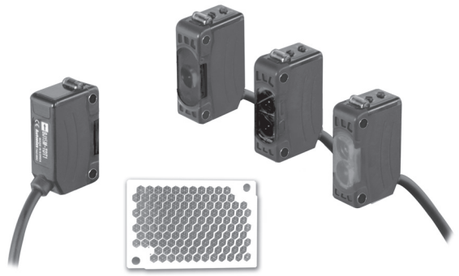
Autonics

PHOTOELECTRIC SENSOR

BJ SERIES

M A N U A L



Thank you very much for selecting Autonics products.
For your safety, please read the following before using.

■ Caution for your safety

※Please keep these instructions and review them before using this unit.

※Please observe the cautions that follow;

⚠ Warning Serious injury may result if instructions are not followed.

⚠ Caution Product may be damaged, or injury may result if instructions are not followed.

※The following is an explanation of the symbols used in the operation manual.
⚠ Caution: Injury or danger may occur under special conditions.

⚠ Warning

1. **In case of using this unit with machinery (Ex: nuclear power control, medical equipment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install fail-safe device.**
   It may cause a fire, human injury or damage to property.
2. **Do not disassemble or modify this unit. Please contact us if it is required.**
   It may cause electric shock or a fire.

⚠ Caution

1. **This unit shall not be used outdoors.**
   It might shorten the life cycle of the product or give an electric shock. Use this product inside only. Do not use the product outdoors or location subject to temperatures or humidity outside.(Ex: rain, dirty, frost, sunlight, condensation, etc.)
2. **Do not use this unit in place where there is flammable or explosive gas.**
   It may cause a fire or explosion.
3. **Please observe the rated specifications.**
   It may shorten the life cycle or damage to the product.
4. **Please observe the rated voltage and do not supply AC power.**
   It may cause damage to this unit.
5. **Please check the polarity of power and wrong wiring.**
   It may cause damage to this unit.
6. **Do not use this unit in place where there is vibration or impact.**
   It may cause damage to this unit.
7. **In cleaning the unit, do not use water or an oil-based detergent.**
   It may cause electric shock or fire.

■ Ordering information

BJ 15 M – T D T 1 – P

Output type		NPN open collector output
	P	PNP open collector output
		Single body type
	1	Emitter
	2	Receiver
Output mode	T	Solid-state output(Transistor)
Power Supply	D	DC power
	T	Through - beam
	P	Polarized retroreflective
Sensing type	D	Diffuse Reflective
Sensing distance unit		mm
	M	m
Sensing distance	Number	Sensing distance
Item	BJ	Compact long sensing type

※**The above specifications are subject to change and some models may be discontinued without notice.**

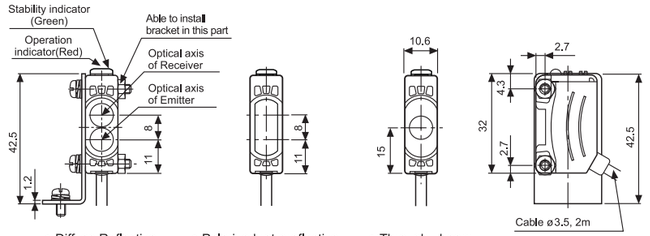
■ Specifications

Model		BJ15M-TDT	BJ10M-TDT	BJ7M-TDT	BJ3M-PDT	BJ1M-DDT	BJ300-DDT	BJ100-DDT
	NPN output	BJ15M-TDT-P	BJ10M-TDT-P	BJ7M-TDT-P	BJ3M-PDT-P	BJ1M-DDT-P	BJ300-DDT-P	BJ100-DDT-P
Sensing type		Through - beam			Polarized retroreflective	Diffuse Reflective		
Sensing distance		15m	10m	7m	0.1 to 3m (MS-2A)※1	1m (Non-glossy white paper 300×300mm)	300mm (Non-glossy white paper 100×100mm)	100mm (Non-glossy white paper 100×100mm)
Sensing target		Opaque materials of Min. ø12mm		Opaque materials of Min. ø8mm	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: Max. 20mA, Receiver: Max. 20mA			Max. 30mA			
Light source / Wavelength		Infrared LED (850nm)	Red LED (660nm)	Red LED (Point light source 650nm)	Red LED (660nm)	Infrared LED (850nm)	Red LED (660nm)	Infrared LED (850nm)
Sensitivity adjustment		Built-in VR						
Operation mode		Light ON/Dark ON Selectable						
Control output		NPN or PNP open collector output • Load voltage : Max. 26.4VDC • Load current : Max. 100mA • Residual voltage - NPN: Max. 1V, PNP: Max. 2.5V						
Protection circuit		Reverse polarity protection circuit, Output short-circuit(overcurrent) protection circuit			Reverse polarity protection circuit, Interference prevention function, Output short-circuit(overcurrent) protection circuit			
Indicator		Operation indicator: Red, Stability indicator: Green (Emitter of power indicator for transmitted beam:Green)						
Insulation resistance		Min. 20MΩ (500VDC megger)						
Noise strength		± 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 10~55Hz(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. 11,000/ₓ , Incandescent lamp : Max 3,000/ₓ (Receiver illumination)						
	Ambient Temperature	-25~55℃, Storage: -40~70℃						
	Ambient humidity	35~85%RH, Storage: 35~85%RH						
Protection		IP65(IEC standards)						
Meterial		Case: PC+ABS, LED CAP: PC, Sensing part: PMMA						
Cable		ø 3.5mm, 3-wire, Length: 2m (Emitter: ø 3.5mm, 2-wire, Length: 2m) (AWG24, Core diameter: 0.08mm, Number of cores: 40, Insulator diameter: ø 1mm)						
Accessory	Common	Mounting bracket, Bolt, Nut, VR adjustment driver						
	Individual	———			Reflector (MS-2A)	———		
Approval		CE						
Unit weight		Approx. 90g			Approx. 60g	Approx. 45g		

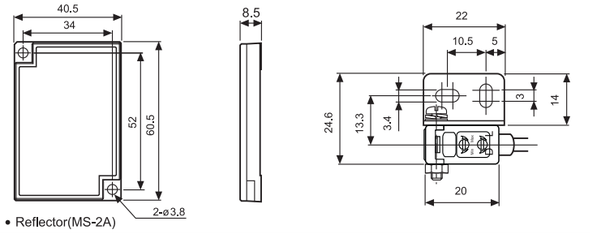
※1: If reflector MS-2S, MS-3S(Sold separately) are used, sensing distance will be lengthened as 0.1 to 4m, 0.1 to 5m.
※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

■ Dimensions

(Unit: mm)



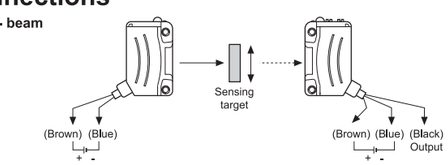
• Diffuse Reflective • Polarized retroreflective • Through - beam



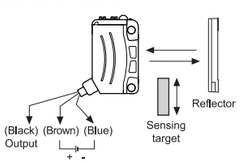
• Reflector(MS-2A)

■ Connections

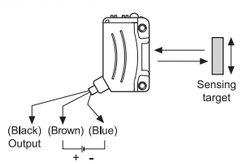
• **Through - beam**



• **Polarized retroreflective**



• **Diffuse Reflective**



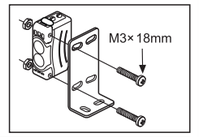
■ Control output circuit diagram

Item	Photoelectric sensor circuit	Connection
NPN Open collector output	Main circuit, Over current protection	(Brown)+V, (Black)Output, Load, Max. 100mA, 12-24VDC ± 10%, (Blue)0V
PNP Open collector output	Main circuit, Over current protection	(Brown)+V, Max. 100mA, 12-24VDC ± 10%, (Black)Output, Load, (Blue)0V

■ Mounting & Adjustment

◎ **For mounting**

Please use bolt M3 for mounting of sensor, set the tightening torque under 0.5N·m.



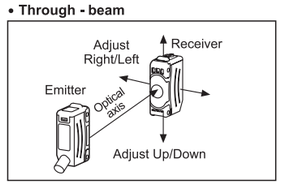
◎ **Switching operation mode**

Light ON operation (Light ON)	D L	Turn the switching volume of operation mode to the end of right(L direction), it is set as Light ON.
Dark ON operation (Dark ON)	D L	Turn the switching volume of operation mode to the end of left (D direction), it is set as Dark ON.

※For through - beam type, the switching volume of operation mode is built-in the receiver.

◎ **Optical axis adjustment**

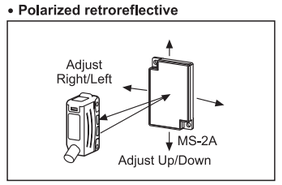
• **Through - beam**



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.

◎ **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	(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

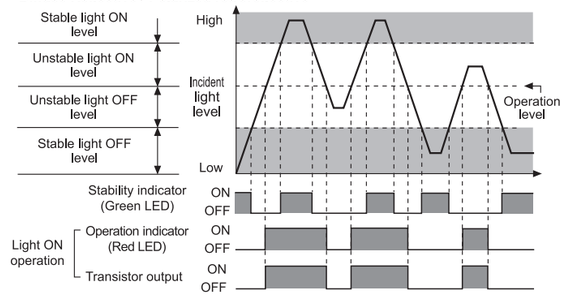
※Please set adjuster as sensitivity adjustment is executed in stable Light ON area and the reliability of environment(temperature, supply, dust etc.) is increased after the mounting it in a stable area.
※It may cause breakdown when the sensitivity and operation mode conversion adjuster is turned by force.

■ Operation mode

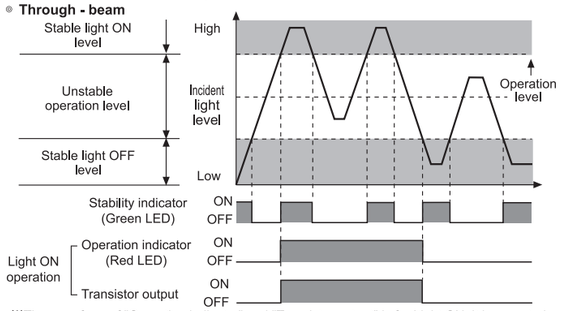
Operation mode	Light ON	Dark ON
Receiver	Received light / Interrupted light	
Operation indicator (Red LED)	ON / OFF	
Transistor output	ON / OFF	

■ Operation timing diagram

◎ **Diffuse Reflective / Polarized retroreflective**



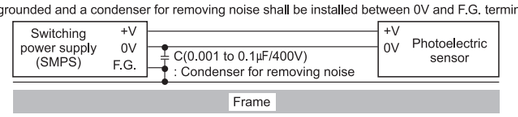
◎ **Through - beam**



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

■ Caution for using

1. The sensor will be in a detectable status within 500ms after supply the power. If the power line of the load and the sensor is different, supply power voltage to the sensor first.
2. Shade a strong source of light as like sunlight, spotlight not to be let in the inclination angle range of photoelectric sensor directly.
3. The photoelectric sensor may cause malfunction under the fluorescent lamp light, be sure to use the cover or the shutter to shade the light.
4. When more than 2 sets of through - beam types sensors are used closely, it might cause interference each other. Be sure to put enough space between them in order to avoid malfunction.
5. If photoelectric sensor is installed at flat part, it may cause malfunction by reflection light from flat part. Be sure to put space between photoelectric sensor and ground.
6. When wiring the photoelectric sensor with high voltage line, power line in a same conduit, it may cause malfunction or mechanical problem, please do wire separately or use different conduit.
7. Avoid install the unit in place with corrosive gas, oil or dust, strong flux, noise, sunlight, strong alkali and acid.
8. In case of connecting relay as inductive load to output, please remove surge by using diode or varistor.
9. Photoelectric sensor cable shall be used as short as possible, because it may cause malfunction by noise through the cable.
10. When it is stained by dirt at lens, please clean the lens with dry cloth, do not use an organic materials such as alkali, acid and chromic acid.
11. When use switching power supply as the source of supplying power, F.G. terminal shall be grounded and a condenser for removing noise shall be installed between 0V and F.G. terminal.



12. Installation environment
    ①It shall be used indoor ②Altitude Max. 2,000m
    ③Pollution Degree 3 ④Installation Category II

※**It may cause malfunction if above instructions are not followed.**

■ Major products

■ Photoelectric sensors ■ Fiber optic sensors ■ Door sensors ■ Door side sensors ■ Area sensors ■ Proximity sensors ■ Pressure sensors ■ Rotary encoders ■ Connector/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/soldering system ■ Temperature controllers ■ Temperature/Humidity transducers ■ SSR/Power controllers ■ Counters ■ Timers ■ Panel meters ■ Tachometer/Pulse(Rate)meters ■ Display units ■ Sensor controllers

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