Autonics

THIN TYPE AREA SENSOR
BWP SERIES
INSTRUCTION MANUAL

Thank you for choosing Autonics product.
Please read the following safety considerations before use.

▣ Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.

※Safety considerations are categorized as follows.
⚠**Warning** Failure to follow these instructions may result in serious injury or death.
⚠**Caution** Failure to follow these instructions may result in personal injury or product damage.

※The symbols used on the product and instruction manual represent the following.
⚠ symbol represents caution due to special circumstances in which hazards may occur.

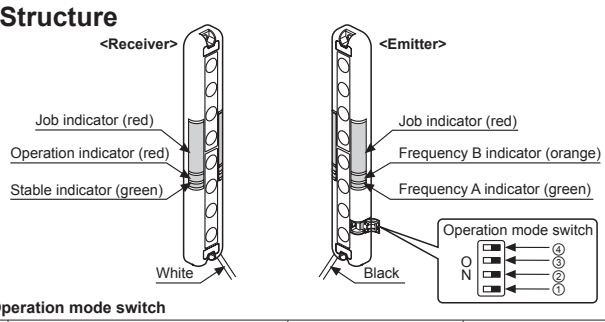
⚠ Warning

1. **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, fire, or economic loss.
2. **This unit is not safety sensor protecting from damages of property or injury from dangerous parts of mechanical equipment, but it is the sensor detecting a normal object or irruption into the working area regardless of safety.**
3. **Do not use it as safety equipment for the cutter or press.**
4. **This unit does not follow any international safety standard.**
   Check the safety standard of the country the product is used.
5. **Please note that we do not take any responsibilities for the problem related to overseas' laws or <Product liability (PL)> is happened by using as follows;**
   ①Safety equipment for protecting a hand or other parts of worker at dangerous area.
   ②Interlock on mechanical equipment.
   ③Safety sensor on mechanical equipment for stopping it when detecting a hand or other parts of worker.
   ④Using for detecting a hand or other parts of worker at dangerous area and controlling door or window.

⚠ Caution

1. **Do not use the unit outdoors.**
   Failure to follow this instruction may result in shortening the life cycle of the unit.
   The unit is proper indoor environment. Do not use the product outdoors or location subject to temperatures or humidity outside. (E.g.: rain, dirty, frost, sunlight, condensation, etc.)
2. **Do not wire this in power ON status.**
   Failure to follow this instruction may result in malfunction.
3. **Use this unit in the rated specifications.**
   Failure to follow this instruction may result in malfunction or shortening the life cycle of the unit.
4. **Use ground Frame Ground (F.G.) terminal when supplying power by Switching Mode Power Supply.**
5. **Avoid using this unit where there is fluorescent light with high frequency, high speed start or signal light affecting to sensing ability.**
6. **It may do not able to shade the light by reflecting from surface of a wall when installing it in 0.3m from wall or flat parts. Please keep < ▣ Installations >.**
7. **It may cause malfunction from interference when using them closely in parallel. Please keep < ▣ Installations >.**
8. **Install an emitter and a receiver in the same direction.**
   The emitting light is not transferred to receiver if installed in opposite direction.
9. **Avoid using this unit where there is severe vibration.**
   Failure to follow this instruction may result in malfunction or fire.
10. **In cleaning the unit, do not use water or an oil-based detergent.**
    Failure to follow this instruction may result in malfunction or fire.
11. **Make power and output line shorten as possible, or it may cause malfunction by surge etc.**

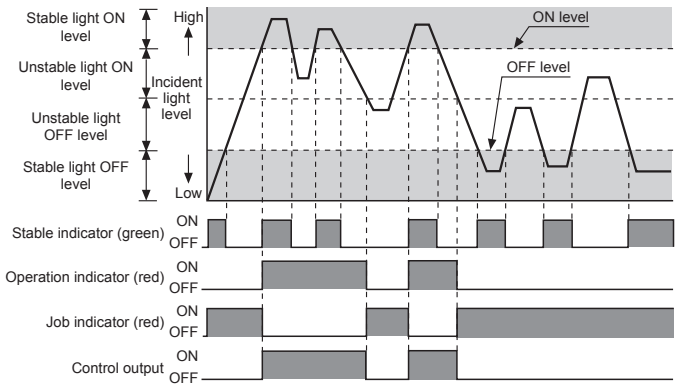
▣ Structure



◎ **Operation mode switch**

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

▣ Timing Diagram Operation



※The waveforms of operation indicator, job indicator, and control output are the state of operation for Light ON, but in case of Dark ON, it is opposite operation against Light ON mode.

▣ Indicators Display

Item	Emitter			Receiver			
	Indicator			Indicator			Control output
	Green	Orange	Job indicator	Green	Red	Job indicator	
Power ON	☼	●	—	—	—	—	—
FREQ. A operation	☼	●	—	—	—	—	—
FREQ. B operation	☼	☼	—	—	—	—	—
TEST	▶	◀	☼	☼	●	☼	OFF
Stable light ON	—	—	●	☼	☼	●	ON
Unstable light ON	—	—	●	●	☼	●	ON
Unstable light OFF	—	—	☼	●	●	☼	OFF
Stable light OFF	—	—	☼	☼	●	☼	OFF
Flashing function ON	—	—	◑	☼	●	◑	OFF
Synchronous line malfunction	—	—	☼	▶	◀	☼	OFF
Over current	—	—	☼	◑	◑	☼	OFF

Display classification list	
☼	Lighting
●	Light out
◑	Flashing by 0.3 sec
◑◑	Flashing simultaneously by 0.3 sec
▶◀	Cross-flashing by 0.3 sec

※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.
(in case, malfunction of synchronous line and over current, control output is OFF regardless of the mode.)

※**The above specifications are subject to change and some models may be discontinued without notice.**

▣ Ordering Information

BWP **20** – **08** **T** **P**

Output	**No-mark**	NPN open collector output
	P	PNP open collector output
Emitter/Receiver	**T**	Emitter
	R	Receiver
Number of optical axis	**08 to 20**	8 to 20
Optical axis pitch	**20**	20mm pitch
Item	**BWP**	Plastic case area sensor

※ ⋯ This information is intended for product management. (no need to refer when selecting a model)

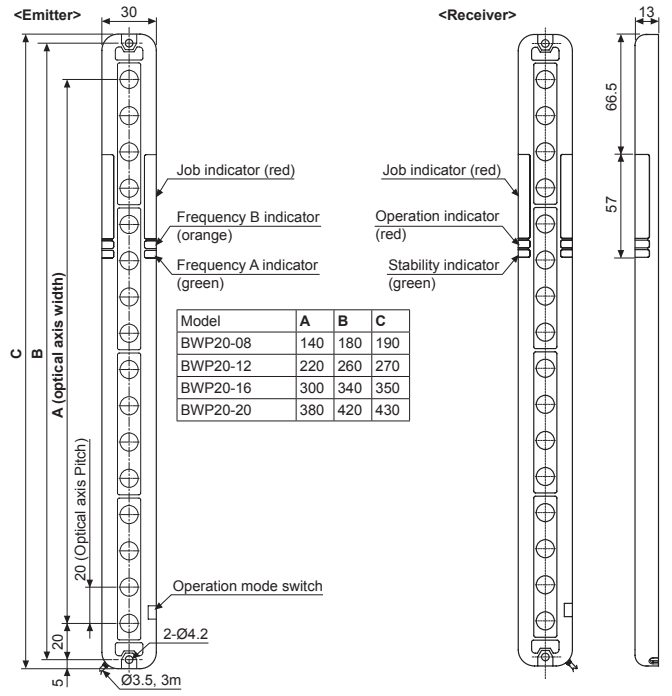
▣ Specifications

Model	NPN open collector output	BWP20-08	BWP20-12	BWP20-16	BWP20-20
	PNP open collector output	BWP20-08P	BWP20-12P	BWP20-16P	BWP20-20P
Sensing type		Through-beam type			
Sensing distance		0.1 to 5m			
Sensing target		Opaque materials of min. Ø30mm			
Optical axis pitch		20mm			
Number of optical axis		8	12	16	20
Sensing width		140mm	220mm	300mm	380mm
Power supply		12-24VDC ±10% (ripple P-P: max. 10%)			
Current consumption		Emitter: max. 80mA, Receiver: max. 80mA			
Control output		NPN or PNP open collector output • Load voltage: max. 30VDC • Load current: max. 150mA • Residual voltage - NPN: max. 1V, PNP : max. 2.5V			
Protection circuit		Reverse polarity protection circuit, output short over current protection circuit			
Operation mode		Switching of Light ON/Dark ON by switch			
Response time		Max. 6ms (frequency B selection is max. 7ms)			
Light source		Infrared LED (850nm modulated)			
Synchronization type		Timing method by synchronous line			
Interference protection		Interference protection by transmission frequency selection			
Environment	Ambient illumination	Ambient light: max. 10,000lx (received light side illumination)			
	Ambient temperature	-10 to 55℃, storage: -20 to 60℃			
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH			
Noise resistance		±240V the square wave noise (pulse width 1μs) by the noise simulator			
Dielectric strength		1,000VAC 50/60Hz for 1 minute			
Insulation resistance		Min. 20MΩ (at 500VDC megger)			
Vibration		1.5mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours			
Shock		500m/s² (50G) in each X, Y, Z direction for 3 times			
Protection structure		IP40 (IEC standard)			
Material		Case: Polycarbonate/Acrylonitrile-Butadiene-Styrene, Sensing part: Polymethyl methacrylate			
Cable		Ø3.5mm, 4-wire, 3m (AWG24, core diameter: 0.08mm, number of cores: 40, insulator diameter: Ø1mm)			
Approval		CE			
Weight※1		Approx. 480g (approx. 280g)	Approx. 520g (approx. 320g)	Approx. 620g (approx. 360g)	Approx. 680g (approx. 430g)

※1: The weight includes packaging. The weight in parenthesis is for unit only.
※The temperature or humidity mentioned in Environment indicates a non freezing or condensation.

▣ Dimensions

(unit: mm)

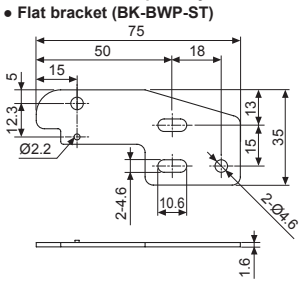


Model	A	B	C
BWP20-08	140	180	190
BWP20-12	220	260	270
BWP20-16	300	340	350
BWP20-20	380	420	430

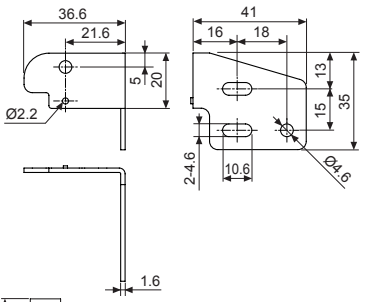
※Please use bolt M4 for mounting of sensor, set the tightening torque under 2N·m.

<Bracket>: sold separately

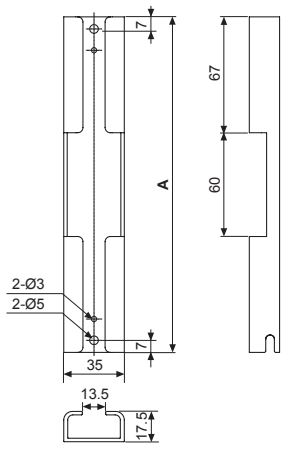
● **Flat bracket (BK-BWP-ST)**



● **L-shaped bracket (BK-BWP-L)**



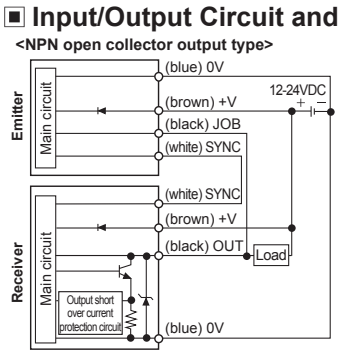
● **Protection bracket (BK-BWP-P□)**



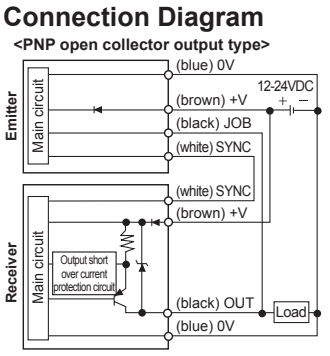
Model	A
BK-BWP-P08	194
BK-BWP-P12	274
BK-BWP-P16	354
BK-BWP-P20	434

▣ Input/Output Circuit and Connection Diagram

<NPN open collector output type>



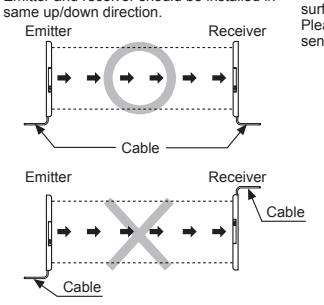
<PNP open collector output type>



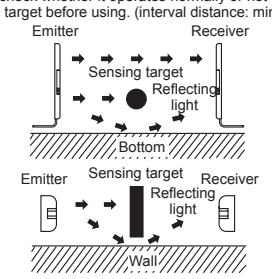
※If the receiver OUT (black) line and the emitter JOB (black) line are not connected each other, the job indicator of the emitter is not operated and maintains the light status.

▣ Installations

◎ **For direction of installation**
Emitter and receiver should be installed in same up/down direction.

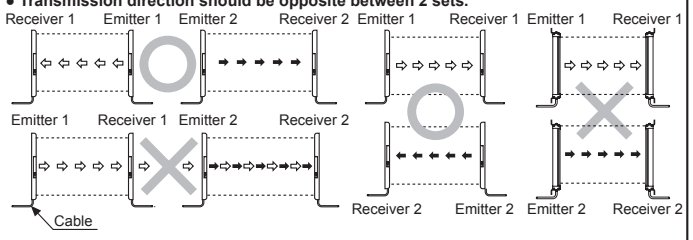


◎ **For reflection from the surface of wall and flat**
When installing it as below, the light reflected from the surface of wall and flat is not shaded.
Please check whether it operates normally or not with a sensing target before using. (interval distance: min. 0.3m)

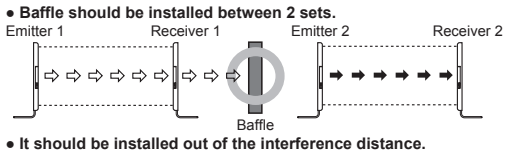


◎ **For protection of interference**
It may cause interference when installing more than 2 sets of the sensor. In order to avoid the interference of the sensor, please install as following figures and use the interference protection function.

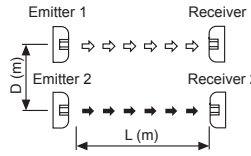
● **Transmission direction should be opposite between 2 sets.**



● **Baffle should be installed between 2 sets.**



● **It should be installed out of the interference distance.**



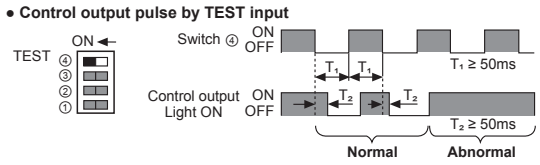
Sensing distance (L)	Installation allowable distance (D)
0.1 to 1m	Min. 0.2m
Min. 1m	Min. 0.3m

※It may be a little different based on installation environment.

▣ Functions

◎ **TEST (stop transmission function)**
When selecting TEST mode, emit is stopped and green&orange LED of emitter flashes. It is available to check whether sensor operates properly with stopping the transmission in TEST mode. It is changed to light OFF status when emit the transmission is stopped, control output is OFF in Light ON mode and ON in Dark ON mode.

● **Control output pulse by TEST input**



◎ **Interference protection**
In case of using 2 of sensor in serial or parallel in order to extend sensing width, it may cause sensing error because of light interference.
This function is operating a sensor in transmission frequency A and another sensor in transmission frequency B to avoid these sensing errors by the light interference.

	Operation mode SW	Frequency A, B indicator
Sensor Ⓐ (transmission frequency A)	Frequency A	Frequency A (green)
Sensor Ⓑ (transmission frequency B)	Frequency B	Frequency B (orange)

◎ **Light ON/Dark ON mode**
The control output is ON when it is light ON in Light ON and the control output is ON when it is light OFF in Dark ON. It is available to select with user's preference.

	Operation mode SW	Control output operation
Light ON	Light ON	It is ON when it is light ON.
Dark ON	Dark ON	It is ON when it is light OFF.

◎ **Switching of Lighting/Flashing of Job indicator**
Job indicator is lighting or flashing to make out work sensing operation more easily.

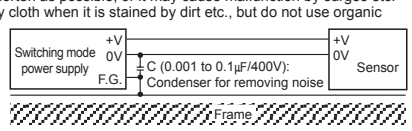
	Operation mode SW	Job indicator operation
Lighting	Lighting	Lighting indicator
Flashing	Flashing	Flashing indicator

▣ Troubleshooting

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

▣ Cautions During Use

1. Please make the interval enough between 2 sets or exchange the positions of emitter and receiver in order to remove interference as occurring interference by the emitter of another set when using emitter/receiver more than 2 sets closely.
2. Please install this sensor at proper height (min. approx. 0.3m) from flat part because malfunction may be caused due to certain amount of light received by light reflected when installing it close to flat part.
3. Avoid using this unit where there are fluorescent light with high frequency, high speed start or signal light affecting to sensing ability.
4. Please use a single conduit or separated wiring as it may cause malfunction or mechanical problem when installing the wiring of the sensor with high voltage lines.
5. Avoid using this unit where there are places with corrosive gas or dust, or it may cause malfunction.
6. Please make power and output line shorten as possible, or it may cause malfunction by surges etc.
7. Please clean the sensor cover with dry cloth when it is stained by dirt etc., but do not use organic materials such as thinners.
8. When using switching mode power supply as the source of supplying power, Frame Ground (F.G.) terminal shall be grounded and a condenser for removing noise shall be installed between 0V and F.G. terminal.



9. Within min. sensing distance, it may cause malfunction due to diffuse reflection by the unit or ambient objects. Within 20cm of sensing distance, over 5cm distance is required between the target (Ø30) and the receiver.
10. Installation environment
    ①Indoor ②Altitude max. 2,000m ③Pollution degree 2 ④Installation category II

※**Failure to follow these instructions may result in product damage.**

▣ Major Products

■ Photoelectric Sensors
■ Fiber Optic Sensors
■ Door Sensors
■ Door Side Sensors
■ Area Sensors
■ Proximity Sensors
■ Pressure Sensors
■ Rotary Encoders
■ Connectors/Sockets
■ Switching Mode Power Supplies
■ Control Switches/Lamps/Buzzers
■ I/O Terminal Blocks & Cables
■ Stepper Motors/Drivers/Motion Controllers
■ Graphic/Logic Panels
■ Field Network Devices
■ Laser Marking System (Fiber, CO_2, Nd: YAG)
■ Laser Welding/Cutting System
■ Temperature Controllers
■ Temperature/Humidity Transducers
■ SSRs/Power Controllers
■ Counters
■ Timers
■ Panel Meters
■ Tachometer/Pulse (Rate) Meters
■ Display Units
■ Sensor Controllers

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