

Autonics

**Area Sensor
BW SERIES**

INSTRUCTION MANUAL



Thank you for choosing our 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.
※⚠ symbol represents caution due to special circumstances in which hazards may occur.

- ⚠ 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.

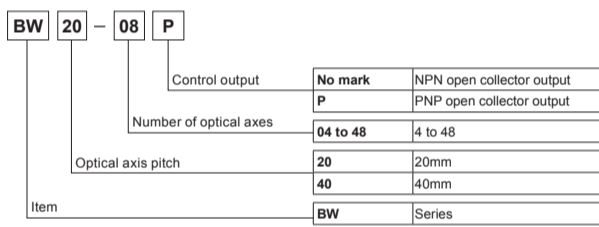
⚠ Warning

- 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 fire, personal injury, or economic loss.
- Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in fire.
- Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.
- Do not disassemble or modify the unit.**
Failure to follow this instruction may result in fire.
- 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

- Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent.**
Failure to follow this instruction may result in fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
Failure to follow this instruction may result in fire or explosion.
- Do not use a load over the range of rated relay specification.**
Failure to follow this instruction may result in insulation failure, contact melt, contact failure, relay broken, or fire.

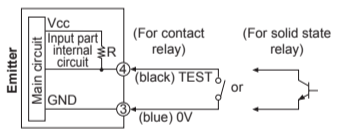
■ Ordering Information



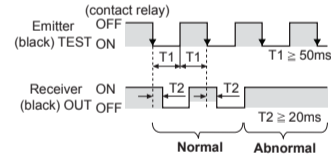
■ Function

○ Emitter OFF (external diagnosis)
When TEST input (black) of emitter is 0V, emitting stops and red LED of emitter flashes. By stopping the emitting while TEST input of emitter is 0V, it is noticeable whether sensor operates in order from the external system.
(If the emitting stops, sensor is in light OFF status and control output of receiver turns OFF.)

• Connections for TEST input



• Control output pulse by TEST input



○ Self-Diagnosis

The unit regularly executes self-diagnosis during operation. If error occurs, control output turns OFF and the operation indicator displays the status.

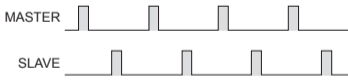
• Diagnosis items

- Emitter: ① Damage in light emitter, ② Emitter failure (Time out), ③ Malfunction of MASTER/SLAVE line (Operation in MASTER)
 - Receiver: ① Damage in light receiver, ② Control output over current, ③ Malfunction, disconnection, or circuit break of synchronous line.
- ※Operation indicator displays each diagnosis items in different way. Refer to "■ Operation Indicator".

○ Interference Protection

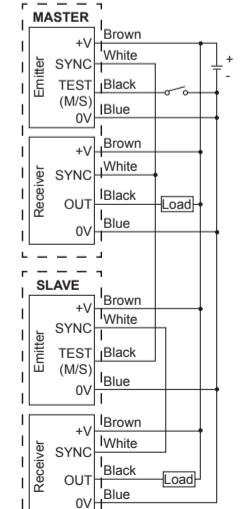
In case of using 2 sensors in parallel in order to extend sensing width, it may cause sensing error because as light interference.
This function is operating a sensor as MASTER and another sensor as SLAVE to avoid these sensing errors by the light interference.

• Time chart for MASTER/SLAVE transmission pulse

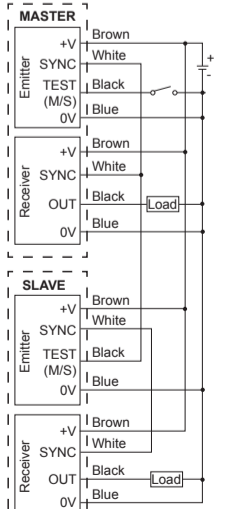


• MASTER/SLAVE connections

<NPN open collector output >



<PNP open collector output >



※Connect '(TEST)/M/S' of SLAVE emitter to 'SYNC' of MASTER.

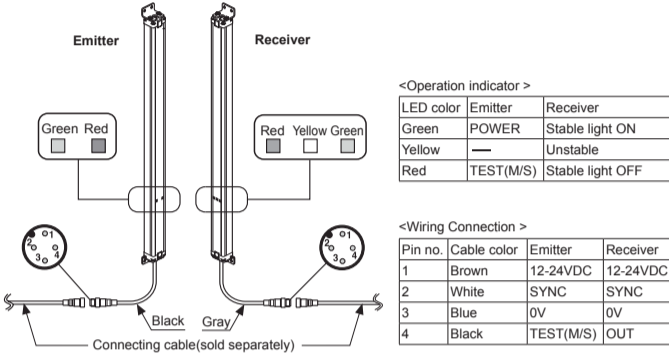
※The above specifications are subject to change and some models may be discontinued without notice.
※Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

■ Specifications

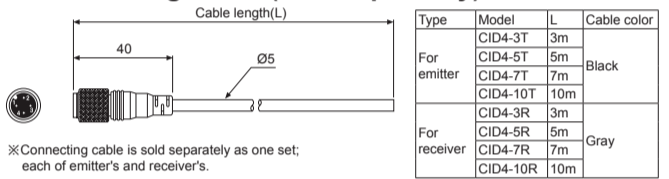
Model	BW20-(P)	BW40-(P)
Sensing method	Through-beam type	
Sensing distance	0.1 to 7m	
Min. sensing target	Opaque material of min. Ø30mm	Opaque material of min. Ø50mm
Optical axis pitch	20mm	40mm
Number of optical axes	8 to 48	4 to 24
Sensing height	140 to 940mm	
Response time	Max. 10ms	
Power supply	12-24VDC= ±10% (ripple P-P: max. ±10%)	
Current consumption	Emitter: max. 120mA, Receiver: max. 120mA	
Operation mode	Light ON fixed	
Control output	NPN or PNP open collector output • Load voltage: max. 30VDC=, + Load current: max. 100mA • Residual voltage - NPN: max. 1VDC=, PNP: max. 2.5VDC	
Protection circuit	Reverse polarity protection circuit, output short over current protection circuit	
Light source	Infrared LED (850nm modulated)	
Insulation resistance	Over 20MΩ (at 500VDC megger)	
Synchronization type	Timing method by synchronous line	
Self-diagnosis	Emitter/Receiver monitoring, Direct light monitoring, Over current monitoring	
Interference protection	Interference protection by master/slave function	
Noise immunity	±240V the square wave noise (pulse width 1μs) by the noise simulator	
Dielectric strength	1,000VAC 50/60Hz for 1minute	
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours	
Shock	500m/s ² (approx. 50G) in each X, Y, Z direction for 3 times	
Environment	Ambient illu.: Ambient light: max. 100,000lx (receiver illumination) Ambient temp.: -10 to 55°C, storage: -20 to 60°C Ambient humi.: 35 to 85%RH, storage: 35 to 85%RH	
Protection structure	IP65 (IEC standard)	
Material	• Case: Aluminum, • Front cover, sensing part: Acrylic	
Cable	Ø5mm, 4-wire, 300mm, M12 connector	
Accessory	Bracket A: 4, Bracket B: 4, Bolt: 8	
Approval	CE	
Weight ^{※1}	BW20-48: approx. 2.1kg (approx. 1.4kg)	BW40-24: approx. 2.1kg (approx. 1.4kg)

※1: The weight includes packaging. The weight in parenthesis is for unit only.
※The temperature and humidity of environment resistance is rated at non-freezing or condensation.

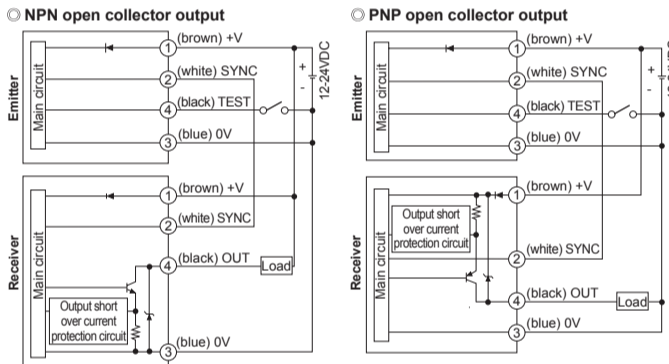
■ Structure



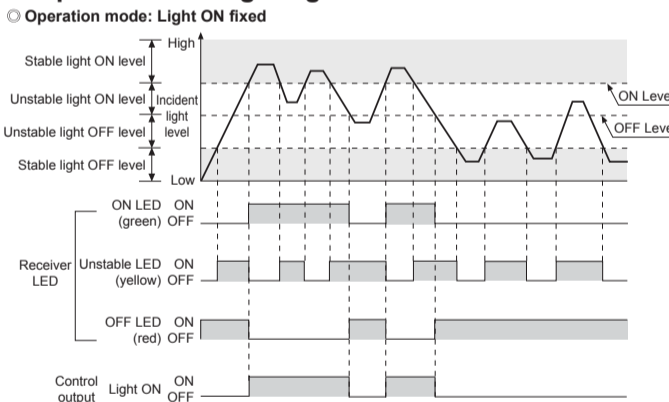
■ Connecting Cable (sold separately)



■ Input-Output Circuit and Connections

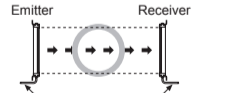


■ Operation Timing Diagram

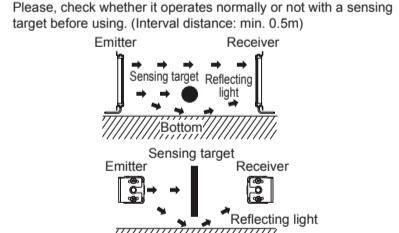


■ Installation

○ For Direction Of Installation
Emitter and receiver should be installed in same up/down direction.

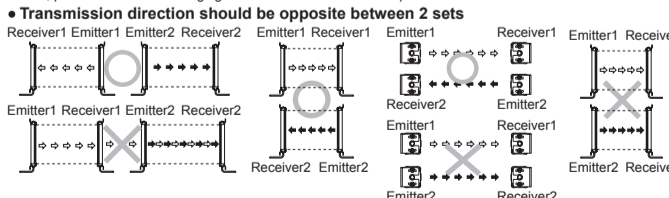


○ For Reflection From The Surface Of Wall And Flat
When installing it as below the light reflected from the surface of wall and flat will not be shaded. Please, check whether it operates normally or not with a sensing target before using. (Interval distance: min. 0.5m)

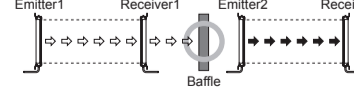


○ For Prevention Of Interference

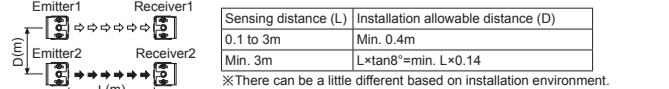
It may cause interference when installing more than 2 sets of the sensor. In order to avoid the interference of the sensor, please install as following figures and use the interference protection function.



• Baffle should be installed between 2 sets

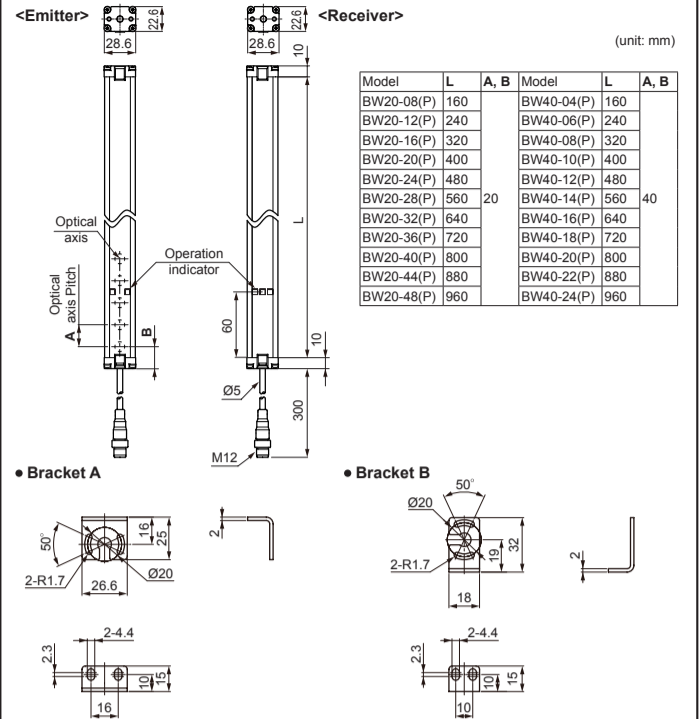


• It should be installed out of the interference distance



※Avoid using the unit in the place where the sensor is exposed directly to the fluorescent light with high speed start or high frequency.

■ Dimensions



■ Bracket Mounting



■ Optical Axis Pitch/Number of Optical Axis/Sensing Height

Number of optical axes	Model	Number of optical axes	Sensing height	Optical axis pitch	Model	Number of optical axes	Sensing height	Optical axis pitch
8	BW20-08(P)	4	140mm	—	BW40-04(P)	4	120mm	—
12	BW20-12(P)	6	220mm	—	BW40-06(P)	6	200mm	—
16	BW20-16(P)	8	300mm	—	BW40-08(P)	8	280mm	—
20	BW20-20(P)	10	380mm	—	BW40-10(P)	10	360mm	—
24	BW20-24(P)	12	460mm	—	BW40-12(P)	12	440mm	—
28	BW20-28(P)	14	540mm	20mm	BW40-14(P)	14	520mm	40mm
32	BW20-32(P)	16	620mm	—	BW40-16(P)	16	600mm	—
36	BW20-36(P)	18	700mm	—	BW40-18(P)	18	680mm	—
40	BW20-40(P)	20	780mm	—	BW40-20(P)	20	760mm	—
44	BW20-44(P)	22	860mm	—	BW40-22(P)	22	840mm	—
48	BW20-48(P)	24	940mm	—	BW40-24(P)	24	920mm	—

■ Operation Indicator

Item	Emitter Indicator			Receiver Indicator			Control output
	Green	Red	Yellow	Green	Yellow	Red	
Power ON	●	●	—	●	●	—	Light ON
MASTER operation	●	●	—	—	—	—	—
SLAVE operation	●	●	—	—	—	—	—
Test input	●	●	—	—	—	—	—
Break of emitter	●	●	—	—	—	—	—
Break of light emitting element	●	●	—	—	—	—	OFF
Install mode	Normal installation	●	●	●	●	●	OFF
	Hysteresis installation	●	●	●	●	●	OFF
	Abnormal installation	●	●	●	●	●	OFF
Stable light ON	—	—	—	●	●	●	ON
Unstable light ON	—	—	—	●	●	●	ON
Unstable dark ON	—	—	—	●	●	●	OFF
Stable dark ON	—	—	—	●	●	●	OFF
Break of receiver	—	—	—	—	—	—	OFF
Control output overcurrent	—	—	—	—	—	—	OFF
Synchronous line noise	—	—	—	—	—	—	OFF
Emitter failure(Time out)	—	—	—	—	—	—	OFF

Display classification list			
●	Light ON	●	Cross-Flashing by 0.5 sec
●	Light OFF	●	Sequence-Flashing by 0.5 sec
●	Flashing by 0.5 sec	●	Cross-Flashing twice by 0.5 sec
●	Flashing simultaneously by 0.5 sec	—	—

■ Troubleshooting

Malfunction	Cause	Troubleshooting
Not operating	Power supply	Supply the rated power.
	Incorrect cable connection or disconnection	Check the wiring.
Not operating sometimes	Rated connection failure	Use it within rated sensing distance.
	Pollution by dirt of sensor cover	Remove dirt by soft brush or cloth.
Control output is OFF even though there is no target object.	Connector connection failure	Check the assembled part of the connector.
	Out of rated sensing distance	Use within the rated sensing distance.
LED displays for break of light emitting element	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 generated by motor, electric generator, high voltage line etc.	Put away the strong electric wave or noise generator.
LED displays for failure of emitter	Break of light emitting element	Contact Autonics Corp.
LED displays for failure of receiver	Break of light emitting receiving element	Contact Autonics Corp.
LED displays for synchronous line	Synchronous line incorrect connection or disconnection	Check the wiring.
LED displays for control output over current	Break of synchronous circuit of emitter or receiver	Contact Autonics Corp.
	Control output line is shorten	Check the wiring.
LED displays for emitter malfunction	Over load	Check the rated load capacity.
	Emitter malfunction	Treat after checking the emitter display LED.

■ Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- 12-24VDC 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 0V 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.
 - ①Indoors (in the environment condition rated in 'Specifications')
 - ②Altitude max. 2,000m
 - ③Pollution degree 2
 - ④Installation category II

■ Major Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door Side Sensors
- Area Sensors
- Proximity Sensors
- Pressure Sensors
- Rotary Encoders
- Connector/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., Nd: YAG)
- Laser Welding/Cutting System
- Temperature Controllers
- Temperature/Humidity Transducers
- SSR/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers
- Control Switches/Lamps/Buzzers

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