



Rectangular Photoelectric Sensors

BJX Series

PRODUCT MANUAL

Be sure to follow the instructions and precautions in the instruction manual, other manuals, and the Autonics website.

The specifications, dimensions, and other information in this document are subject to change without notice for product improvement. Certain models may be discontinued without notice.

Safety Precautions

- ‘Safety Precautions’ are provided to ensure safe and proper use of the product and to prevent accidents or hazards. Please make sure to follow them carefully.
- ⚠ symbol indicates a caution, warning of potential hazards under certain conditions..

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

- 01. Fail-safe device must be installed when using the product in applications that may cause serious injuries or property loss. (E.g. nuclear control systems, medical equipment, ships, vehicles, railroads, aircraft, combustion devices, safety devices, security systems, disaster prevention devices, etc.)**
Failure to do so may result in personal injury, property loss or fire.
- 02. Do not use or store the product in environments containing flammable, explosive, or corrosive gases, or in places exposed to high humidity, direct sunlight, radiant heat, vibration, shock, or salt.**
Failure to do so may result in explosion or fire.
- 03. Do not disassemble, repair, or modify the product without authorization.**
Failure to do so may result in fire.
- 04. Do not connect, repair, or inspect the product while connected to a power source.**
Failure to do so may result in fire.
- 05. Check the connection diagram before wiring.**
Failure to do so may result in fire.

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

- 01. Use the product within its rated specifications and performance limits.**
Failure to do so may result in fire or product damage.
- 02. Use a dry cloth to clean the product. Do not use water or organic solvents.**
Failure to do so may result in fire.

Cautions During Use

- Make sure to follow the instructions in ‘Cautions During Use’. Failure to do so may result in unexpected accidents.
- When connecting inductive loads such as DC relays or solenoid valves use a diode, varistor, or similar component to suppress surges.
- Wait at least 0.5 seconds after applying power before using the product. When using separate power supplies for sensor and load, apply power to the sensor first.
- Power input should be supplied from an isolated and limited voltage/current source, or from a Class 2 or SELV power supply.
- To prevent surges and inductive noise, separate the wiring from high-voltage and power lines, and keep wiring lengths as short as possible.
- When supplying power with an SMPS, ground the F.G. terminal and connect a noise suppression capacitor between the 0 V and F.G. terminals.
- When using the product with noise-generating devices (e.g. switching regulators, inverters, servo motors, etc.), make sure to ground the F.G. terminal of the unit.
- This product may be used in the following environmental conditions.
 - Indoors (within rated environmental performance specifications)
 - Altitude: up to 2,000 m
 - Pollution Degree 3
 - Installation Category II

Product Components

Sensing type	Through-beam	Polarized retroreflective	Diffuse reflective
Product components	Product, instruction manual		
Reflector	-	MS-2A	-
Adjustment screwdriver	× 1	× 1	× 1
Bracket A or B ⁰¹⁾	× 2	× 1	× 1
M3 bolt	× 4	× 2	× 2

01) Cable type: Bracket A, connector type: Bracket B

For reference only. The actual product does not support all combinations.
To check all supported models, please refer to the Autonics website.

① Sensing distance Number: Sensing distance (unit: mm) Number+M: Sensing distance (unit: m)	⑤ Through-beam Emitter/Receiver⁰¹⁾ No mark: Reflective type 1: Emitter
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T: Through-beam
P: Polarized retroreflective
D: Diffuse reflective

D: 10 - 30 VDC

T: Solid state (transistor)

01) This model name is for through-beam photoelectric sensor management only and is not required when placing an order.

- Reflector: MS Series
- Retroreflective tape: MST Series
- Bracket A, B
- M8 connector cable: C1D(H)408-□, C1D(H)408-□

- 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
 - Characteristic curves
- When installing multiple sensors closely, mutual interference may cause malfunction.
- For installation, tighten the screw with a torque of 0.5 N m. Mount the brackets correctly to prevent the twisting of the sensor's optical axis.
- 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.

Setting Operation Mode

- Be sure to set the mode before power-on.
- Use the offered adjustment screwdriver. Do NOT turn with excessive force to prevent product damage.
- In case of through-beam type, the operation mode switch is on the receiver.

Operation Timing Chart and Indicators

The graph illustrates the relationship between Received light, Through-beam, and Reflective signals over time. The vertical axis represents light intensity, and the horizontal axis represents time. A dashed line indicates the Operation level.

The graph is divided into four horizontal regions:

- Stable light ON area**: The top region where the light signal is stable and above the operation level.
- Unstable light ON area**: The region below the stable light ON area, where the light signal is still above the operation level but fluctuates.
- Unstable light OFF area**: The region below the unstable light ON area, where the light signal is below the operation level but fluctuates.
- Stable light OFF area**: The bottom region where the light signal is stable and below the operation level.

The **Through-beam** signal is a square wave that is ON (high) during the Stable light ON area and OFF (low) during the Unstable light ON area. The **Reflective** signal is a square wave that is ON (high) during the Unstable light ON area and OFF (low) during the Stable light ON area.

The graph shows three cycles of light ON and OFF, with the Through-beam signal being ON during the first two cycles and OFF during the third cycle.

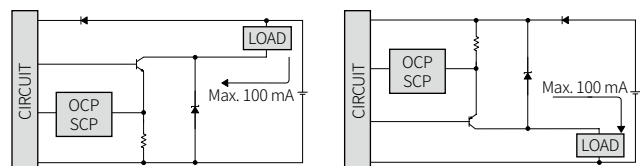
- In Dark ON mode, the waveforms are reversed.
- Operation indicator and transistor output differ from the sensing method.

A diagram showing a power source labeled "10-30 VDC" connected to a brown wire and a blue wire. The brown wire is connected to the positive terminal of the power source, and the blue wire is connected to the negative terminal.

Pin	Color	Function
①	Brown	+V
②	-	-
③	Blue	0 V
④	Black	OUT

- Connector pin ④ is N.C (not connected) terminal for the emitter.

■ PNP Open Collector Output

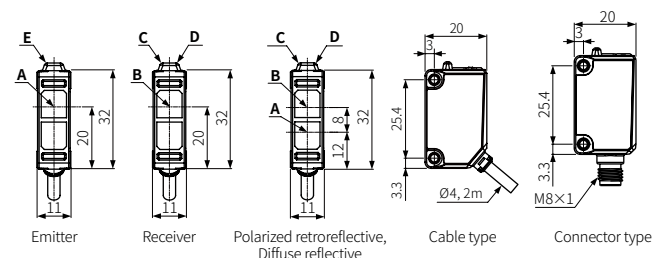


- OCP (over current protection), SCP (short circuit protection)
- If short-circuit the control output terminal or supply current over the rated specification, normal control signal is not output due to the protection circuit.

- Set the adjuster for stable Light ON area, minimizing the effect of the installation environment.
- Use the offered adjustment screwdriver. Do NOT turn with excessive force to prevent product damage.
- The steps below are based on Light ON mode.

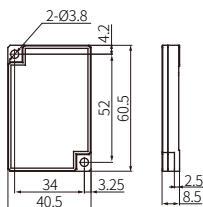
Dimensions

- Unit: mm (Refer to the CAD files from the Autronics website for exact dimensions)
- This dimensions shown are for cable type and connector types.
Refer to the 'Specifications' for the cable, wire, and connector specifications

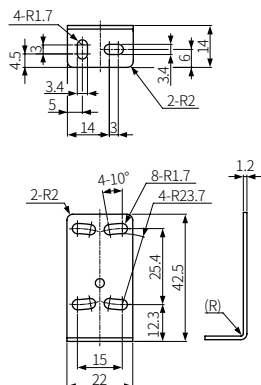


A	Optical axis of emitter	D	Stability indicator (green)
B	Optical axis of receiver	E	Power indicator (red)
C	Operation indicator (yellow)		

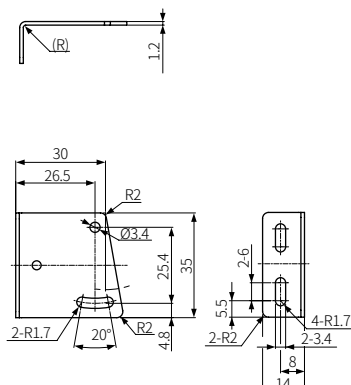
■ Reflector (MS-2A)



■ Bracket A



■ Bracket B (BJP SERIES BRACKET B)



Sold Separately: M8 Connector Cable

• For detailed information, refer to the 'M8/M12 Connector Cable' manual.

Appearance	Power	Connector 1	Connector 2	Length	Feature	Model
	DC	M8 (Socket-Female) 4-pin	4-wire	2 m	PVC	CID408-2
				5 m		CID408-5
	DC	M8 (Socket-Female) 4-pin	4-wire	2 m	Oil resistant PVC	CIDH408-2
				5 m		CIDH408-5
	DC	M8 (Socket-Female) 4-pin, L type	4-wire	2 m	PVC	CLD408-2
				5 m		CLD408-5
	DC	M8 (Socket-Female) 4-pin, L type	4-wire	2 m	Oil resistant PVC	CLDH408-2
				5 m		CLDH408-5

Specifications

Model	BJX□-TDT-□-□			BJX3M-PDT-□-□		BJX□-DDT-□-□		
Sensing type	Through-beam			Polarized retroreflective		Diffuse reflective		
Sensing distance	10 m	15 m	30 m	3 m ⁽⁰¹⁾		100 mm ⁽⁰²⁾	300 mm ⁽⁰²⁾	1 m ⁽⁰³⁾
Sensing target	Opaque materials			Opaque materials		Opaque materials, translucent materials		
Min. sensing target	≥ Ø 15 mm			≥ Ø 75 mm		-		
Hysteresis	-			-		≤ 20% of sensing distance		
Response time	≤ 1 ms							
Light source	Red LED	Infrared	Red LED	Red LED		Infrared	Red LED	Red LED
Peak emission wavelength	660 nm	850 nm	660 nm	660 nm		850 nm	660 nm	660 nm
Sensitivity adjustment	YES (Adjuster)			YES (Adjuster)		YES (Adjuster)		
Mutual interference prevention	-			YES		YES		
Operation mode	Light ON mode - Dark ON mode selectable (Adjuster)							
Indicator	Operation indicator (yellow), stability indicator (green), power indicator (red) ⁽⁰⁴⁾							
Certifications	CE 标志, RoHS, ENEC			CE 标志, RoHS, ENEC		CE 标志, RoHS, ENEC		

01) Reflector (MS-2A)

02) Non-glossy white paper 100 × 100 mm

03) Non-glossy white paper 300 × 300 mm

04) Only for the emitter

Unit weight (packaged)	Through-beam	Polarized retroreflective	Diffuse reflective
Cable type	≈ 95 g (≈ 145 g)	≈ 50 g (≈ 115 g)	≈ 50 g (≈ 100 g)
Connector type	≈ 12 g (≈ 65 g)	≈ 6 g (≈ 75 g)	≈ 6 g (≈ 60 g)
Power supply	10-30 VDC≒ ±10% (ripple P-P: ≤10%)		
Current consumption	It depends on the sensing type		
Through-beam	Emitter: ≤20 mA, receiver: ≤20 mA		
Reflective	≤30 mA		
Control output	NPN open collector output / PNP open collector output model		
Load voltage	≤30 VDC≒		
Load current	≤100 mA		
Residual voltage	NPN: ≤1 VDC≒, PNP: ≤2 VDC≒		
Protection circuit	Reverse power protection circuit, output short overcurrent protection circuit		
Insulation resistance	≥20 MΩ (500 VDC≒ megger)		
Noise immunity	±240 VDC≒ the square wave noise (pulse width: 1 μs) by the noise simulator		
Dielectric strength	Between the charging part and the case: 1,000 VAC~ 50/60 Hz for 1 min		
Vibration resistance	1.5 mm double amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 2 hours		
Shock resistance	500 m/s ² (≈ 50 G) in each X, Y, Z direction for 3 times		
Ambient illuminance (receiver)	Sunlight: ≤11,000 lx, incandescent lamp: ≤3,000 lx		
Ambient temperature	-25 to 60 °C, storage: -40 to 70 °C (no freezing or condensation) ⁽⁰¹⁾		
Ambient humidity	35 to 85 %RH, storage: 35 to 85 %RH (no freezing or condensation)		
Protection rating	IP65 (IEC standard)		
Connection	Cable type / Connector type model		
Cable specification	Ø 4 mm, 3-wire (Emitter: 2-wire), 2 m		
Wire specification	AWG26 (0.52 mm, 20-core), insulator outer diameter: Ø 1 mm		
Connector	M8 4-pin plug type		
Material	Case: PC, CAP: PC, sensing part: PMMA		

01) UL approved ambient temperature: 40 °C

Sold Separately: Reflector MS Series

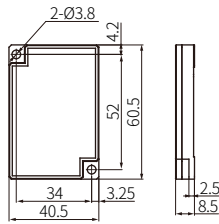
Appearance	Size (W × H)	Reflectivity	Sensing type	Model
	40.5 × 60.5 mm	Typical reflectivity	Retroreflective	MS-2
		Typical reflectivity	Polarized retroreflective	MS-2A
		High reflectivity	Polarized retroreflective	MS-2S
	81.5 × 60.5 mm	Typical reflectivity	Retroreflective	MS-3
		High reflectivity	Polarized retroreflective	MS-3S
	29.3 × 38 mm	Typical reflectivity	Retroreflective	MS-4
	15.4 × 24 mm	Typical reflectivity	Retroreflective	MS-5
	13.7 × 23 mm	Typical reflectivity	Retroreflective	MS-6

- Material: PMMA / ABS (front part / rear part)
- Installation: Bolt mounting

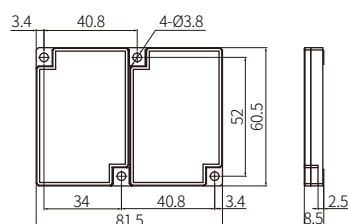
■ Dimensions

(Unit: mm)

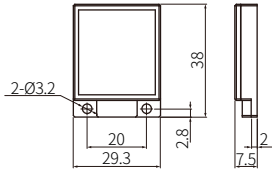
MS-2



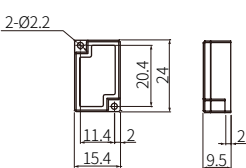
MS-3



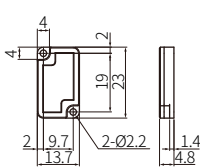
MS-4



MS-5



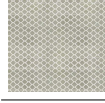
MS-6



■ Cautions During Installation

- Select a reflector size appropriate for the sensor's operating environment and installation space.
- Generally, a larger reflector provides a longer detection distance.
- Using a high-reflectance reflector increases the detection distance.
- Reflectance may vary depending on the sensor's operating conditions.

Sold Separately: Reflector Tape (MST Series)

Appearance	Size (W × H)	Packaged unit	Sensing type	Model
	50 × 50 mm	10	• Retroreflective • Polarized retroreflective	MST-50-10
	100 × 100 mm	5	• Retroreflective • Polarized retroreflective	MST-100-5
	200 × 200 mm	2	• Retroreflective • Polarized retroreflective	MST-200-2

- Material: PMMA / PC / Acrylic (surface film / prism layer / adhesive layer)
- Ambient temperature: -35 to 65 °C (temperature for adhesion: 10 to 30 °C)
- Installation: Tape cutting (installation distance: ≥ 20 mm)

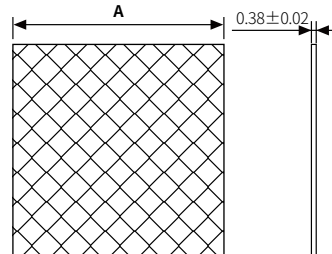
■ Effective Reflectance of MST Series

Series	Sensing type	MST-50-10	MST-100-5	MST-200-2
BTS	Retroreflective	130%	140%	150%
BM		70%	110%	170%
BMS		90%	120%	190%
BEN		90%	130%	140%
BX		90%	100%	110%
BJ/BJR/BJX	Polarized retroreflective	40%	60%	80%
BH		60%	80%	140%
BEN		70%	90%	120%
BX		30%	40%	60%
BRQ		40%	80%	90%
BRQP-B (short body type)		40%	50%	80%
BRQPS (side sensing type)		25%	30%	35%

- The values are relative measurements based on our standard mirrors set to 100%.
- The reflectance may decrease depending on the installation angle (angle of incidence) between the sensor optical axis and the mirror surface.

■ Dimensions

(Unit: mm)



Model	A
MST-50-10	□ 50
MST-100-5	□ 100
MST-200-2	□ 200

■ Cautions During Installation

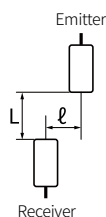
- Select a reflector tape size appropriate for the sensor's operating environment and installation space.
- Generally, a larger reflector tape provides a longer sensing distance.
- Check the reflectance of the reflector tape before use.
- Reflectance may vary depending on the sensor's operating conditions.
- Clean the surface where the reflector tape will be applied with a dry cloth before attachment.
- Avoid creasing or damaging the surface of the reflector tape.
- Clean regularly to maintain optimal performance.
- Use only neutral detergents, and avoid other chemical solvents.

Product Characteristics

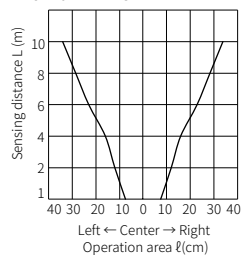
This data is based on internal testing and for reference only. Performance may vary by installation and usage environment. Product testing prior to use is recommended.

Through-beam Type (TYPICAL)

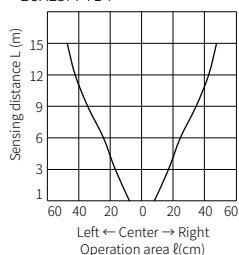
■ Detection Area



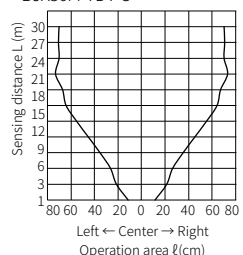
• BJX10M-TDT-C-P



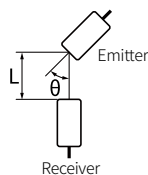
• BJX15M-TDT



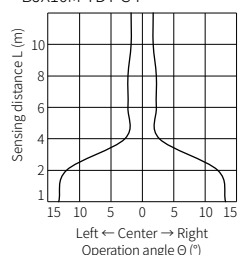
• BJX30M-TDT-C



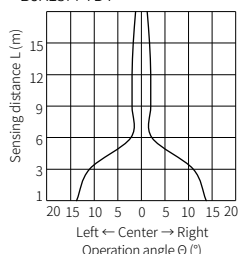
■ Emitter Angle



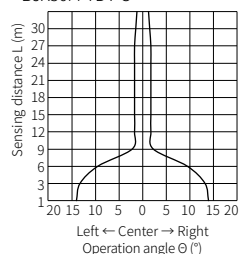
• BJX10M-TDT-C-P



• BJX15M-TDT

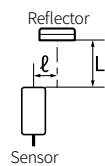


• BJX30M-TDT-C

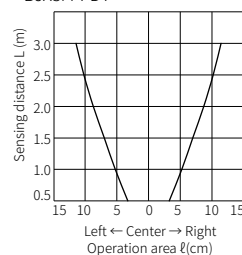


Polarized Retroreflective Type (TYPICAL)

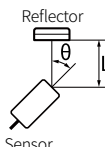
■ Detection Area



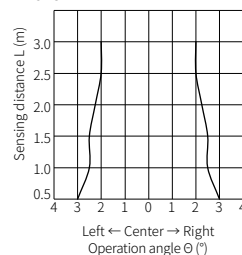
• BJX3M-PDT



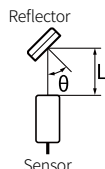
■ Sensor Angle



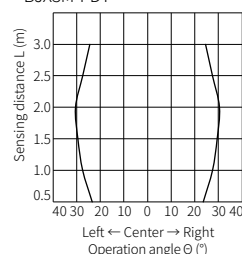
• BJX3M-PDT



■ Reflector Angle

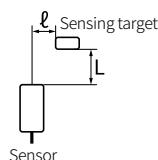


• BJX3M-PDT

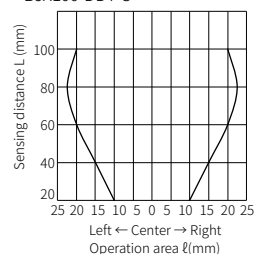


Diffuse Reflective Type (TYPICAL)

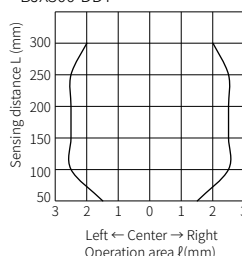
■ Detection Area



• BJX100-DDT-C



• BJX300-DDT



• BJX1M-DDT-C

