

# Autonics

## Cross-beam Area Sensor BWC 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 personal injury, economic loss or fire.
- 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.
- 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 may be present.

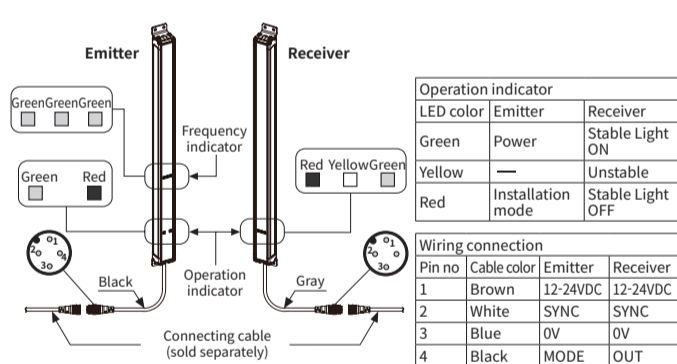
#### ⚠ Caution

- 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 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.

#### ■ Ordering Information

BWC	40	-	14	H
Operation mode				
H Light ON				
HD Dark ON				
Number of optical axes				
Number 4 to 20pcs				
Optical axis pitch				
40 40mm pitch				
80 80mm pitch				
Item				
BWC Area sensor				

#### ■ Structure



#### ■ Connection Cable (sold separately)

Type	Model	L	Cable color
Emitter	CID4-3T	3m	Black
	CID4-5T	5m	
	CID4-7T	7m	
	CID4-10T	10m	
	CID4-15T	15m	
Receiver	CID4-3R	3m	Gray
	CID4-5R	5m	
	CID4-7R	7m	
	CID4-10R	10m	
	CID4-15R	15m	

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

#### ■ Function

**○ Interference Protection**  
 You can change transmitted light frequency to prevent interference from several units.  
 To change transmitted light frequency, input 0V for over 1 second to 4th terminal, (black) MODE, in installation mode.  
 Frequency type is displayed by frequency indicator.

Transmitted light frequency	Green1	Green2	Green3
Frequency A	●	●	●
Frequency B	●	●	●
Frequency C	●	●	●
Frequency D	●	●	●
Frequency E	●	●	●

#### ○ Installation Mode

This function is for stable installation.  
 Inputting 0V to 4th terminal of emitter which is (black) MODE, supply power to the product to enter to the installation mode.

#### ○ Self-Diagnosis Output

This function outputs self-diagnosis signal, when front screen is contaminated with dust, optical axis is misaligned due to vibration, emitter is damaged due to the long-term usage, or light is not received due to obstacle such as leaves and trash on the product.  
 It operates in the operation mode, and you can check the status through an external device which is connected to 4th terminal of emitter, (black) MODE.

Item	Emitter operation indicator	Control output		Self-diagnosis output
		Light ON	Dark ON	
Front screen contamination level 1	Red, flashing at 1 sec interval	ON	OFF	OFF
Front screen contamination level 2, covering optical axis	Red, flashing at 0.25 sec interval	ON	OFF	ON

#### ○ Self-Diagnosis

If there is checked malfunction during normal operation by regular self-diagnosis, control output turns OFF and operation indicator displays the state. (Refer to 'Operation Indicator'.)

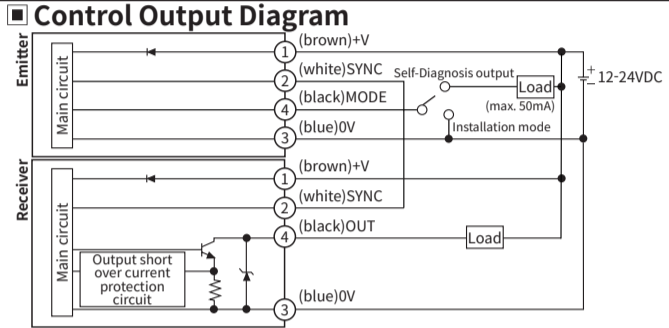
#### ● Diagnosis item

- |   |                     |
|---|---------------------|
| ① Break of light emitting element                 | ② Break of emitter  |
| ③ Break of adjacent emitting element more than 2. | ④ Break of receiver |
| ⑤ Emitter failure                                 | ⑥ Receiver failure  |
| ⑦ Malfunction of synchronous cable                |                     |
- ※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	BWC40-□□H	BWC40-□□HD	BWC80-14H	BWC80-14HD
Sensing method	Through-beam			
Sensing distance	1.0 to 7.0m			
Sensing target	Opaque material of min Ø50mm		Opaque material of min Ø90mm	
Optical axis pitch	40mm		80mm	
Number of optical axes	4/10/12/16/18/20pcs		14pcs	
Sensing height	120 to 760mm		1,040mm	
Beam pattern	3-point cross beam netting type			
Power supply	12-24VDC±10% (ripple P-P: max. 10%)			
Protection circuit	Reverse polarity protection circuit, output short over current protection circuit			
Current consumption	Max. 100mA			
Operation mode	Light ON	Dark ON	Light ON	Dark ON
Response time	Within 50ms			
Control output	NPN open collector output • Load voltage: max. 30VDC± • Load current: max. 100mA (self-diagnosis output: max 50mA) • Residual voltage: max. 1VDC±			
Light source	Infrared LED (850nm modulated light type)			
Synchronization type	Timing method by synchronous cable			
Self-diagnosis	Transmitted-received light monitoring, direct light monitoring, output circuit monitoring, self-diagnosis output (checking whether there is contamination on the front screen, or any obstacle on optical axis)			
Interference protection	Interference protection by frequency changing setting			
Noise immunity	±240V the square wave noise (pulse width 1µs) by the noise simulator			
Dielectric strength	1,000VAC 50/60Hz for 1minute			
Insulation resistance	Over 20MΩ (at 500VDC megger)			
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 <sup>2</sup> (approx. 50G) in each X, Y, Z direction for 3 times			
Environment	Ambient illum.	Ambient light: max. 100,000lx		
	Ambient temp.	-10 to 55°C, storage: -20 to 60°C		
	Ambient humi.	35 to 85%RH, storage: 35 to 85%RH		
Material	Case: aluminum, sensing part and indicator: acrylic			
Cable	Ø5mm, 4-wire, length: 300mm, M12 connector			
Accessory	Bracket A: 4, bracket B: 4, fixing bolt: 8			
Protection	IP67 (IEC standard)			
Korean Railway Standards	—		KRS SG 0068	
Approval	CE		CE	
Weight <sup>※1</sup>	Approx. 2.1kg (approx. 1.7kg) (based on BWC80-14H)			

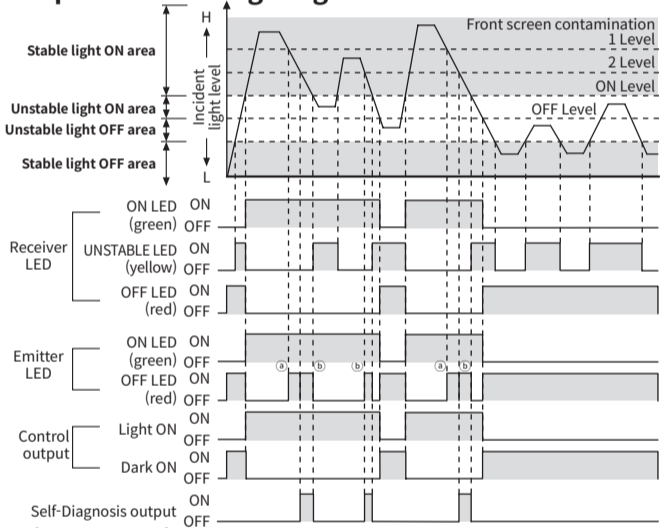
#### ■ Control Output Diagram



#### ■ Operating Mode

Emitter/Receiver	Light ON		Dark ON	
	Received light	Interrupted light	Received light	Interrupted light
Operation indicator (Green LED)	ON	OFF	ON	OFF
Transistor output	ON	OFF	ON	OFF

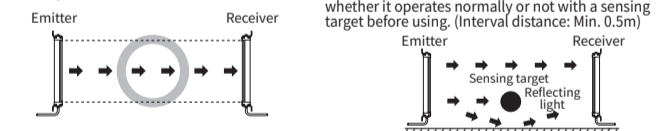
#### ■ Operation Timing Diagram



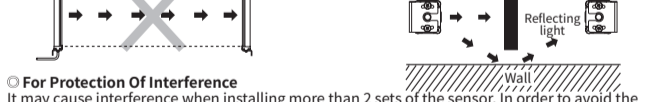
#### ■ Installations

For the first installation, enter installation mode.  
 ① Entry method for installation mode: Supply power with inputting 0V to 4th terminal (Black) MODE.  
 ② After entering installation mode, install the unit at the position where green LED of receiver operation indicator turns ON.  
 ③ After installation, re-supply power to the unit.

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



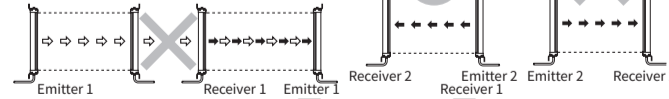
**○ For Reflection From The Surface Of Wall And Flat**  
 When installing it as below, the light reflected from the surface of wall and flat is not shaded. Please check whether it operates normally or not with a sensing target before using. (Interval distance: Min. 0.5m)



#### ○ For Protection Of Interference

It may cause interference when installing more than 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.

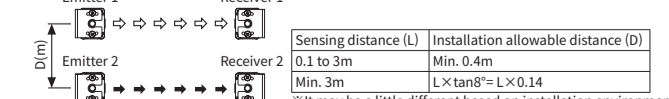
• Transmission direction should be opposite between 2 sets.  
 Receiver 1 Emitter 1 Emitter 2 Receiver 2 Emitter 1 Receiver 1 Emitter 1 Receiver 1



• Baffle should be installed between 2 sets.  
 Emitter 1 Receiver 1 Emitter 2 Receiver 2

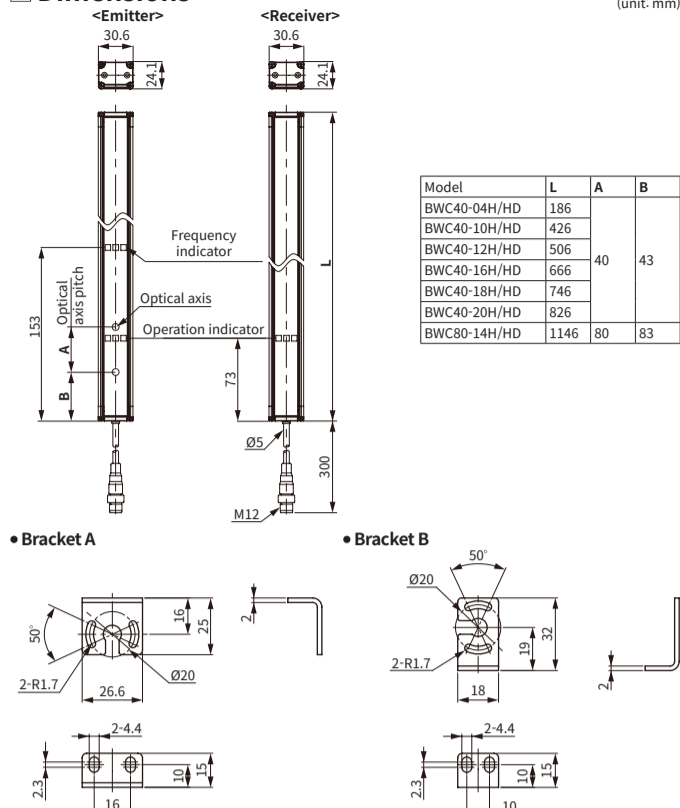


• It should be installed out of the interference distance.  
 Emitter 1 Receiver 1 Emitter 2 Receiver 2

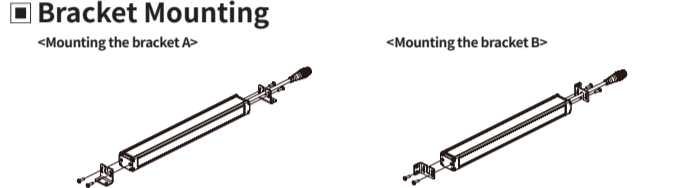


※Avoid using the unit in the place where the sensor is exposed directly to the fluorescent light with high speed start or high frequency.

#### ■ Dimensions



#### ■ Bracket Mounting



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

Model	Number of optical axis	Sensing height	Optical axis pitch
BWC40-04H/HD	4	120mm	40mm
BWC40-10H/HD	10	360mm	
BWC40-12H/HD	12	440mm	
BWC40-16H/HD	16	600mm	
BWC40-18H/HD	18	680mm	
BWC40-20H/HD	20	760mm	
BWC80-14H/HD	14	1,040mm	80mm

#### ■ Operation Indicator

Item	Emitter Indicator		Receiver Indicator		Control output	
	Green	Red	Green	Yellow	Light ON	Dark ON
Power supply	●	●	●	●	—	—
Break of emitter	●	●	●	●	—	—
Break of light emitting element	●	●	●	●	OFF	OFF
Break of adjacent emitting element more than 2.	●	●	●	●	OFF	OFF
Installation mode	Normal installation	●	●	●	—	—
	Hysteresis section	●	●	●	●	OFF
	Abnormal installation	●	●	●	●	OFF
Stable light ON	●	●	●	●	ON	OFF
Unstable light ON	●	●	●	●	ON	OFF
Unstable light OFF	●	●	●	●	OFF	ON
Stable light OFF	●	●	●	●	OFF	ON
Break of receiver	—	—	●	●	OFF	OFF
Control output over current	—	—	●	●	OFF	OFF
Synchronous line malfunction	—	—	●	●	OFF	OFF
Emitter failure (time out)	—	—	●	●	OFF	OFF
Receiver failure (time out)	—	—	●	●	OFF	OFF

Indicator table	Indicator
●	Lighting
●	Light out
●	Flashing at 0.5 sec interval
●	Flashing simultaneously at 0.5 sec interval
●	Cross-flashing at 0.5 sec interval
●	Sequence-flashing at 0.5 sec interval

#### ■ Troubleshooting

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

#### ■ 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.
  - Indoors (in the environment condition rated in 'Specifications')
  - Altitude max. 2,000m
  - Pollution degree 2
  - Installation category II

