Autonics

AREA SENSOR
BW SERIES

RusAutomation

M A N U A L

CE

Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

■ Caution for your safety

※Please keep these instructions and review them before using this unit.

※Please observe the cautions that follow;
⚠ **Warning** Serious injury may result if instructions are not followed.
⚠ **Caution** Product may be damaged, or injury may result if instructions are not followed.

※The following is an explanation of the symbols used in the operation manual.
⚠Caution: Injury or danger may occur under special conditions.

⚠ Warning

1. **In case of using this unit with machinery(Ex: nuclear power control, medical equpment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install fail-safe device.**
   It may cause a fire, human injury or damage to property.
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.**
   Please 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

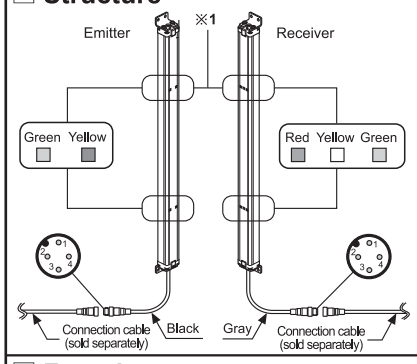
1. **This unit shall not be used outdoors.**
   It might shorten the life cycle of the product or give an electric shock.
   Use this product inside only. Do not use the product outdoors or location subject to temperatures or humidity outside.(Ex: rain, dirty, frost, sunlight, condensation, etc.)
2. **Do not wire this in power ON status.**
   It may cause an electric shock.
3. **Please use in the rated specifications.**
   It may cause malfunction or life cycle shorter.
4. **Please ground Frame Ground(F.G.) terminal when supplying power by switching power.**
5. **Avoid using this unit where there are fluorescent light with high frequency, high speed start or signal light affecting to sensing ability.**
6. **It may be not able to shade the light by reflecting from surface of a wall when installing it in 0.5 from wall or flat parts. Please keep < ▣ Installation >.**
7. **It may cause malfunction from interference when using them closely in parallel.**
   Please keep < ▣ Installation >.
8. **Please install emitter and receiver in same direction. The emitting light is not transferred to receiver if installed in opposite direction.**
9. **Avoid using this unit where there are severe vibration.**
   It may cause a fire and malfunction.
10. **In cleaning the unit, do not use water or an oil-based detergent.**
    It may cause an electric shock or fire.
11. **Please make power and output line shorten as possible, or it may cause malfunction by surge etc. (Max. 30m)**

■ Ordering information

BW 20 – 08 P

- Item: **BW** Series name
- Optical axis pitch: **20** 20mm Pitch; **40** 40mm Pitch
- Number of optical axes: **04 to 48** 04 to 48pcs
- Solid state output: (blank) NPN open collector output; **P** PNP open collector output

■ Structure



<Operation indicator >

LED color	Emitter	Receiver
Green	POWER	ON
Yellow	TEST(M/S)	UNSTABLE
Red	———	OFF

<Wiring Connection >

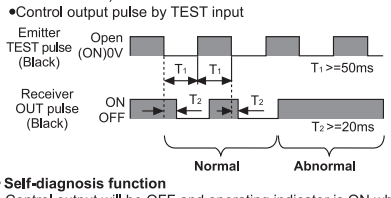
Pin No	Cable color	Emitter	Receiver
1	Brown	12-24VDC	12-24VDC
2	White	SYNC	SYNC
3	Blue	0V	0V
4	Black	TEST(M/S)	OUT

※1: Upper operation indicator is set additionally in case the number of the optical axes is more than 24pcs in BW20-series and more than 12pcs in BW40-series.

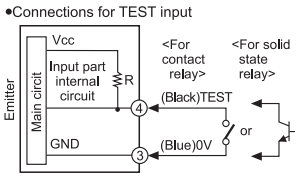
■ Functions

◎**Light emitted stop function(External diagnosis function)**
When TEST input (black) of emitter is 0V, emit is stopped and yellow LED of emitter flashes. It is available to check whether sensor operates properly with stopping the transmission when TEST input (black) of emitter is 0V. (It is changed to light OFF status when emit the transmission is stopped, control output of receiver is OFF.)

•Control output pulse by TEST input



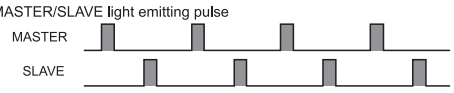
•Connections for TEST input



◎**Self-diagnosis function**
Control output will be OFF and operating indicator is ON when malfunction is checked by self-diagnosis regularly in normal operation.
•Diagnosis items
•Emitter: ①Break of light emitting element ②Break of light emitting circuit ③Malfunction of MASTER/SLAVE line(Operation in MASTER)
•Receiver: ①Break of light receiving circuit ②Break of output circuit ③Over current at output part ④Synchronous line malfunction ⑤Ambient light received

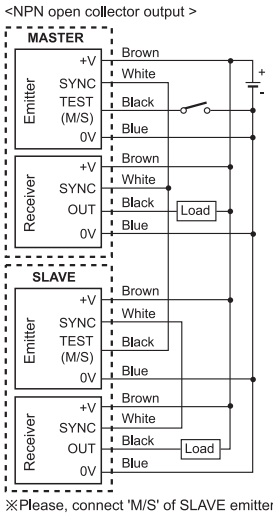
◎**Interference protection function**
In case of using 2 pcs of sensor in parallel in order to extend sensing width, it may cause sensing error because as light interference. This function is operating a sensor as MASTER and another sensor as SLAVE to avoid these sensing errors by the light interference.

•Time chart for MASTER/SLAVE light emitting pulse

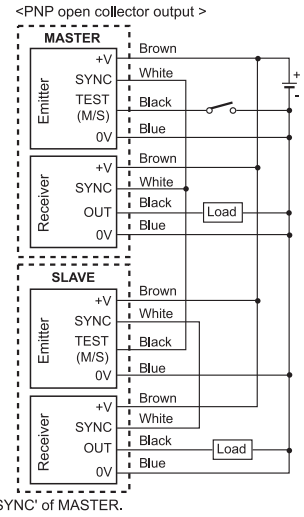


•MASTER/SLAVE connections

<NPN open collector output >



<PNP open collector output >



※Please, connect 'M/S' of SLAVE emitter to 'SYNC' of MASTER.

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

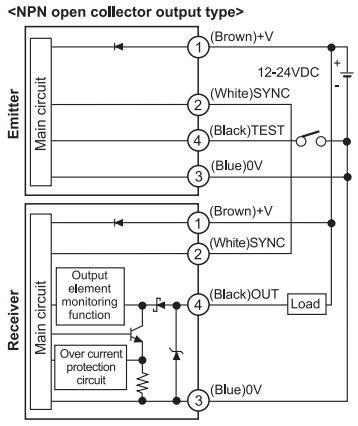
■ Specifications

Model		BW20-□(P)	BW40-□(P)
Sensing type		Through-beam	
Sensing distance		0.1 to 7m	
Sensing target		Opaque materials of min. ø30mm	Opaque materials of min. ø50mm
Optical axis pitch		20mm	40mm
Number of optical axes		8 to 48pcs	4 to 24pcs
Sensing width		140 to 940mm	120 to 920mm
Pointing angle		Within ±5° (At over 3m sensing distance)	
Power supply		12-24VDC ±10%(Ripple P-P: Max. 10%)	
Reverse power protection circuit		Built in	
Current consumption		Emitter: Max. 80mA, Receiver: Max. 80mA	
Control output		NPN or PNP open collector output • Load voltage: Max. 30VDC • Load current: Max. 100mA • Residual voltage - NPN: Max. 1V, PNP : Max. 2.5V	
Operation mode		Light ON only	
Short-circuit protection		Built-in	
Response time		Min. 12ms	
Light source		Infrared LED(850nm modulated)	
Synchronization type		Synchronous method by synchronous line	
Self-diagnosis		Ambient light monitoring, Emitter/Receiver light circuit monitoring, Output circuit monitoring	
Interference protection		Interference protection by master/slave function	
Environment	Ambient illumination	Sunlight: Max. 10,000ℓx	
	Ambient temperature	-10 to +55°C, Storage: -20 to +60°C	
	Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH	
Noise strength		The square wave noise by the noise simulator (Voltage : ±240V, Period: 10ms, Pulse width: 1μs)	
Dielectric strength		1,000VAC 50/60Hz for 1minute	
Insulation resistance		Min. 20MΩ (at 500VDC megger)	
Vibration		1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours	
Shock		500m/s² (50G) in X, Y, Z directions for 3 times	
Protection		IP65(IEC standard)	
Material		•Case: Aluminum •Cover, Sensing part: Acril	
Accessory		Bracket A: 4EA, Bracket B: 4EA, Bolt: 8EA	
Unit weight		Approx. 1.4kg(For 48 optical axes)	

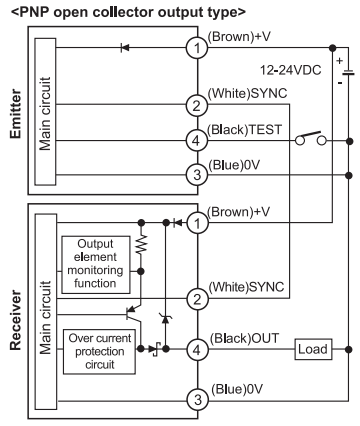
※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

■ Input/Output circuit and connection diagram

<NPN open collector output type>

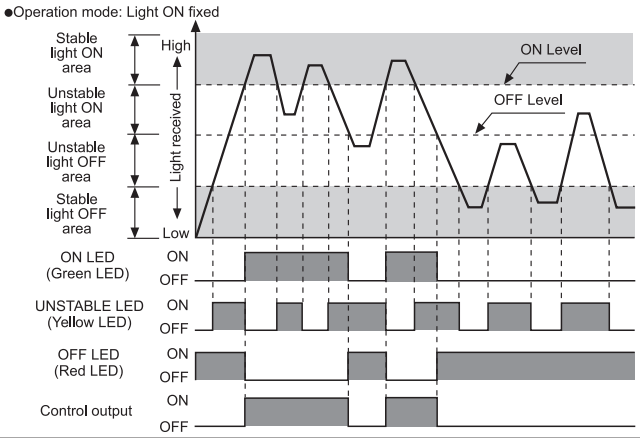


<PNP open collector output type>



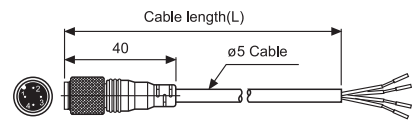
■ Timing diagram operation

●Operation mode: Light ON fixed



■ Connecting cable

※Connecting cable is optional and sold in a set(2pcs).

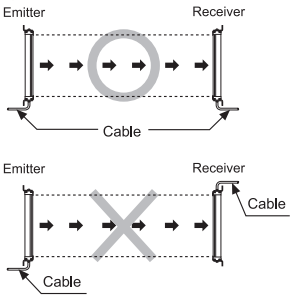


Model	Cable length (L)	Connector color
CID4-3T CID4-3R	3m	Emitter(T) :Black Receiver(R) :Gray
CID4-5T CID4-5R	5m	
CID4-7T CID4-7R	7m	
CID4-10T CID4-10R	10m	

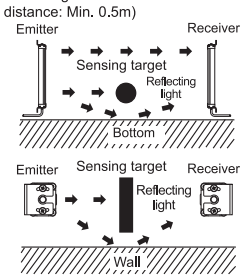
※Connecting cable is sold separately as one set; each of emitter's and receiver's.

■ Installations

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

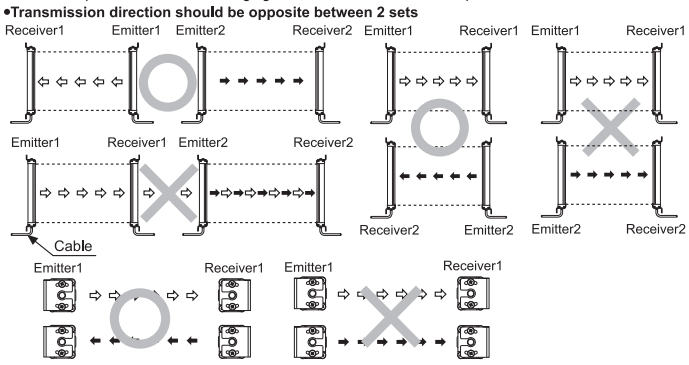


◎**For reflection from the surface of wall and flat**
When installing it as below, the light reflected from the surface of wall and flat is not shaded. Please check whether it operates normally or not with a sensing target before using.
(Interval distance: Min. 0.5m)

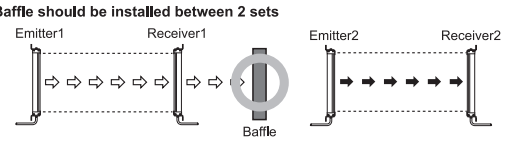


◎**For protection of interference**
It may cause interference when installing more than 2sets of the sensor. In order to avoid the interference of the sensor please install as following figures and use the interference protection function.

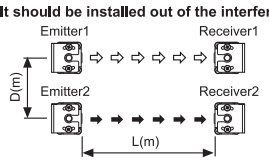
•**Transmission direction should be opposite between 2 sets**



•**Baffle should be installed between 2 sets**



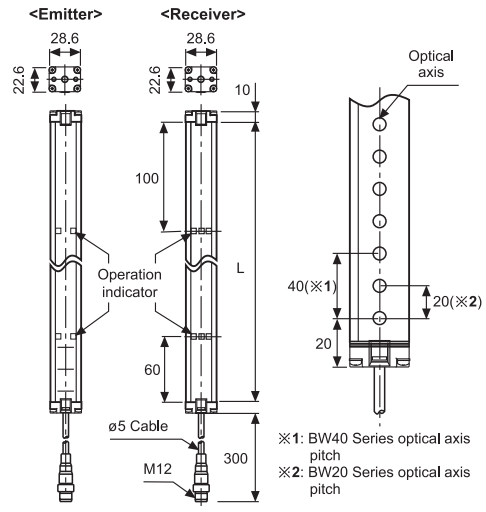
•**It should be installed out of the interference distance**



Sensing distance(L)	Installation allowable distance(D)
0.1 to 3m	Min. 0.4m
Min. 3m	L×tan8° = L×0.14 min.

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

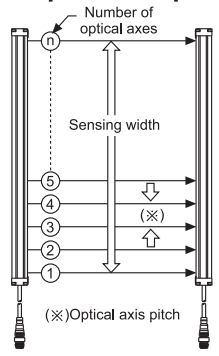
■ Dimensions



Model	L(mm)
BW20-08(P)	160mm
BW40-04(P)	
BW20-12(P)	240mm
BW40-06(P)	
BW20-16(P)	320mm
BW40-08(P)	
BW20-20(P)	400mm
BW40-10(P)	
BW20-24(P)	480mm
BW40-12(P)	
BW20-28(P)	560mm
BW40-14(P)	
BW20-32(P)	640mm
BW40-16(P)	
BW20-36(P)	720mm
BW40-18(P)	
BW20-40(P)	800mm
BW40-20(P)	
BW20-44(P)	880mm
BW40-22(P)	
BW20-48(P)	960mm
BW40-24(P)	

(Unit: mm)

■ Optical axis pitch/Number of optical axes/Sensing width



Model	Optical axis pitch
BW20-□(P)	20mm
BW40-□(P)	40mm

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

■ Operation indicator

Item	Emitter Indicator		Receiver Indicator			Control output
	Green	Yellow	Green	Yellow	Red	
Power supply	☼	●	—	—	—	—
MASTER operation	☼	●	—	—	—	—
SLAVE operation	☼	☼	—	—	—	—
Test input	☼	◑	—	—	—	OFF
Break of light emitting element	▶	◀	—	—	—	OFF
Break of light emitting circuit	◑	◑	—	—	—	OFF
Stable light ON	—	—	☼	●	●	ON
Unstable light ON	—	—	☼	☼	●	ON
Unstable light OFF	—	—	●	☼	☼	OFF
Stable light OFF	—	—	●	●	☼	OFF
Break of light receiving circuit	—	—	●	▶	◀	OFF
Break of output element	—	—	▶	◀	●	OFF
Synchronous line malfunction	—	—	▶	●	◀	OFF
Over current	—	—	◑	◑	◑	OFF
Ambient light received	—	—	●	◑	◑	OFF
Emitter failure	—	—	▶	▶	▶	OFF

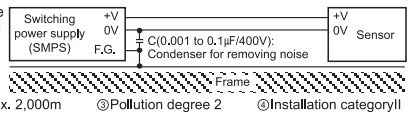
Display classification list	
☼	Lighting
●	Light out
◑	Flashing by 0.5sec.
◑◑ or ◑◑◑	Flashing simultaneously by 0.5 sec.
▶◀	Cross-flashing by 0.5sec.
▶▶▶	Sequence-flashing by 0.5sec.

■ 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 detecting 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 rated detecting distance	Use it within rated detecting 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 break of light emitting element	Break of light emitting element	Contact our company.
LED displays for break of light emitting circuit	Break of light emitting circuit	
LED displays for break of light receiving element	Break of light receiving element	
LED displays for break of output element	Break of output element	
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.
LED displays for ambient light receiving	Ambient light received to receiver	Remove the ambient light.
LED displays for emitter malfunction	Emitter malfunction	Treat after checking the emitter display LED.

■ Caution for using

1. Please make the interval enough between 2 sets or exchange the positions of emitter and receiver in order to remove interference occurring by the emitter of another set when using emitter/receiver more than 2sets closely.
2. Please install this sensor at proper height(Min. approx. 0.5m) 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 detection ability.
4. Please use a single conduit or separated wiring as it may cause malfunction or mechanical trouble when installing the wiring of the sensor with high voltage lines.
5. Avoid using this unit where there are these kinds of places with corrosive gas or dust as it may cause malfunction.
6. Please make power and output line shorten as possible, or it may cause malfunction by surge 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 the kinds of thinners.
8. When using switching 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. Installation environment
   ①It shall be used indoor ②Altitude max. 2,000m ③Pollution degree 2 ④Installation categoryII

※It may cause malfunction if above instructions are not followed.

■ 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_2, Nd:YAG)
- Laser welding/soldering system
- Temperature controllers
- Temperature/Humidity transducers
- SSR/Power controllers
- Counters
- Timers
- Panel meters
- Tachometer/Pulse(Rate) meters
- Display units
- Sensor controllers