Autonics

AREA SENSOR
BW SERIES

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. **This unit is not safety sensor purposed on saving life, protecting damages of asset or hearting body from dangerous parts of mechanical equipment, but it is the sensor detecting a normal object or irruption into working area without safety.**
2. **Please, don't use it as safety equipment for the cutter or press.**
3. **This unit doesn't follow any safety standard in the world. Please, check the safety standard of the country used.**
4. **Please, note that we don't take any responsibilities when the problem related to overseas' rules 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.
   ④Detector for detecting a hand or other parts of worker at dangerous area and controlling door or window.

⚠Caution

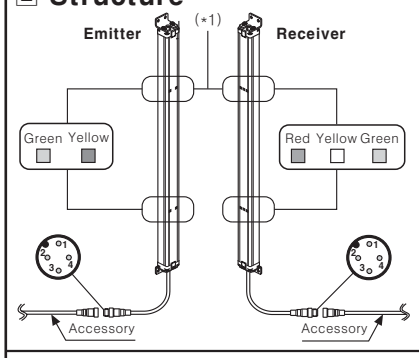
1. **Please, don't do wiring in power ON.**
   Please, use in specifications.
2. **Please, use in specifications.**
   It may cause malfunction or life cycle shorter.
3. **Please, earth F.G.(Frame Ground) terminal when supplying power by switching power.**
4. **Please, avoid fluorescent light with high frequency, high speed start or signal light affecting to detection ability.**
5. **It may unavailable to cut off the light by reflecting from the parts when installing it in 0.5m from wall or flat parts. Please, keep < ▣ Installation >.**
6. **It may cause malfunction from interference when using them closely in parallel. Please, keep < ▣ Installation >.**
7. **Please, install emitter and receiver in same direction. Light beam emitting will not be transferred to receiver if installed in opposite direction.**
8. **Please, avoid a large vibrating area.**
   It may cause a fire and malfunction.
9. **In cleaning the unit, do not use water or an oil-based detergent.**
   It may cause an electric shock or fire.
10. **Please make power and output line as short as possible as it may cause malfunction by surges etc. if the lines is long. (Max. 30m)**

▣ Ordering information

BW 20 – 08 P

Solid state output		NPN open collector output
	P	PNP open collector output
Number of optical axes	04~48pcs	
Optical axis pitch	20	20mm Pitch
	40	40mm Pitch
Series		

▣ Structure



〈 Operation indicator 〉

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

〈 Wiring Connection 〉

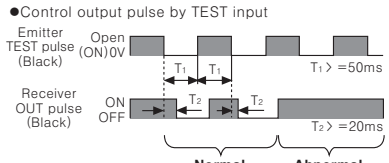
Pin No	Cable color	Emitter	Receiver
1	Brown	12-24VDC	12-24VDC
2	White	SYNC	SYNC
3	Blue	0V	0V
4	Black	TEST(M/S)	OUT

※(*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.

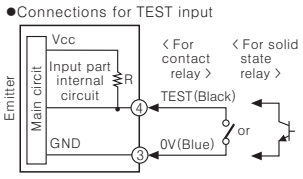
▣ Functions

◎Light emitted stop function(External diagnosis function)
Light emitted will be stopped and yellow LED is flickered if supplying 0V to test input on the emitter. It is for checking malfunction of the sensors during TEST input on the emitter is 0V. (Control output of the receiver is OFF as it becomes light cut off when the light emitted is stopped)

●Control output pulse by TEST input



●Connections for TEST input

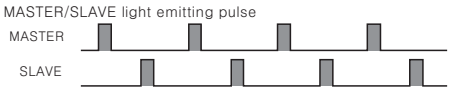


◎Self-diagnosis function
Control output will be OFF and operating indicator is ON when malfunction is checked by self-diagnosis regularly in normal operation.

●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

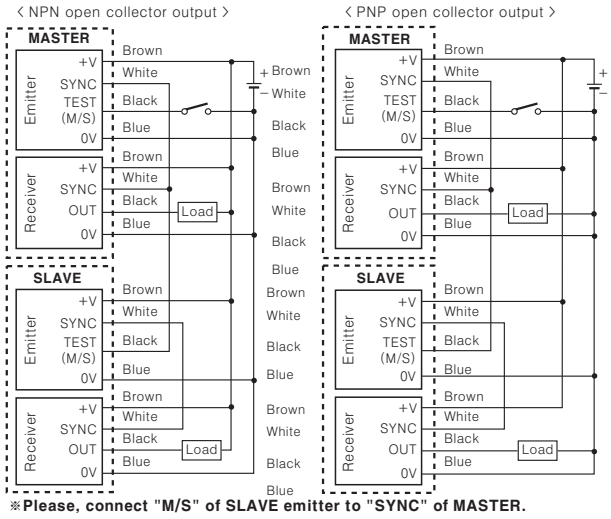
◎Interference protection function
In case of using 2pcs of sensor in parallel in order to extend detecting width the detection will be failure because as light interference. This function is to avoid the light interference as operating a sensor in MASTER and another sensor in SLAVE to protect these kinds of failures.

●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.

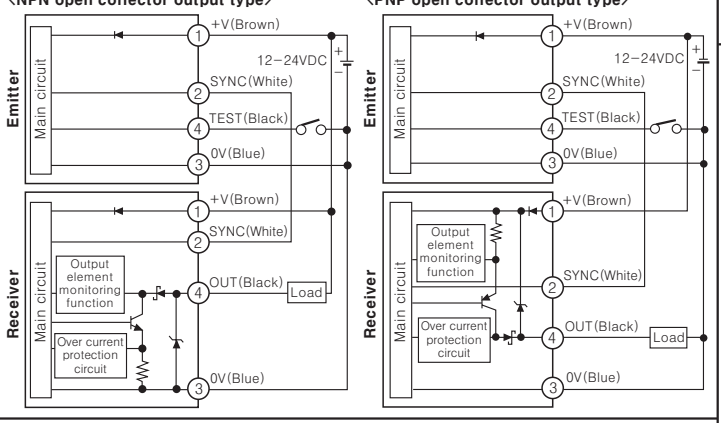
※The above specification are changeable without notice anytime.

▣ Specifications

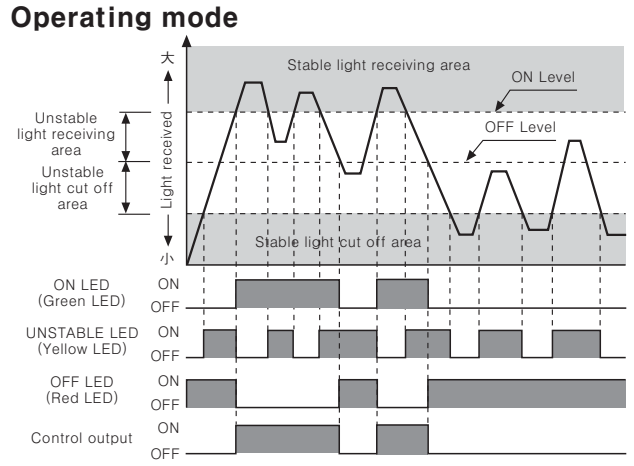
Model	BW20-□(P)	BW40-□(P)
Detecting type	Through-beam	
Detecting distance	0.1 ~ 7m	
Detecting target	Opaque materials of min. φ30mm	Opaque materials of min. φ50mm
Optical axis pitch	20mm	40mm
Number of optical axes	8~48	4~24
Detecting width	140~940mm	120~920mm
Pointing angle	Within ±5° (At over 3m detecting 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 open collector output ☞ Load voltage:Max. 30VDC, Load current:Max. 100mA, Residual voltage:Max. 1V PNP open collector output ☞ Load current:Max. 100mA, Output voltage:Min. (Power supply-2.5)V	
Operation mode	Light ON only	
Short-circuit protection	Built-in	
Response time	Min. 12ms	
Light source	Infrared LED(modulated)	
Synchronization type	Timing 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 temperature	-10 to +55℃(non-freezing condition)	
Environment: Storage temperature	-20 ~ +60℃	
Environment: Ambient humidity	35 ~ 85%RH	
Environment: Storage humidity	35 ~ 85%RH	
Environment: Ambient illumination	Sunlight : Max. 11,000ℓx, Incandescent lamp : Max. 3,000ℓx	
Noise strength	The square wave noise by the noise simulator (Voltage : ±240V, Period : 10ms, Pulse width : 1㎲)	
Dielectric strength	1,000VAC 50/60Hz for 1minute	
Insulation resistance	Min. 20MΩ(500VDC)	
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	• Body : Aluminum • Cover, Rens : Acril	
Accessory	Bracket A : 4EA, Bracket B : 4EA, Bolt : 8EA	
Net weight	Approx. 1.4kg(For 48 optical axes)	

▣ Input/Output circuit and connection diagram

〈NPN open collector output type〉 〈PNP open collector output type〉

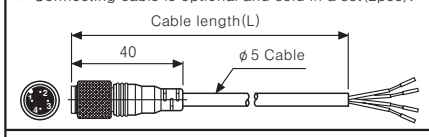


▣ Operating mode



▣ Connecting cable

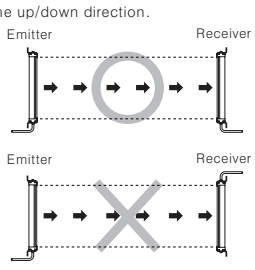
※Connecting cable is optional and sold in a set(2pcs).



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

▣ Installations

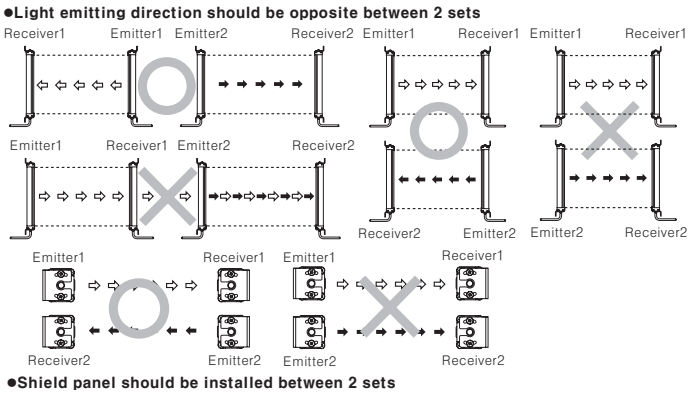
◎For direction of installation
Emitter and receiver should be installed in same up/down direction.



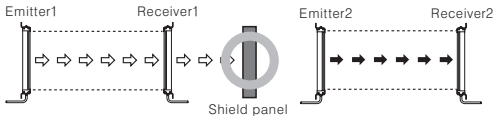
◎For reflection from the surface of wall and flat
When installed as below the light reflected from the surface of wall and flat will not cut off. Please, check whether it operates normally or not with a detecting target before using. (Interval distance:Min. 0.5m)

◎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.

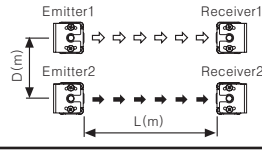
●Light emitting direction should be opposite between 2 sets



●Shield panel should be installed between 2 sets



●It should be installed out of the installation allowable distance

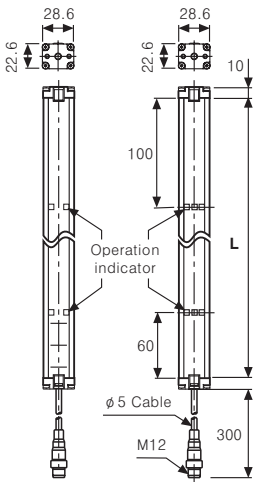


Detecting distance(L)	Installation allowable distance(D)
0.1~3m	Min. 0.4m
Min. 3m	L×tan8° = L×0.14 min.

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

▣ Dimensions

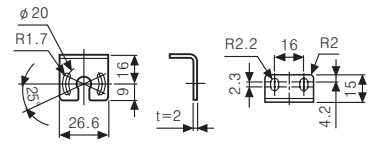
〈Emitter〉 〈Receiver〉



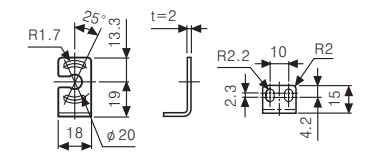
(*1)BW40 Series optical axis pitch
(*2)BW20 Series optical axis pitch

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)	

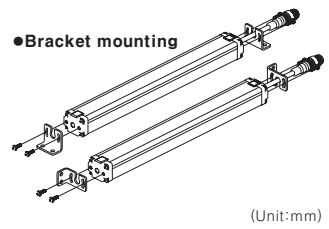
●Bracket A



●Bracket B

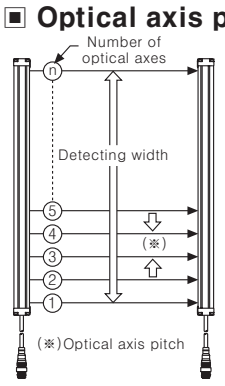


●Bracket mounting



(Unit:mm)

▣ Optical axis pitch/Number of optical axes/ Detecting width



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

Model	Number of optical axes	Detecting width	Model	Number of optical axes	Detecting 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 Green	Emitter Indicator Yellow	Receiver Indicator Green	Receiver Indicator Yellow	Receiver Indicator Red	Control output
Power supply	☼	●	—	—	—	—
MASTER operation	☼	●	—	—	—	—
SLAVE operation	☼	☼	—	—	—	—
Test input	☼	◑	—	—	—	OFF
Break of light emitting element	▶	◀	—	—	—	OFF
Break of light emitting circuit	◑	◑	—	—	—	OFF
Stable light received	—	—	☼	●	●	ON
Unstable light received	—	—	☼	☼	●	ON
Unstable light cut off	—	—	●	☼	☼	OFF
Stable light cut 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

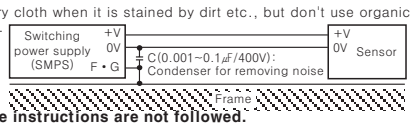
Display classification list	
☼	Light ON
●	Light OFF
◑	Flickering by 0.5sec.
◑◑ or ◑◑◑	Flickering simultaneously by 0.5 sec.
▶◀	Cross-flickering by 0.5sec.
▶▶▶	Sequence-flickering by 0.5sec.

▣ Inspection / Treatment for malfunction

Malfunction	Caution	Treatment
Non-operation	Power	Supply rated power
	Cut-off line, wiring failure	Check the wiring
	Rated connection failure	Use 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 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.
Break of light emitting element LED displayed	Break of light emitting element	Contact our company
Break of light emitting circuit LED displayed	Break of light emitting circuit	
Break of light receiving element LED displayed	Break of light receiving element	
Break of output element LED displayed	Break of output element	
Synchronous line malfunction LED displayed	Synchronous line connection failure or cut off	Check the wiring
	Break of synchronous circuit of emitter or receiver	Contact our company
Over current LED displayed	Control output line shorted	Check the wiring
	Over load	Check the rated load capacity
Ambient light receiving LED displayed	Ambient light received to receiver	Remove the ambient light
Emitter malfunction LED displayed	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 as occurring interference 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 as malfunction may be caused due to certain amount of light received by light reflected when installing it close to flat part.
3. Please, avoid 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. Please, avoid these kinds of places with corrosive gas or dust as it may cause malfunction.
6. Please make power and output line as short as possible as it may cause malfunction by surges etc. if the lines is long. (Max. 30m)
7. Please, clean the sensor cover with dry cloth when it is stained by dirt etc., but don't use organic materials such as the kinds of thinners.
8. Please, earth F.G terminal as following figure and install the condenser for removing noise between 0V and F.G terminal when using switching power supply.



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

▣ Main products

- COUNTER
- TIMER
- TEMPERATURE CONTROLLER
- PANEL METER
- TACHO/LINE SPEED/PULSE METER
- DISPLAY UNIT
- PROXIMITY SENSOR
- PHOTOELECTRIC SENSOR
- FIBER OPTIC SENSOR
- PRESSURE SENSOR
- ROTARY ENCODER
- SENSOR CONTROLLER
- POWER CONTROLLER
- STEPPING MOTOR & DRIVER & CONTROLLER
- LASER MARKING SYSTEM(CO_2, Nd:YAG)

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