Cross-Beam Area Sensor

■ Features

Shaded parts (▬) are changed and added functions from previous BWC Series.

- Minimized blind zone with 3-point cross-beam netting method
- Long sensing distance: 1 to 7m
- 7 types of model
  : wide range of choice in the number of optical axis (4 to 20), pitch of optical axis (40, 80mm), and sensing width (120 to 1,040mm)
- Easy installation with installation mode
- Built-in interference protection, self-diagnosis function
- Self-diagnosis output
  : sensing front screen contamination and covering optical axis by itself, making easy to see the status from external equipment (patent)
- Conspicuous high luminance indicators at emitter/receiver for easy check of the status from side, front even long distance
- Suitable for KRS Korean Railway Srandard (BWC80-14HD meets KRS conditions.)
- Protection structure IP67 (IEC structure)

⚠ Please read "Safety Considerations" in the instruction manual before using.

(only for BWC80-14HD model)

■ Applications

Various environment:
Utilized in various environment: obstacle detecting sensor for subway platform screen door (PSD), and etc.

■ Ordering Information

BWC **40** – **14** **H**

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

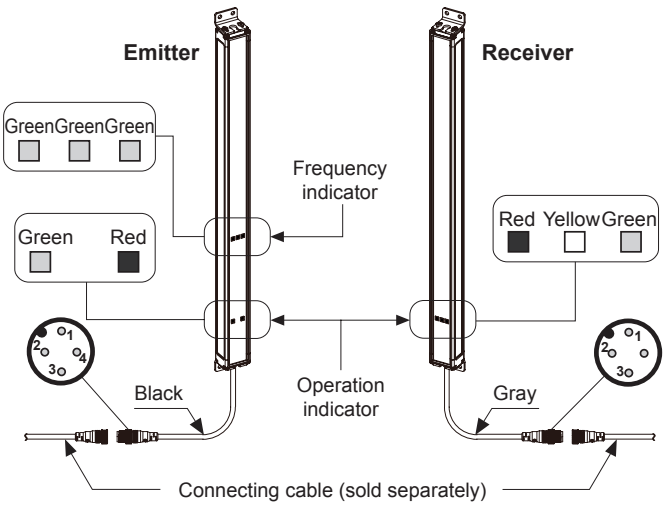
■ Specifications

Model	BWC40-□□H	BWC40-□□HD	BWC80-14H	BWC80-14HD
Sensing type	Through-beam type			
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	4/10/12/16/18/20		14	
Sensing height	120 to 760mm		1,040mm	
Beam pattern	3-point cross-beam netting type			
Response time	Max. 50ms			
Power supply	12-24VDC⎓ ±10% (ripple P-P: max. 10%)			
Current consumption	Max. 100mA			
Light source	Infrared LED (850nm modulated)			
Operation mode	Light ON	Dark ON	Light ON	Dark ON
Control output	NPN open collector output • Load voltage: max. 30VDC⎓ • Load current: max. 100mA(self-diagnosis output: max 50mA) • Residual voltage: max. 1VDC⎓			
Protection circuit	Reverse power polarity, output short over current protection circuit			
Insulation resistance	Over 20MΩ (at 500VDC megger)			
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 simulation			
Dielectric strength	1,000VAC 50/60Hz for 1 min			
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours			

Model		BWC40-□□H	BWC40-□□HD	BWC80-14H	BWC80-14HD
Shock		500m/s² (approx. 50G) in each X, Y, Z direction for 3 times			
Environment	Ambient illumination	Ambient light: max. 100,000lx (received light side illumination)			
	Ambient temperature	-10 to 55℃, storage: -20 to 60℃			
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH			
Protection structure		IP65 (IEC standard)			
Material		Case: Aluminum, sensing part and indicator: Acrylic			
Cable		Ø5mm, 4-wire, 300mm, M12 connector			
Accessory		Bracket A: 4, Bracket B: 4, Fixing bolt: 8			
Korean Railway Standards		—			KRS SG 0068
Approval		CE			CE, KC
Weight※1		Approx. 2.1kg (approx. 1.7kg) (based on BWC80-14H)			

※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 environment.

■ Structure



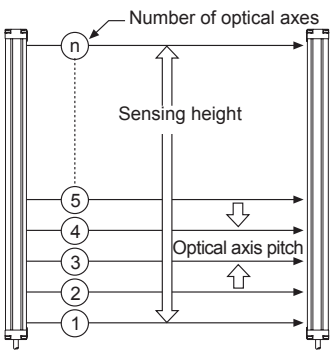
< Operation indicator>

LED color	Emitter	Receiver
Green	Power	Stable light ON
Yellow	—	Unstable area
Red	Installation mode	Stable light OFF

<Wiring connection>

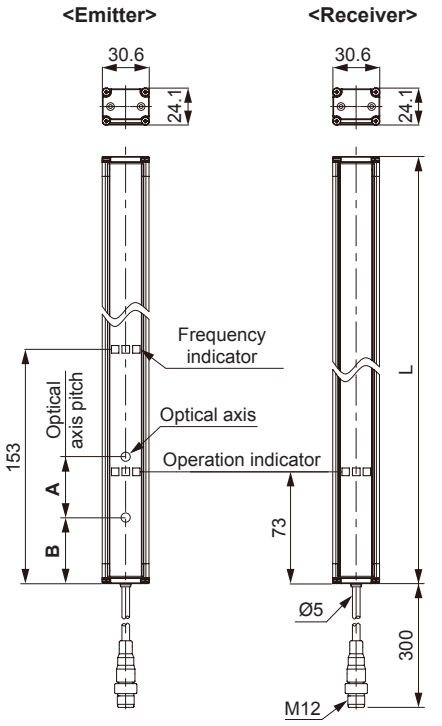
Pin No	Cable color	Emitter	Receiver
1	Brown	12-24VDC	12-24VDC
2	White	Sync	Sync
3	Blue	0V	0V
4	Black	Mode	OUT

■ Optical Axis Pitch/Number Of Optical Axes/Sensing Height



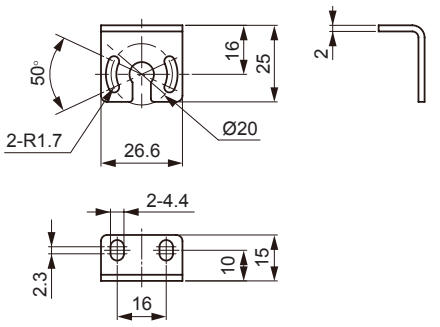
Model	Number of optica axes	Sensing height	Optical axis pitch
BWC40-04H/HD	4	120mm	40mm
BWC40-10H/HD	10	360mm	
BWC40-12H/HD	12	440mm	
BWC40-16H/HD	16	600mm	
BWC40-18H/HD	18	680mm	
BWC40-20H/HD	20	760mm	
BWC80-14H/HD	14	1,040mm	80mm

▣ Dimensions

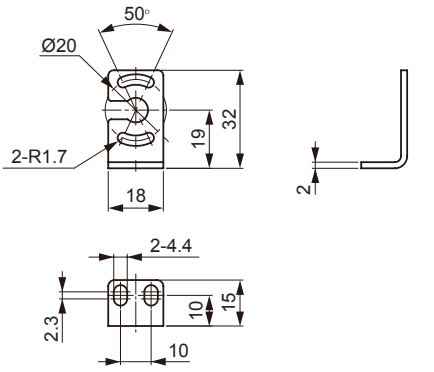


Model	L	A, B
BWC40-04H/HD	160	40
BWC40-10H/HD	400	
BWC40-12H/HD	480	
BWC40-16H/HD	640	
BWC40-18H/HD	720	
BWC40-20H/HD	800	
BWC80-14H/HD	1120	80

● **Bracket A**

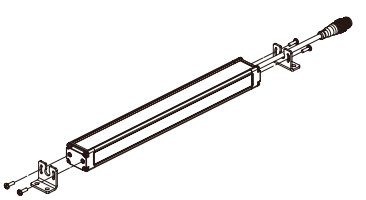


●**Bracket B**

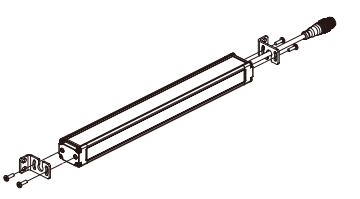


▣ Bracket Mounting

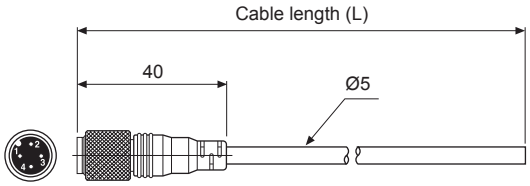
● **Mounting the bracket A**



● **Mounting the bracket B**



■ Connection Cable (sold separately)



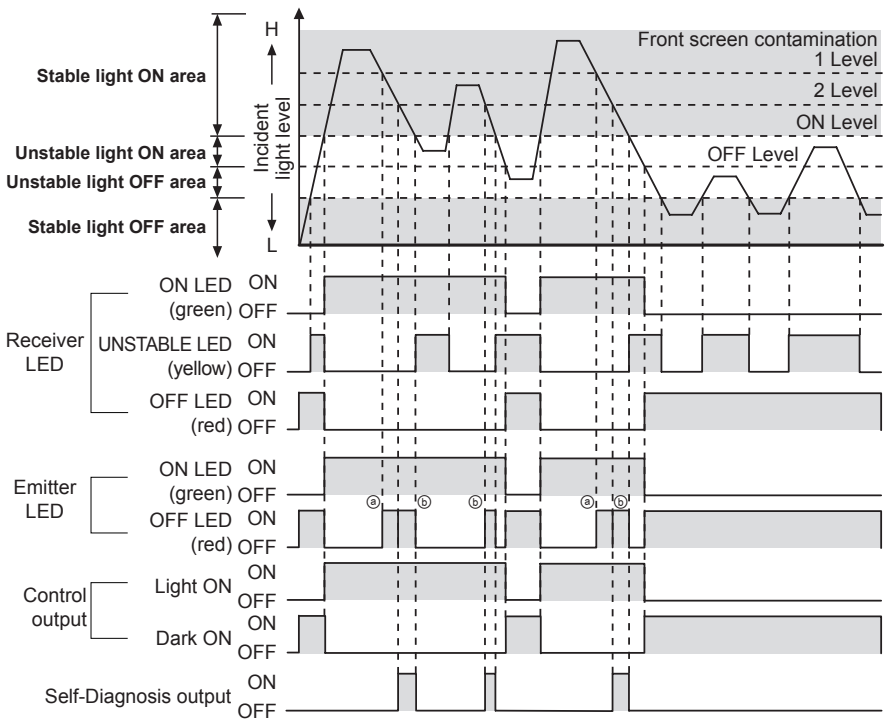
※Connection cable is sold separately as one set; each of emitter's and receiver's.

Type	Model	L	Cable color
For emitter	CID4-3T	3m	Black
	CID4-5T	5m	
	CID4-7T	7m	
	CID4-10T	10m	
For receiver	CID4-3R	3m	Gray
	CID4-5R	5m	
	CID4-7R	7m	
	CID4-10R	10m	

■ Operation Mode

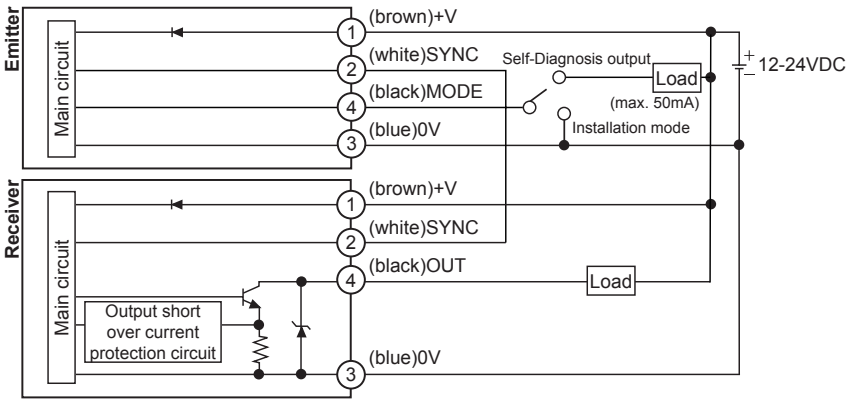
Operation mode	Light ON	Dark ON
Receiver	Received light Interrupted light	Received light Interrupted light
Operation indicator (Green LED)	ON OFF	ON OFF
Transistor output	ON OFF	ON OFF

■ Operation Timing Diagram



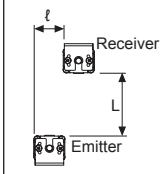
※ⓐ: [Self-diagnosis output] Front screen contamination level 1 / flashing at 1 sec interval
ⓑ: [Self-diagnosis output] Front screen contamination level 2, covering optical axis / flashing at 0.25 sec interval

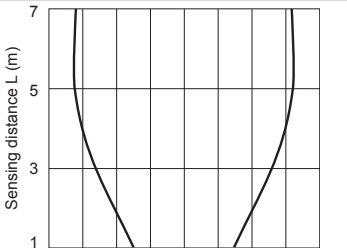
▣ Control Output Circuit

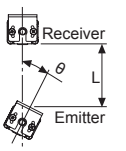


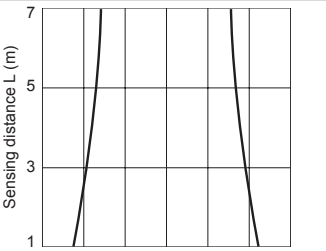
▣ Feature Data

Parallel shifting characteristic		Angle characteristic	
Measuring method	Data	Measuring method	Data









▣ Functions

◎ 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.

☼: ON, ●: OFF

Transmitted light frequency	Frequency indicator		
	Green 1	Green 2	Green 3
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 t 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.

● 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

※For more information about operation indication display, refer to "**▣ Operation Indicator**"

■ Operation Indicator

Item		Emitter		Receiver				
		Indicator		Indicator			Control output	
		Green	Red	Green	Yellow	Red	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	☼	◑	☼	●	◑	OFF	OFF
	Hysterisis section	●	◑	●	☼	◑		
	Abnormal installation	●	◑	●	●	◑		
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

Indicators	
☼	Lighting
●	Light out
◑	Flashing at 0.5 sec interval
◑◑ or ◑◑◑	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	Supply the rated power.
	Cable incorrect connection, or isconnection	Check the wiring connection
	Out of rated sensing distance	Use it within rated sensing 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 the rated sensing distance	Use it within the rated sensing distance.
	There is an obstacle to cut off the emitted light between emitter and receiver.	Remove the obstacle.
	There is strong electric wave or noise generator such as motor, electric generator, or high voltage line, etc.	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.	Check the wiring connection.
	Over load	Check the rated load capacity.

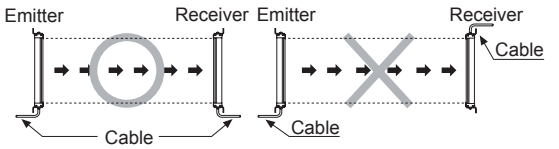
▣ Installation

For the first installation, enter installation mode.

① Entry method for installation mode: Supply the power with inputting 0V to terminal 4 (black) MODE of Emitter.
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 the power to the unit.

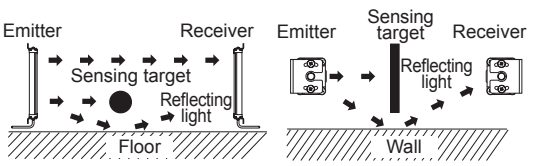
◎ For direction of installation

Emitter·Receiver should be installed in same up/down direction.



◎ For reflection from the surface of wall/flat

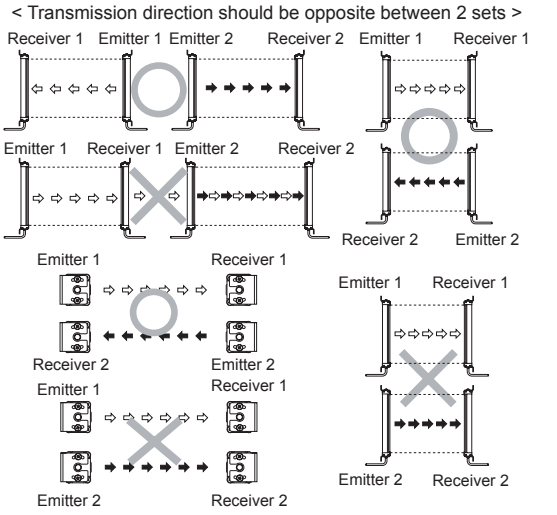
When installing it as below, the light reflected from the surface of wall and flat is not shaded. Please check whether it operates normally or not with a sensing target before using. (interval distance: min. 0.5m)



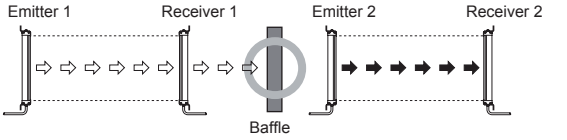
◎ For protection of interference

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 interference protection function

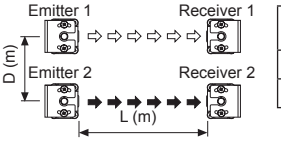
< Transmission direction should be opposite between 2 sets >



< 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	Over 0.4m
Over 3m	L×tan8°=L×0.14

※It may be different by installation environment.
※Avoid using the unit in the place where the sensor is exposed directly to the fluorescent light with high speed start or high frequency.

▣ Proper Usage

1. Follow instructions in 'Cautions during Use'.
   Otherwise, It may cause unexpected accidents.
2. 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
3. Use the product, 1 sec after supplying power.
   When using separate power supply for the sensor and load, supply power to sensor first.
4. 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.
5. When connecting a DC relay or other inductive load, remove surge by using diodes or varistors.
6. Wire as short as possible and keep away from high voltage lines or power lines, to prevent surge and inductive noise.
7. 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