



# Autonics BW Series Single-Beam Area Sensors Instruction Manual

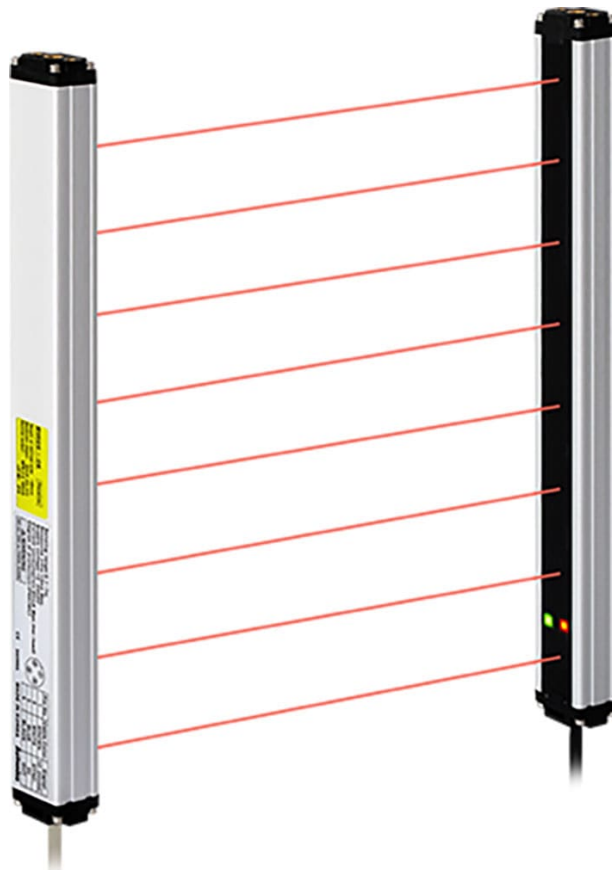
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# Autonics

**Autonics BW Series Single-Beam Area Sensors**



## **Product Information Transparent Guide Single-Beam Area Sensors BW Series**

The BW series of transparent guide single-beam area sensors offer a reliable and efficient solution for detecting the presence or absence of objects in industrial automation applications. These sensors are equipped with emitter and receiver circuits that detect the presence of an object and provide a corresponding control output to trigger an action.

### **Safety Considerations**

It is important to follow the safety considerations provided in the user manual to avoid any accidents or injuries.

#### **These instructions include:**

1. Install a fail-safe device when using the unit with machinery that may cause serious injury or substantial economic loss.
2. Avoid using the unit in a place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.
3. Do not connect, repair, or inspect the unit while connected to a power source.
4. Check connections before wiring.
5. Do not disassemble or modify the unit.
6. Do not use this product with the purpose of injury prevention or life protection, as well as in the place where economic loss maybe present.

### **Cautions during Use**

**Follow these instructions during use:**

1. Use the unit within the rated specifications.
2. Use a dry cloth to clean the unit, and do not use water or organic solvent.
3. Do not use a load over the range of rated relay specification.

## **Cautions during Installation**

Follow these instructions during installation: Refer to the Autonics website to select the specified model.

## **Product Components**

**The product components include:**

- Emitter circuit
- Receiver circuit
- Optical axis
- Control output
- Operation indicator

## **Product Usage Instructions**

Follow these instructions to use the Transparent Guide Single-Beam Area Sensors:

1. Check the safety considerations before installation and usage.
2. Refer to the Autonics website to select the specified model for installation.
3. Use the unit within the rated specifications.
4. Clean the unit with a dry cloth and avoid using water or organic solvent.
5. Connect the unit as per the wiring instructions provided in the user manual.
6. Do not disassemble or modify the unit.
7. Use a fail-safe device when using the unit with machinery that may cause serious injury or substantial economic loss.
8. Avoid using the unit in a place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.

Thank you for choosing our Autonics product. Read and understand the instruction manual and manual thoroughly before using the product. For your safety, read and follow the below safety considerations before using. For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website. Keep this instruction manual in a place where you can find easily. The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice. Follow Autonics website for the latest information

## **Safety Considerations**

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- symbol indicates caution due to special circumstances in which hazards may occur.

**Warning** Failure to follow instructions may result in serious injury or death

1. 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.
2. 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.
3. Do not connect, repair, or inspect the unit while connected to a power source. Failure to follow this instruction may result in fire.
4. Check 'Connections' before wiring. Failure to follow this instruction may result in fire.
5. Do not disassemble or modify the unit. Failure to follow this instruction may result in fire.
6. 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 maybe present.

**Caution** Failure to follow instructions may result in injury or product damage

1. Use the unit within the rated specifications. Failure to follow this instruction may result in fire or product damage.
2. Use a dry cloth to clean the unit, and do not use water or organic solvent. Failure to follow this instruction may result in fire.
3. 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

## **Cautions during Use**

- Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
- 12 – 24 VDC 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 0 V 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. 2,000 m
  - Pollution degree 2
  - Installation category II

## **Cautions during Installation**

- Be sure to install this product by following the usage environment, location, and specified ratings. Consider the listed conditions below.
  - Installation environment and background (reflected light)
  - Sensing distance and sensing target
  - Direction of target's movement
  - Feature data
- If the installation environment has reflected light from the wall or floor, a interval distance of at least 0.5 m is required.
- When installing multiple sensors closely, it may result in malfunction due to mutual interference. Install it by referring to the interference protection and the installation method in the manual.
- Do not use in places where the light-receiving sensor is exposed to direct sunlight or where the ambient illumination is higher than the specification.
- Do not impact with a hard object or bend the cable excessively. That could decrease the product's water resistance.
- Use this product after the test. Check whether the indicator works appropriately for the positions of the detectable object

## Ordering Information

This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website



### 1. Optical axis pitch

Number: Optical axis pitch (unit: mm)

### 2. Number of optical axes

Number: Number of optical axes

### 3. Control output

**No-mark:** NPN open collector output

**P:** PNP open collector output

## Product Components

- Product × 1
- Instruction manual × 1
- Bracket A × 4
- Bracket B × 4
- Fixing bolt × 8

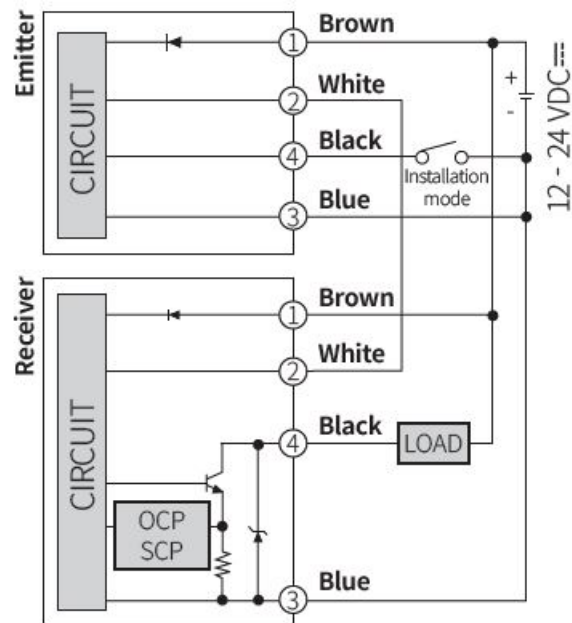
## Sold Separately

Connection cable: CID4-T(R) (1 set – emitter and receiver)

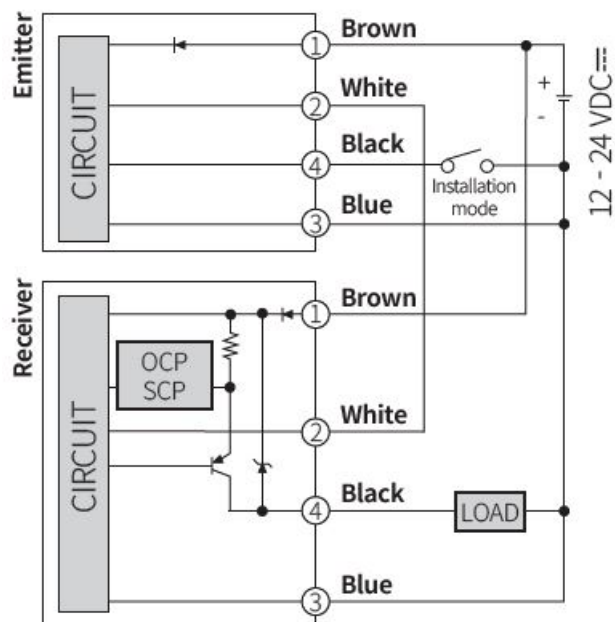
## Connections

<b>Brown</b>	12 – 24 VDC	<b>White</b>	SYNC
<b>Blue</b>	0 V	<b>Black</b>	TEST (M/S) (emitter) / OUT (receiver)

### NPN open collector output

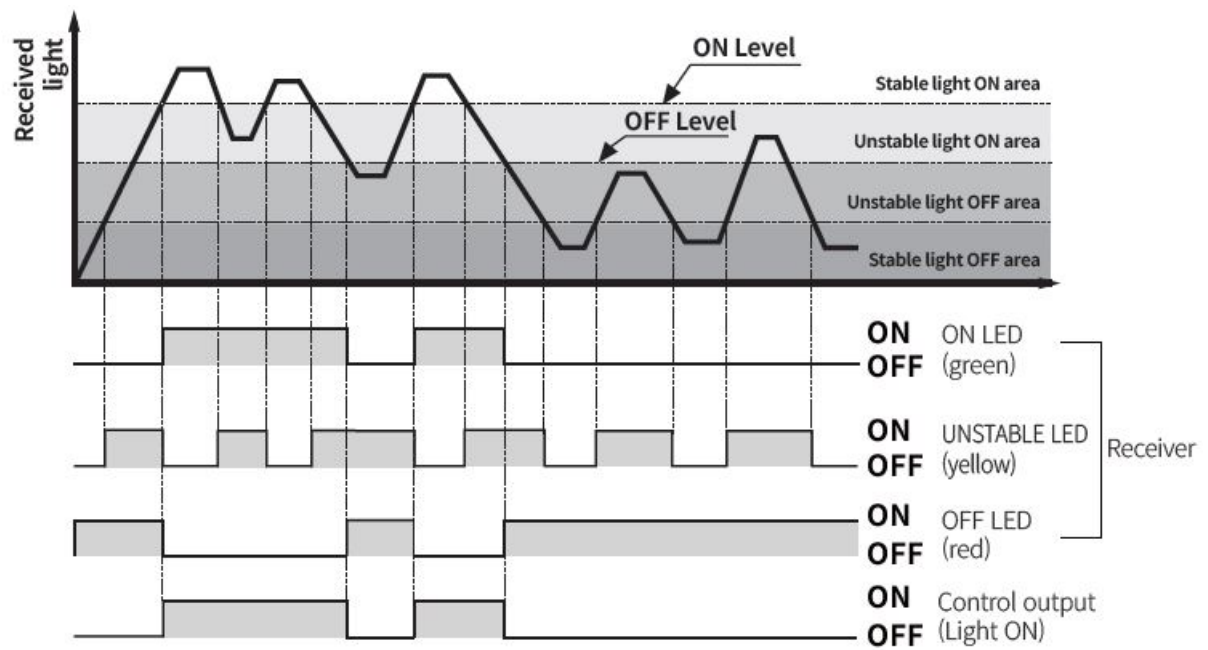


### PNP open collector output



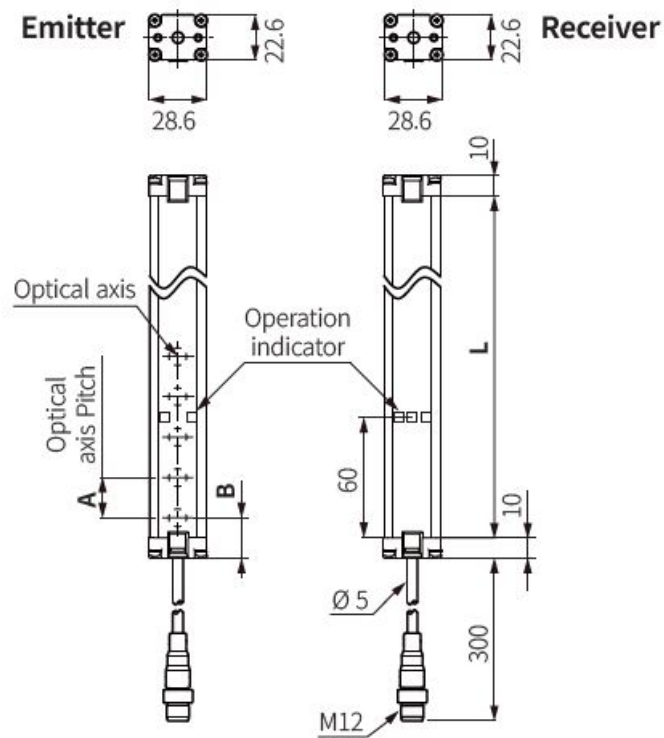
OCP (over current protection), SCP (short circuit protection)

## Operation Timing Chart



## Dimensions

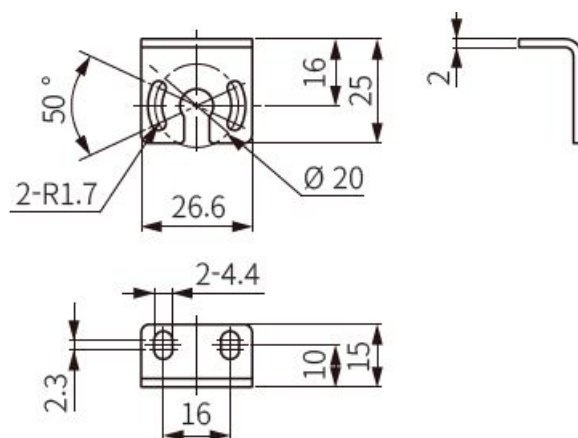
**Unit:** mm, For the detailed drawings, follow the Autonics website



**Optical axis Pitch (A, B) 40 mm**

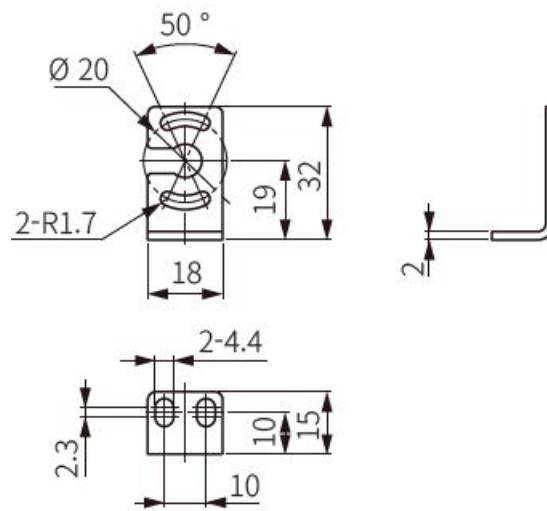
Model	Product length (L)	Num. of optical axes	Sensing height
BW40-04(P)	160	4	120 mm
BW40-06(P)	240	6	200 mm
BW40-08(P)	320	8	280 mm
BW40-10(P)	400	10	360 mm
BW40-12(P)	480	12	440 mm
BW40-14(P)	560	14	520 mm
BW40-16(P)	640	16	600 mm
BW40-18(P)	720	18	680 mm
BW40-20(P)	800	20	760 mm
BW40-22(P)	880	22	840 mm
BW40-24(P)	960	24	920 mm

#### Bracket A



#### Bracket B





## Operation Indicator

	ON		Flashing at 0.5 sec interval	<sup>01)</sup>	Cross-flashing at 0.5 sec interval
	OFF		Flashing simultaneously at 0.5 sec interval		Sequence flashing at 0.5 sec interval

Repeated twice, flashes twice at 0.5-second intervals

Item		Emitter indicator		Receiver indicator			Control output (Light ON)
		Green	Red	Green	Yellow	Red	
Power ON				-	-	-	-
MASTER operation				-	-	-	-
SLAVE operation				-	-	-	-
TEST input				-	-	-	-
Break of emitter				-	-	-	-
Break of light emitting element							OFF
Installation mode	Normal installation						OFF
	Hysteresis section						OFF
	Abnormal installation						OFF
Stable light ON		-	-				ON
Unstable light ON		-	-				ON
Unstable light OFF		-	-				OFF
Stable light OFF		-	-				OFF
Break of receiver		-	-				OFF
Over current		-	-				OFF
Synchronous line noise		-	-				OFF
Emitter failure (Time out)		-	-				OFF
Optical axis misalignment alarm		-	-				-

## Specifications

Model	BW20-□(P)	BW40-□(P)
Sensing method	Through-beam	
Light source	Infrared LED (850 nm modulated light)	
Sensing distance	0.1 to 7.0 m	
Sensing target	Opaque material	
Min. sensing target	≥ Ø 30 mm	≥ Ø 50 mm
Number of optical axes	8 to 48	4 to 24
Sensing height	140 to 940 mm	120 to 920 mm
Optical axis pitch	20 mm	40 mm
Response time	≤ 10 ms	
Operation mode	Light ON	
Functions	Emitter OFF (external diagnosis), self-diagnosis	
Interference protection	Interference protection by MASTER / SLAVE function <sup>01)</sup>	
Synchronization type	Timing method by synchronous line	
Indicator	Emitter: Operation indicator (green, red), receiver: Operation indicator (red, yellow, green)	
Approval		
Weight (packaged)	≈ 1.4 kg (≈ 2.1 kg) (based on BW20-48)	≈ 1.4 kg (≈ 2.1 kg) (based on BW40-24)

Connect '(TEST)M/S' of SLAVE emitter to 'SYNC' of MASTER. Refer to the product manual

<b>Power supply</b>	12 – 24 VDC (ripple P-P: ≤ 10 %)
<b>Current consumption</b>	Emitter / receiver: ≤ 120 mA
<b>Control output</b>	NPN or PNP open collector output
Load voltage	≤ 30 VDC
Load current	≤ 100 mA
Residual voltage	NPN: ≤ 1 VDC, PNP: ≤ 2.5 VDC
<b>Protection circuit</b>	Reverse power protection circuit, output short overcurrent protection circuit
<b>Insulation resistance</b>	≥ 20 MΩ (500 VDC megger)
<b>Noise immunity</b>	± 240 V the square wave noise (pulse width 1 ) by the noise simulator
<b>Dielectric strength</b>	1,000 VAC 50 / 60 Hz for 1minute
<b>Vibration</b>	1.5 mm double amplitude at frequency of 10 to 55 Hz (for 1 min) in each X, Y, Z direction for 2 hours
<b>Shock</b>	500 m/s <sup>2</sup> (≈ 50 G) in each X, Y, Z direction for 3 times
<b>Ambient illumination (receiver)</b>	Ambient light: ≤ 100,000
<b>Ambient temperature</b>	-10 to 55 °C, storage: -20 to 60 °C (no freezing or condensation)
<b>Ambient humidity</b>	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)
<b>Protection rating</b>	IP65 (IEC standard)
<b>Cable spec.</b>	Ø 5 mm, 4-wire, 300 mm
<b>Connector spec.</b>	M12 plug connector
<b>Material</b>	Case: AL, front cover and sensing part: acryl

## Installation Mode

This function is for stable installation. For the first installation, enter installation mode

1. Inputting 0 V to 4th terminal of emitter which is (black) TEST, supply power to the product to enter to the

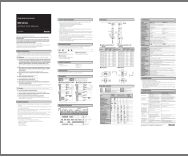
installation mode.

2. After entering installation mode, install the unit at the position where green LED of receiver operation indicator turns ON.
3. After installation, disconnect the 4th terminal of emitter (black) TEST and re-supply power to the unit.

## Troubleshooting

Malfunction	Cause	Troubleshooting
Non-operation	Power supply	Supply the rated power.
	Cable incorrect connection, or disconnection	Check the wiring connection.
	Out of rated sensing distance	Use it within rated sensing distance.
Non-operation in some times	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.
LED displays for failure of emitter	Break of emitter	Contact Autonics Corp.
LED displays for failure of receiver	Break of receiver	
LED displays for break of light emitting element	Break of light emitting element	
LED displays for synchronous line	Synchronous line incorrect connection or disconnection	Check the wiring connection.
	Break of synchronous circuit of emitter or receiver	Contact Autonics Corp.
LED displays for emitter malfunction	Break of emitter	Treat after checking the emitter display LED.
LED displays for over current	Control output line is shorted out.	Check the wiring connection.
	Over load	Check the rated load capacity.

Documents / Resources

	<p><a href="#">Autonics BW Series Single-Beam Area Sensors</a> [pdf] Instruction Manual</p> <p>BW Series Single-Beam Area Sensors, BW Series, Single-Beam Area Sensors, Beam Area Sensors, Area Sensors, Sensors</p>
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References

-  [www.autonics.com](http://www.autonics.com)