≤ 6 ms (frequency B: ≤ 7 ms)			
<b>Operation mode</b>	Light ON / Dark ON (switch)			
<b>Functions</b>	Emitter OFF, operation mode change, Job indicator ON / flashing			
<b>Interference protection</b>	Interference protection by transmission frequency selection			
<b>Synchronization type</b>	Timing method by synchronous line			
<b>Indicator</b>	Emitter: frequency A indicator (green), frequency B indicator (yellow) Receiver: operation indicator (red), stable indicator (green) Emitter / receiver: Job indicator (red)			
<b>Approval</b>	CE ERI		CE ERI	
<b>Weight (packaged)</b>	≈ 280 g (≈ 480 g)	≈ 320 g (≈ 520 g)	≈ 360 g (≈ 620 g)	≈ 430 g (≈ 680 g)
<b>Power supply</b>	12 - 24 VDC= (ripple P-P: ≤ 10 %)			
<b>Current consumption</b>	Emitter / receiver: ≤ 80 mA			
<b>Control output</b>	NPN / PNP open collector output model			
Load voltage	≤ 30 VDC=			
Load current	≤ 150 mA			
Residual voltage	NPN: ≤ 1 VDC=, PNP: ≤ 2.5 VDC=			
<b>Protection circuit</b>	Reverse power protection circuit, output short overcurrent protection circuit			
<b>Insulation resistance</b>	≥ 20 MΩ (500 VDC= megger)			
<b>Noise immunity</b>	± 240 V the square wave noise (pulse width: 1μs) by the noise simulator			
<b>Dielectric strength</b>	1,000 VAC~ 50 / 60 Hz for 1minute			
<b>Vibration</b>	1.5 mm double amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 2 hours			
<b>Shock</b>	500 m/s <sup>2</sup> (≈ 50 G) in each X, Y, Z direction for 3 times			
<b>Ambient illumination (receiver)</b>	Ambient light: ≤ 100,000 lx			
<b>Ambient temperature</b>	-10 to 55 °C, storage: -20 to 60 °C (no freezing or condensation)			
<b>Ambient humidity</b>	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)			
<b>Protection rating</b>	IP40 (IEC standard)			
<b>Cable spec.</b>	Ø 3.5 mm, 4-wire, 3 m			
<b>Wire spec.</b>	AWG 24 (0.08 mm, 40-core), insulator diameter: Ø 1 mm			
<b>Material</b>	Case: PC / ABS, sensing part: PMMA			

## Troubleshooting

Malfunction	Cause	Troubleshooting
Non-operation	Power supply	Supply the rated power.
	Cable incorrect connection, or disconnection	Check the wiring connection.
	Out of rated sensing distance	Use it within rated sensing distance.
Non-operation in sometimes	Pollution by dirt of sensor cover	Remove dirt by soft brush or cloth.
	Connector connection failure	Check the assembled part of the connector
Control output is OFF even though there is not a target object.	Out of the rated sensing distance	Use it within the rated sensing distance.
	There is an obstacle to cut off the emitted light between emitter and receiver.	Remove the obstacle.
	There is strong electric wave or noise generator such as motor, electric generator, or high voltage line, etc.	Put away the strong electric wave or noise generator.
LED displays for synchronous line	Synchronous line incorrect connection or disconnection	Check the wiring connection.
	Break of synchronous circuit of emitter or receiver	Contact Autonics Corp.
LED displays for over current	Control output line is shorted out.	Check the wiring connection.
	Over load	Check the rated load capacity.

## Functions

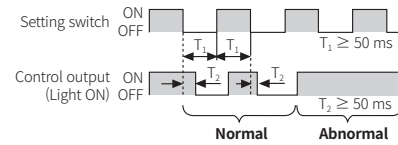
### ■ Interference protection (transmitted light frequency change)

When you install more than two products, there is a risk of mutual interference. Change the frequency to prevent this interference. Set one sensor as frequency A and the other as frequency B via the setting switch.

### ■ Emitter OFF

When 0 V is applied to the TEST input of the emitter, the light emission is forcibly stopped and the external system can check whether the sensor is operating normally. When the emission is stopped, the light is blocked. In the case of Light ON mode, the control output turns OFF. In the case of Dark ON mode, the control output turns ON. The red LED of the emitter flashes until the TEST input is released.

- Control output pulse by TEST input



### ■ Operation mode change (Light ON / Dark ON)

It is available to select with user's preference.

- Light ON: The control output is ON when it is light ON
- Dark ON: The control output is ON when it is light OFF

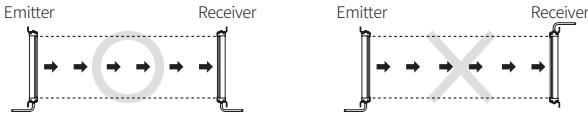
### ■ Job indicator (ON / flashing)

Job indicator is lighting or flashing to make out work sensing operation more easily.

## Installations

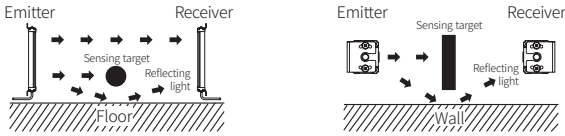
### ■ For direction of installation

Emitter and receiver should be installed in same up/down direction.



### ■ For reflection from the surface of wall and flat

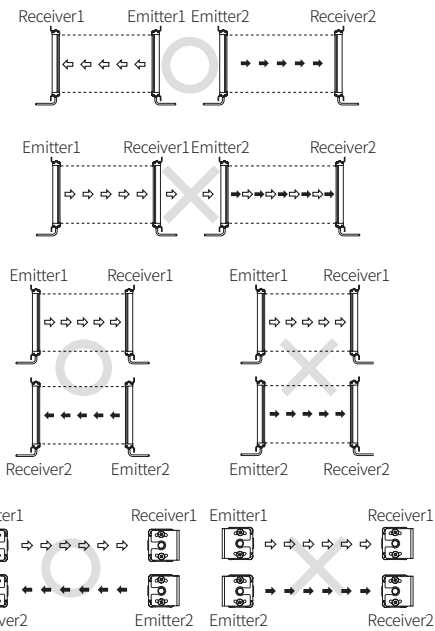
When installing it as below, the light reflected from the surface of wall and flat is not shaded. Please check whether it operates normally or not with a sensing target before using. (interval distance:  $\geq 0.3$  m)



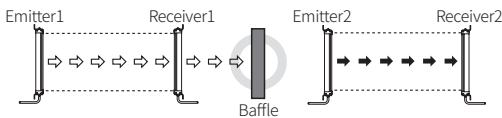
### ■ For protection of interference

It may cause interference when installing more than 2 sets of the sensor. In order to avoid the interference of the sensor, please install as following figures and use the transmitted light frequency changing function.

- Transmission direction should be opposite between 2 sets.

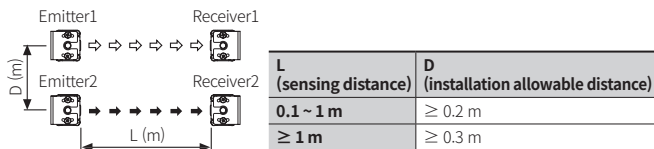


- Baffle should be installed between 2 sets.



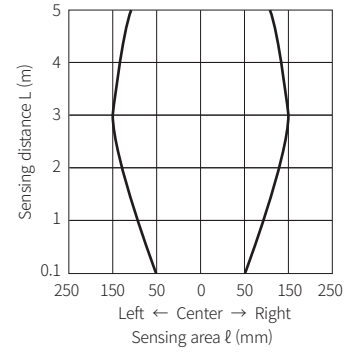
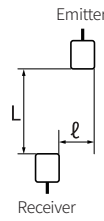
- It should be installed out of the interference distance.

: It may be a little different based on installation environment.  
 : Avoid using the unit in the place where the sensor is exposed directly to the fluorescent light with high speed start or high frequency.

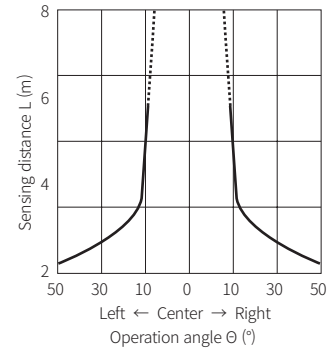
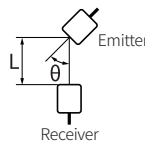


## Feature Data

### ■ Parallel shifting characteristic



### ■ Angle characteristic

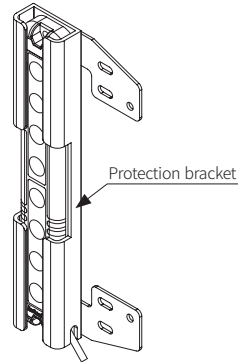
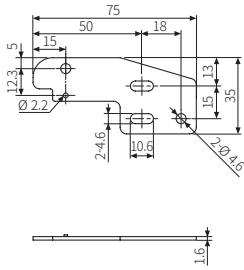


## Sold Separately: Bracket

- Unit: mm, For the detailed drawings, follow the Autonics website.
- When using the flat bracket or L-shaped bracket, use the protection bracket first.  
When mounting the protection bracket, it is possible to install the flat / L-shaped bracket, close mounting is available.
- Flat / L-shaped brackets are sold as a set of two each emitter and receiver.  
(with M4 bolt × 8)

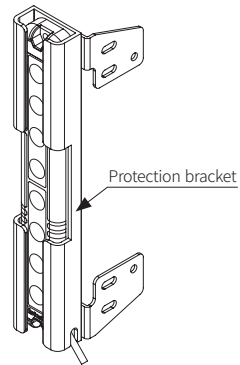
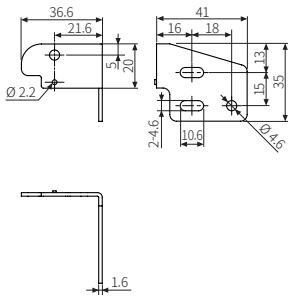
### ■ Flat bracket (BK-BWP-ST)

• Mounting



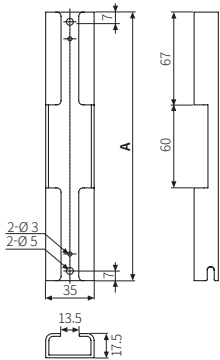
### ■ L-shaped bracket (BK-BWP-L)

• Mounting



### ■ Protection bracket (BK-BWP-P□)

- Mount it from top to bottom of the product.
- The protection bracket is sold as a set of one each for emitter and receiver.  
(with M4 bolt × 4)



Model	A
BK-BWP-P08	194
BK-BWP-P12	274
BK-BWP-P16	354
BK-BWP-P20	434