Autonics

Photoelectric Sensor
BJ SERIES
(connector type)

INSTRUCTION MANUAL

CE

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

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

⚠Caution

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.

■ Ordering Information

BJ 15 M – T D T □ – C – P

Item		
Sensing distance	Number	Sensing distance
Sensing distance unit	No-mark	mm
	M	m
Sensing type	T	Through-beam
	P	Polarized retroreflective
	D	Diffuse Reflective
Power supply	D	DC power
Output	T	Transistor output
Emitter/Receiver	1	Emitter
	2	Receiver
Connection type	C	Connector type
Control output	No-mark	NPN open collector output
	P	PNP open collector output
Item	BJ	Photoelectic sensor series

※ □: This information is intended for product management of through-beam type models. (No need to refer when selecting a model.)

■ Control Output Circuit Diagram

Item	Photoelectric sensor circuit	Connection
NPN open collector output	Main circuit; Output short overcurrent protection circuit; Load; Max. 100mA; 12-24VDC; (brown)+V; (black)Output; (blue)0V	
PNP open collector output	Main circuit; Output short overcurrent protection circuit; Load; Max. 100mA; 12-24VDC; (brown)+V; (black)Output; (blue)0V	

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

※**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

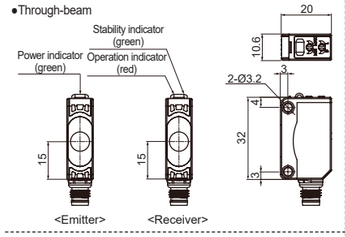
Indicator		Through-beam		Polarized retroreflective	Diffuse Reflective		
Model	NPN output	BJ15M-TDT-C	BJ10M-TDT-C	BJ3M-PDT-C	BJ1M-DDT-C	BJ300-DDT-C	BJ100-DDT-C
	PNP output	BJ15M-TDT-C-P	BJ10M-TDT-C-P	BJ3M-PDT-C-P	BJ1M-DDT-C-P	BJ300-DDT-C-P	BJ100-DDT-C-P
Sensing distance		15m	10m	3m※1	1m※2	300mm※3	100mm※3
Sensing target		Opaque materials of min. Ø12mm		Opaque materials of min. Ø75mm	Translucent, opaque materials		
Hysteresis		—			Max. 20% at sensing distance		
Response time		Max. 1ms					
Power supply		12-24VDC⎓ ±10% (ripple P-P: max. 10%)					
Power consumption		Emitter, Receiver: max. 20mA		Max. 30mA			
Light source		Infrared LED (850nm)	Red LED (660nm)	Red LED (660nm)	Infrared LED (850nm)	Red LED (660nm)	Infrared LED (850nm)
Sensitivity adjustment		Sensitivity adjuster					
Operation mode		Light ON/Dark ON Selectable					
Control output		NPN or PNP Open collector type • Load voltage: max. 26.4VDC⎓ • Load current: max. 100mA • Residual voltage - NPN: max. 1VDC⎓, PNP: max. 2.5VDC					
Protection circuit		Reverse polarity protection circuit, output short overcurrent protection circuit		Reverse polarity protection circuit, interference prevention function, output short overcurrent protection circuit			
Indicator		Operation indicator: red, stability indicator: green (emitter of power indicator for through-beam: green)					
Connection		M8 Connector					
Insulation resistance		Over 20MΩ (at 500VDC megger)					
Noise immunity		±240V the square wave noise (pulse width: 1μs) by the noise simulator					
Dielelctric strength		1,000VAC 50/60Hz for 1minute					
Vibration		1.5mm or 300m/s2 amplitude at frequency of 10 to 55Hz (for 1min) in each X, Y, Z direction for 2 hours					
Shock		500m/s² in X, Y, Z directions for 3 times					
Environment	Ambient illumination	Sunlight: max. 11,000lx, incandescent lamp: max 3,000lx (receiver illumination)					
	Ambient Temperature	-25 to 55℃, storage: -40 to 70℃					
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH					
Protection structure		IP67 (IEC standards)					
Meterial		Case: PBT, LED CAP: PC, lens: PMMA					
Accessory	Common	Fixing bracket, M3 bolt: 4, M3 nut: 4, adjustment screwdriver		Fixing bracket, M3 bolt: 4, M3 nut: 4, adjustment screwdriver			
	Individual	—		Reflector (MS-2A)	—		
Approval		CE					
Weight※4		Approx. 45g (approx. 20g)		Approx. 55g (approx. 30g)	Approx. 35g (approx. 10g)		

※1: The sensing distance is specified with the MS-2A reflector.
The distance between the sensor and the reflector should be set over 0.1m.
If reflector MS-2S, MS-3S (sold separately) are used, sensing distance will be lengthened as 0.1 to 4m, 0.1 to 5m. When using reflective tapes, the reflectivity will vary by the size of the tape. Please refer to the catalog or web site.
※2: Non-glossy white paper 300×300mm.
※3: Non-glossy white paper 100×100mm.
※4: The weight includes packaging. The weight in parenthesis is for unit only.
※M8 Connector cable: sold separately (CID408-2, CID408-5, CLD408-2, CLD408-5)
Cable: Ø4mm, 4P, length: 2m/5m (AWG22, core wire diameter: 0.08mm, no. of core wire: 60, insulator out diameter: 1.25mm)
※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

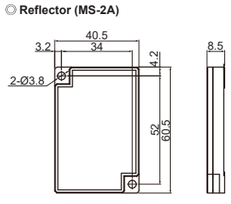
■ Dimensions

(unit: mm)

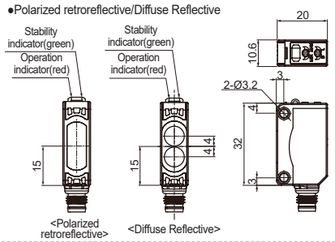
●Through-beam



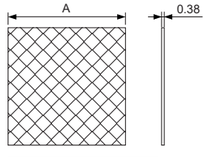
◎ **Reflector (MS-2A)**



●Polarized retroreflective/Diffuse Reflective

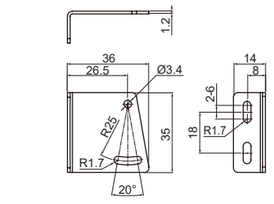


◎ **Reflective tape (sold separately)**

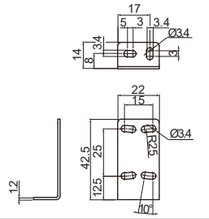


Model	A
MST-50-10	□50
MST-100-5	□100
MST-200-2	□200

● Bracket B

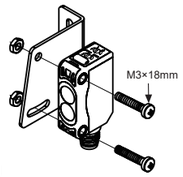


●Bracket A (sold separately)



■ Mounting and Adjustment

◎**For mounting**
When using the reflective type photoelectric sensors closely over three units, it may result in malfunction due to mutual interference.
When using the through-beam type photoelectric sensors closely over two units, it may result in malfunction due to mutual interference.
When installing the product, tighten the screw with a tightening torque of 0.5N·m.

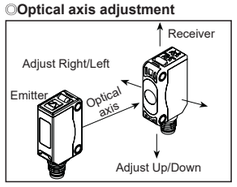


◎ **Operation mode switching**

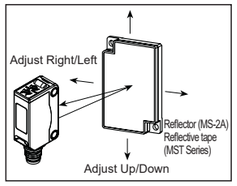
Light ON	D L	Turn the switch all the way to the right (towards L) to select Light ON operation.
Dark ON	D L	Turn the switch all the way to the left (towards D) to select Dark ON operation.

※For through-beam type, the switch is built-in the receiver.

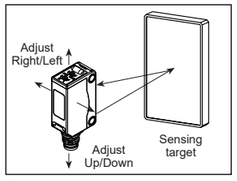
◎**Optical axis adjustment**



●**Through-beam**
1.Supply the power after setting the emitter and the receiver in opposite each other.
2.Check the stable indicator operation range with moving or rotating the position of sensor and mirror as right/left and up/down minutely and mount it in the middle of them.
3.After mounting, check the normal operation of sensor and lighting of stable indicator with sensing target or without it.
※If the sensing target is translucent body or smaller than Ø12mm, it may not sense the target because light is passed.



●**Polarized retroreflective**
1.Set sensor and reflector in opposite each other and turn on the power.
2.Check the stable indicator operation range with moving or rotating the position of sensor and reflector as right/left and up/down minutely, mount in the middle of it.
3.After mounting, check the operation is correct and the lighting of stable indicator with sensing material or without it.



●**Diffuse Reflective**
1.Set the sensor and sensing target as shown in the figure left and turn on the power.
2.Check the stable indicator operation range with moving or rotating the position of sensor and reflector as right/left and up/down minutely, mount in the middle of it.
3.After mounting, check the operation is correct and the lighting of stable indicator with sensing material or without it.

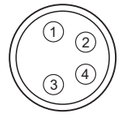
◎**Sensitivity adjustment**

Order	Sensitivity adjuster	Description
1	(A) MIN MAX	Turn the sensitivity adjuster to the right from min. sensitivity position and check (A) where the indicator is turned on in "Light ON status".
2	(A) (C) (B) MIN MAX	Turn the sensitivity adjuster more to the right from min. sensitivity position, check (B) where the indicator is turned on and turn the adjuster to the left, check (C) where the indicator is turned off in "Dark ON status". ※If the indicator is not lighted although the adjuster is turned to the max. position, the max. position is (C).
3	Optimal sensitivity (A) (C) MIN MAX	Set the adjuster at the center of (A) and (C). Also setting of the optimum sensitivity, check the operation is correct and lighting of stable indicator with sensing target or without it. If the indicator is not lighted, please check the sensing method again because sensitivity is unstable.

	"Light ON status"	"Dark ON status"
Through-beam	Emitter → Receiver	Emitter → Sensing target → Receiver
Polarized retroreflective	Sensor → Reflector	Sensor → Sensing target → Reflector
Diffuse Reflective	Sensor → Sensing target	Sensor → No sensing target

※Please set the sensitivity setting adjuster is executed in stable Light ON area and the reliability of environment (temperature, supply, dust etc.) is increased after the mounting it in a stable area.
※When adjusting sensitivity or switching operation modes, please use the Autonics adjustment screwdriver (accessory included). Using a screwdriver with a bigger diameter than the adjuster buttons may cause errors when making adjustments.
※It may cause breakdown when the sensitivity setting adjuster or the operation mode selection switch is turned by force.

■ Connections



[M8 Connector pin]

Connector in No.	Cable colors	Function
①	Brown	Power Source (+V)
②	White	—
③	Blue	Power Source (0V)
④	Black	Output

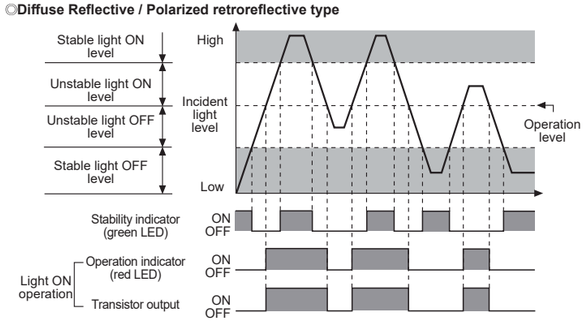
※Connector pin ② is N.C (Not Connected) terminal.
(For through-beam type emitter, terminal no.② and ④ are N.C (Not Connected) terminal.)

■ Operation Mode

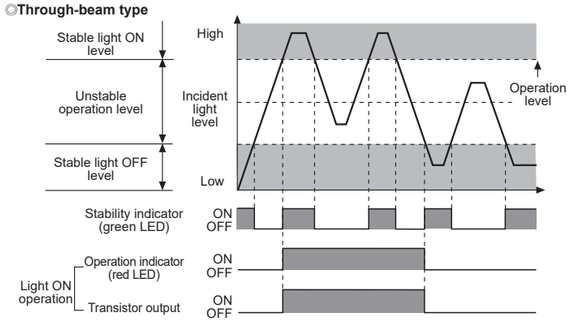
Operation mode	Light ON	Dark ON
Receiver	Received light / Interrupted light	Received light / Interrupted light
Operation indicator (red LED)	ON / OFF	ON / OFF
Transistor output	ON / OFF	ON / OFF

■ Operation Timing Diagram

◎**Diffuse Reflective / Polarized retroreflective type**



◎**Through-beam type**



※The waveform of "Operation indicator" and "Transistor output" is for Light ON, it is operated conversely for Dark ON.

■ Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
2. When connecting a DC relay or other inductive load to the output, remove surge by using diodes or varistors.
3. Use the product, 0.5 sec after supplying power.
   When using separate power supply for the sensor and load, supply power to sensor first.
4. 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
5. Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
6. 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.
7. When using sensor with the equipment which generates noise (switching regulator, inverter, servo motor, etc.), ground F.G. terminal of the equipment.
8. This unit may be used in the following environments.
   ①Indoors (in the environment condition rated in 'Specifications') ②Altitude max. 2,000m
   ③Pollution degree 3 ④Installation category II

■ Major Products

■ Photoelectric Sensors
■ Fiber Optic Sensors
■ Door Sensors
■ Door Side Sensors
■ Area Sensors
■ Proximity Sensors
■ Pressure Sensors
■ Rotary Encoders
■ Connectors/Sockets
■ Switching Mode Power Supplies
■ Control Switches/Lamps/Buzzers
■ I/O Terminal Blocks & Cables
■ Stepper Motors/Drivers/Motion Controllers
■ Graphic/Logic Panels
■ Field Network Devices
■ Laser Marking System (Fiber, CO_2, Nd: YAG)
■ Laser Welding/Cutting System
■ Temperature Controllers
■ Temperature/Humidity Transducers
■ SSRs/Power Controllers
■ Counters
■ Timers
■ Panel Meters
■ Tachometer/Pulse (Rate) Meters
■ Display Units
■ Sensor Controllers

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