Area Sensor

▣ Features

- Long sensing distance up to 7m
- 22 types of products
  (optical axis: 20/40mm, sensing height: 120 to 940mm)
- Minimizes unsensing area with 20mm optical axis pitch (BW20-□)
- Easy to recognize at side, front, and long-distance
  by high brightness LED of Emitter and Receiver
- Includes self-diagnosis function, mutual interference prevention
  function, external diagnosis function.
- Protection structure IP65 (IEC standard)

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

CE

▣ Ordering Information

BW **20** – **08** **P**

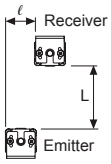
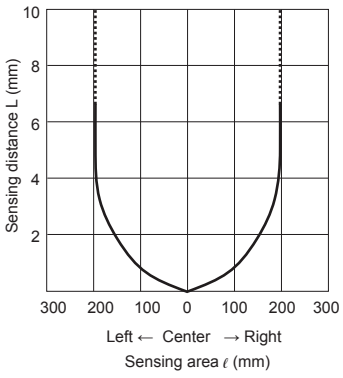
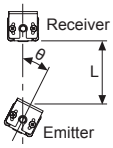
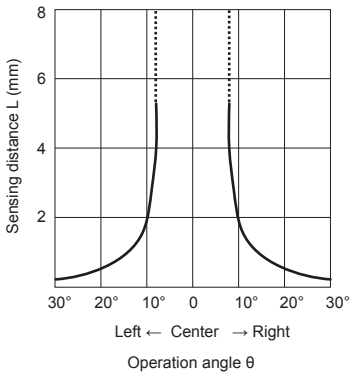
Control output	**No mark**	NPN open collector output
	P	PNP open collector output
Number of optical axis	**04 to 48**	4 to 48
Optical axis pitch	**20**	20mm
	40	40mm
Item	**BW**	Cross-beam area sensor

▣ Specifications

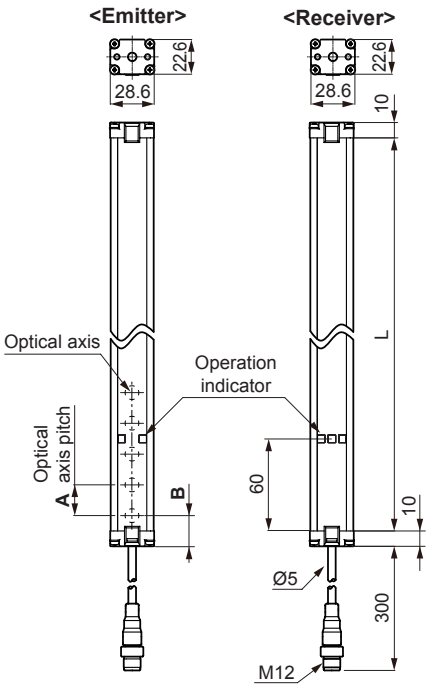
Model		**BW20-□(P)**	**BW40-□(P)**
Sensing method		Through-beam type	
Sensing distance		0.1 to 7m	
Min. sensing target		Opaque material of min. Ø30mm	Opaque material of min. Ø50mm
Optical axis pitch		20mm	40mm
Number of optical axis		8 to 48	4 to 24
Sensing height		140 to 940mm	120 to 920mm
Response 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 1 min	
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 illumination	Ambient light: max. 100,000lx (receiver 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, • 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.

▣ Feature Data

Parallel shifting characteristic		Angle characteristic	
Measuring method	Data	Measuring method	Data
			

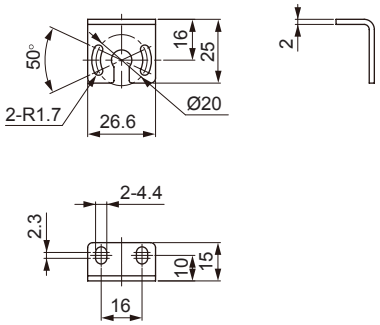
▣ Dimensions



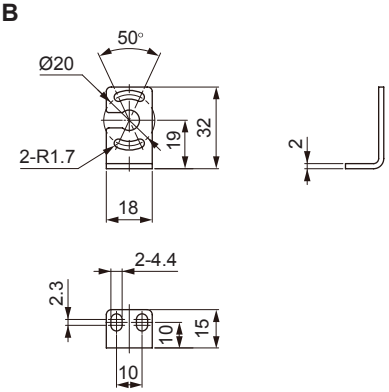
(unit: mm)

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

● **Bracket A**

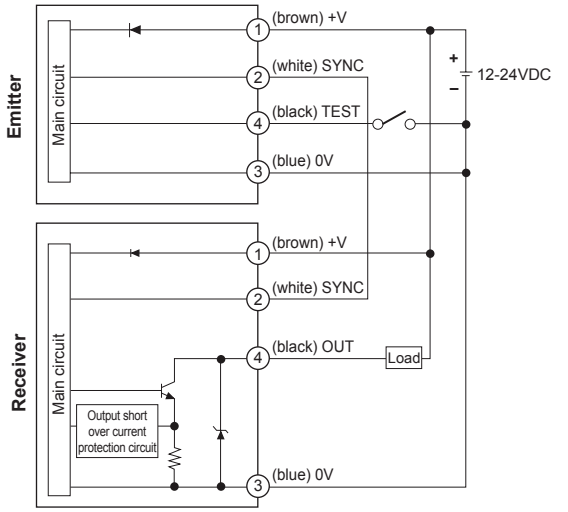


● **Bracket B**

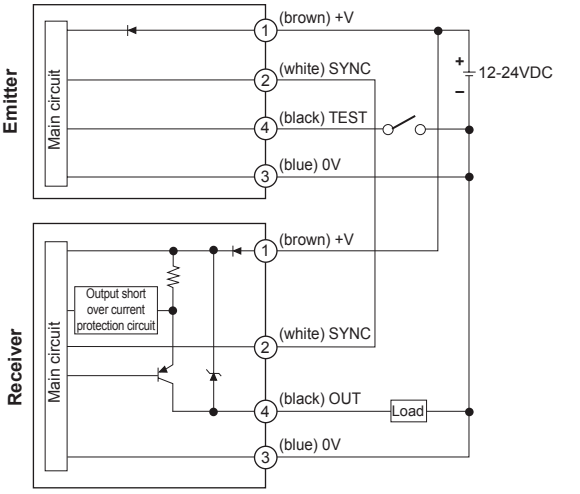


▣ Input·Output Circuit and Connections

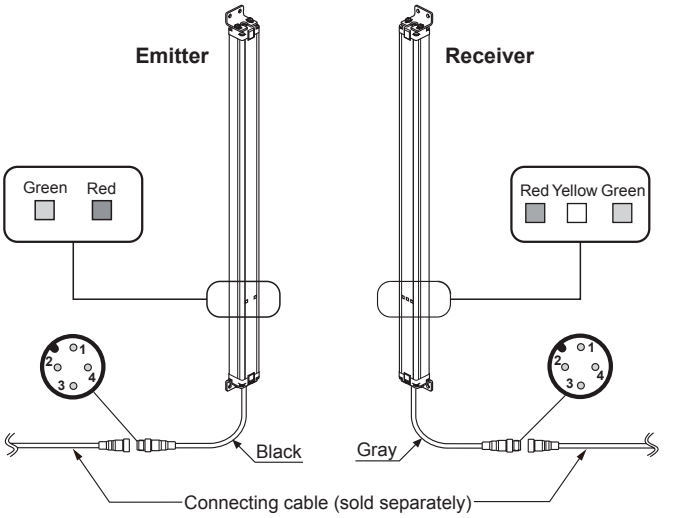
● **NPN open collector output**



● **PNP open collector output**



▣ Structure



<Operation indicator >

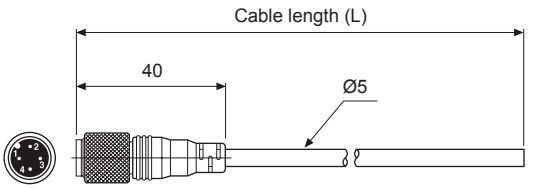
LED color	Emitter	Receiver
Green	POWER	Stable light ON
Yellow	—	Unstable
Red	TEST (M/S)	Stable light OFF

<Wiring Connection >

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

▣ Connecting Cable (sold separately)

(unit: mm)

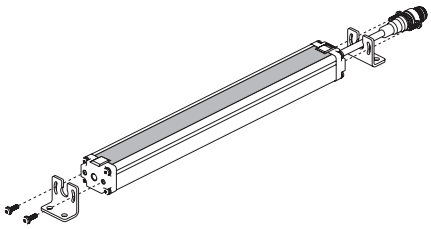


Type	Model	L	Cable color
Emitter	CID4-3T	3m	Black
	CID4-5T	5m	
	CID4-7T	7m	
	CID4-10T	10m	
Receiver	CID4-3R	3m	Gray
	CID4-5R	5m	
	CID4-7R	7m	
	CID4-10R	10m	

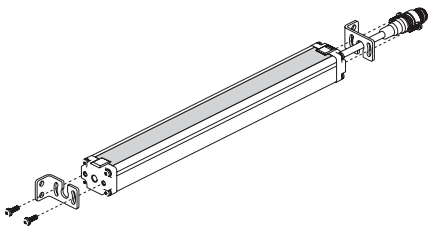
※Connecting cable is sold separately as one set; each of emitter's and receiver's.

▣ Bracket Mounting

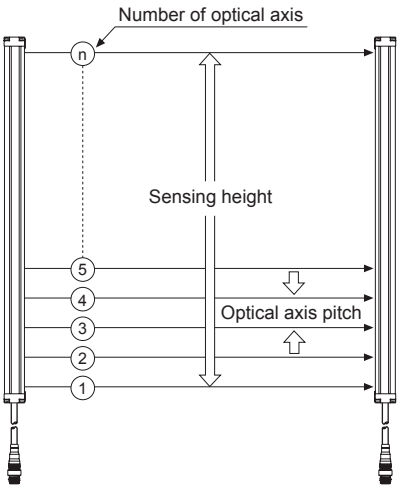
- **Mounting the bracket A**



- **Mounting the bracket B**



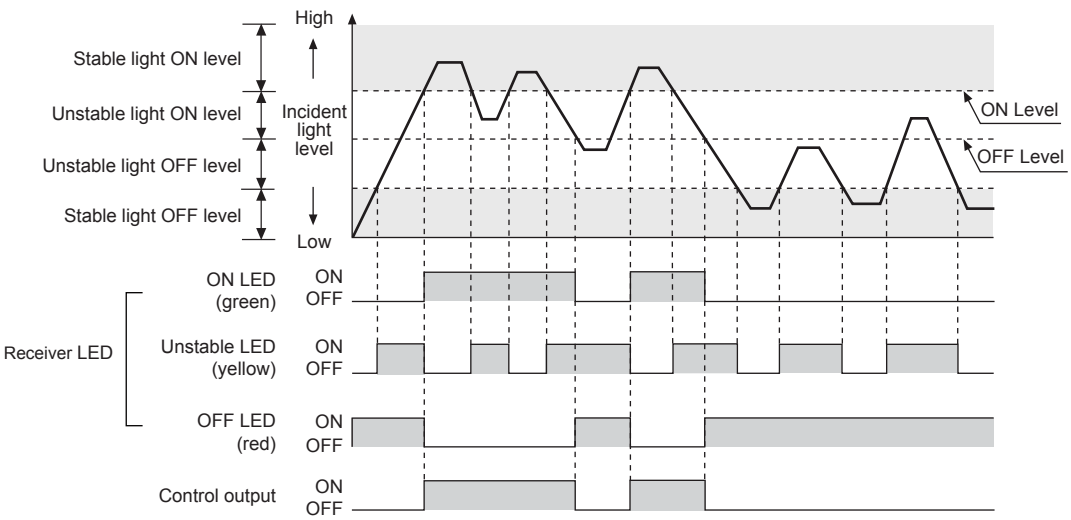
▣ Optical Axis Pitch/Number of Optical Axis/Sensing Height



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

▣ Operation Timing Diagram

- **Operation mode: Light ON fixed**

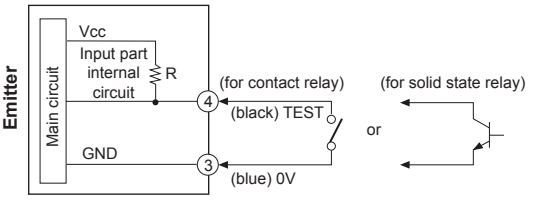


▣ Function

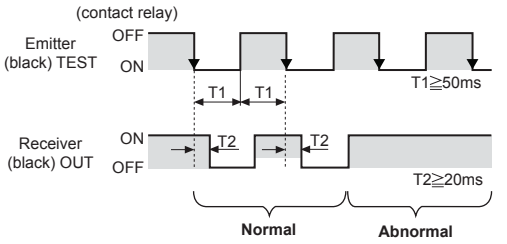
◎ Emitter OFF (external diagnosis)

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.

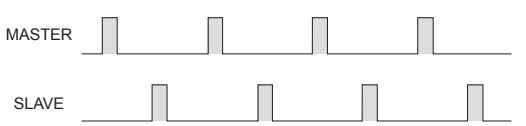
● Operation indicator displays each diagnosis items in different way. Refer to "▣ **Operation Indicator**".

◎ 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.

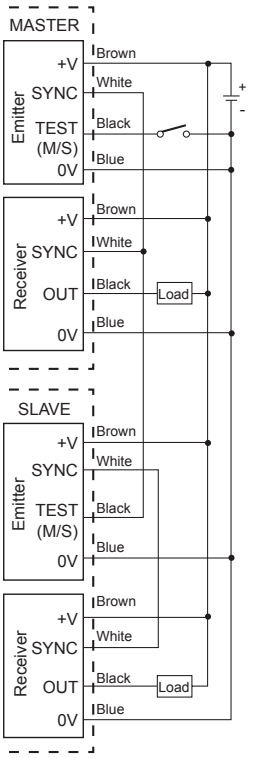
This function is operating a sensor as MASTER and another sensor as SLAVE to avoid these sensing errors by the light interference.

● Time chart for MASTER/SLAVE transmission pulse

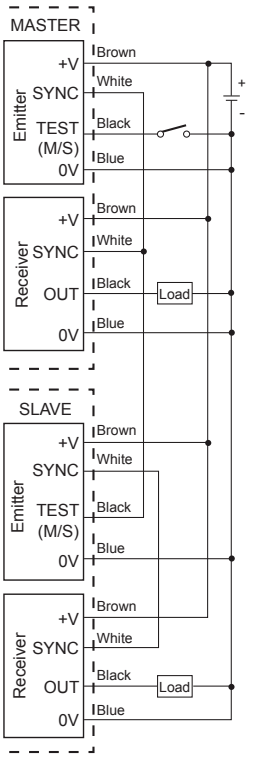


● MASTER/SLAVE connections

<NPN open collector output >



<PNP open collector output >

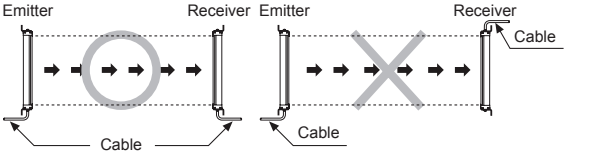


※Connect 'TEST (M/S)' of SLAVE emitter to 'SYNC' of MASTER.

▣ Installation

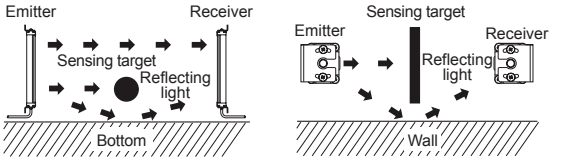
◎ For direction of installation

Emitter and receiver should be installed in same up/down direction.



◎ For reflection from the surface of wall and flat

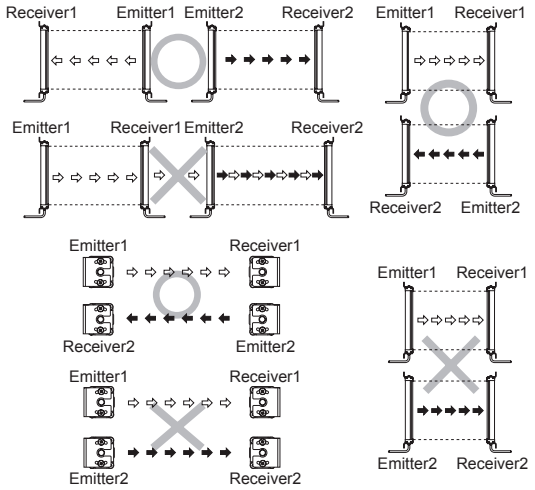
When installing it as below the light reflected from the surface of wall and flat will not be shaded. Please, check whether it operates normally or not with a sensing target before using. (Interval distance: min. 0.5m)



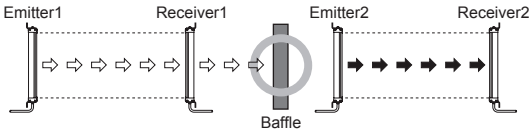
◎ For prevention of interference

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.

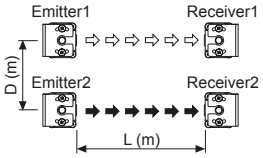
- **Transmission direction should be opposite between 2 sets**



- **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°=min. L×0.14

※There can be a little different based on 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.

■ Operation Indicator

Item		Emitter		Receiver			
		Indicator		Indicator			Control output Light ON
		Green	Red	Green	Yel-low	Red	
Power 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
●	Light OFF
◑	Flashing by 0.5 sec
◑ ◑ or ◑ ◑ ◑	Flashing simultaneously by 0.5 sec
▶ ◀	Cross-flashing by 0.5 sec
▶ ▶ ▶	Sequence-flashing twice by 0.5 sec
▶ ▶ ◀ ◀	Cross-flashing twice by 0.5 sec

■ Troubleshooting

Malfunction	Cause	Troubleshooting
Not operating	Power supply	Supply the rated power.
	Incorrect cable connection or disconnection	Check the wiring.
	Rated connection failure	Use it within rated sensing distance.
Not operating 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 no target object.	Out of rated sensing distance	Use within the rated sensing 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 generated by 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 Autonics Corp.
LED displays for failure of emitter	Break of light emitting circuit	
LED displays for failure of receiver	Break of light emitting receiving element	
LED displays for synchronous line	Synchronous line incorrect connection or disconnection	Check the wiring.
	Break of synchronous circuit of emitter or receiver	Contact Autonics Corp.
LED displays for control output over current	Control output line is shorten	Check the wiring.
	Over load	Check the rated load capacity.
LED displays for emitter malfunction	Emitter malfunction	Treat after checking the emitter display LED.

▣ Proper Usage

1. Follow instructions in 'Proper Usage'.
   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