

**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.
- ⚠Injury or danger may occur under special conditions.

**Warning**

- In case of using this unit with machinery which need safety control (Ex:Nuclear power control, medical equipment, vehicle, train, airplane combustion apparatus, entertainment or safety device etc), it requires installing fail-safe device, or contact us for information on type required.**  
It may result in serious damage, fire or human injury.
- Do not disassemble or modify this unit. Please contact us if it is required.**  
It may give an electric shock and cause a fire.

**Caution**

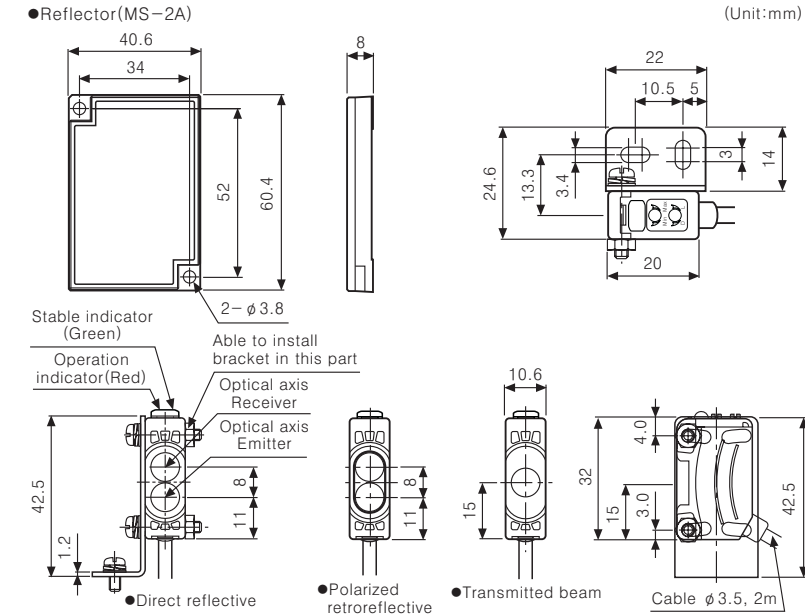
- This unit shall not be used outdoors.**  
It might shorten the life cycle of the product or give an electric shock.
- Do not use this unit in place where there is flammable or explosive gas.**  
It may cause a fire or explosion.
- Please observe specification rating.**  
It may shorten the life cycle or damage to the product.
- Do not use this unit beyond rating power and do not supply AC power(at DC power type).**  
It may result in damage to this unit.
- Please check the polarity of power and wrong wiring.**  
It may result in damage to this unit.
- In case of free voltage type, do not use the load beyond rated switching capacity of Relay contact.**  
It may cause insulation failure, contact melt, contact failure, relay broken, fire etc.
- Do not use this unit in place where there is vibration or impact.**  
It may result in damage to this unit.
- In cleaning the unit, do not use water or an oil-based detergent.**  
It might cause an electric shock or fire that will result in damage to the product.

**Ordering information**

<b>BJ 15 M - T D T - □</b>	
□	NPN open collector output
P	PNP open collector output
T	Solid-state output(TR)
D	DC power
T	Transmitted beam
P	Polarized retroreflective
D	Direct reflective
	Sensing distance unit : mm
M	Sensing distance unit : m
Number	Sensing distance
BJ	Series name

※The above specifications are changeable without notice anytime.

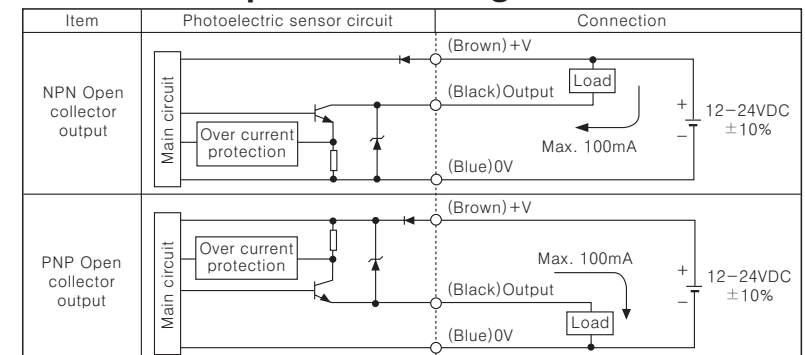
**Dimensions**



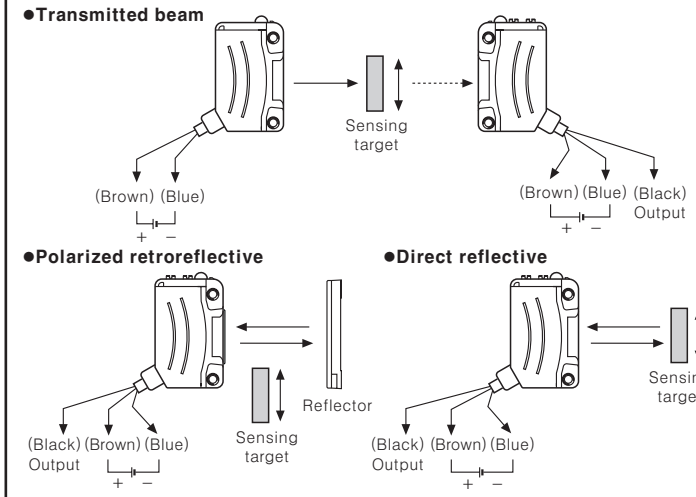
**Specifications**

Model	BJ15M-TDT	BJ10M-TDT	BJ3M-PDT	BJ1M-DDT	BJ300-DDT
NPN open collector output	BJ15M-TDT-P	BJ10M-TDT-P	BJ3M-PDT-P	BJ1M-DDT-P	BJ300-DDT-P
PNP open collector output					
Sensing type	Transmitted beam			Direct reflective	
Power supply	12~24VDC ±10%(Ripple P-P:Max. 10%)				
Power consumption	Emitter:Max. 20mA, Receiver:Max. 20mA		Max. 30mA		
Sensing target	Opaque materials of Min. φ12mm	Opaque materials of Min. φ75mm	Non-glossy white paper 300×300mm	Non-glossy white paper 100×100mm	
Sensing distance	0~15m	0~10m	0.1~3m(MS-2A)	0~1m	0~300m
Hysteresis	Max. 20% at sensing distance				
Light source / Wavelength	Infrared LED/ 850nm	Red LED/ 660nm		Infrared LED/ 850nm	Red LED/ 660nm
Control output	NPN or PNP Open collector type • Load voltage : Max. 26.4VDC • Load current : Max. 100mA • Residual voltage ≧ NPN : Max. 1V, PNP :Min. (Power voltage -2.5V)				
Operation mode	Light ON/Dark ON Selectable(Short rotator volume)				
Protection circuit	Reverse polarity protection, Short-circuit protection	Reverse polarity protection, Short-circuit protection, Interference prevention function			
Response time	Max. 1ms				
Sensitivity adjustment	Short rotator volume (210°)				
Ambient illumination	Sunlight : Max. 11,000lx, Incandescent lamp : Max. 3,000lx				
Ambient temperature	Operation: -25~55℃, Storage: -40~70℃ (non-dew, non-freezing condition)				
Ambient humidity	Operation & Storage:35~85%RH(non-dew, non-freezing condition)				
Insulation resistance	Min. 20MΩ(500VDC)				
Dielectric strength	1000VAC 50/60Hz for 1minute				
Vibration	1.5mm, 300m/s <sup>2</sup> amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours				
Shock Protection	500m/s <sup>2</sup> in X, Y, Z directions for 2 times				
Connection	IP67(IEC standard)				
Indicator	Operation indicator:Red, Stable indicator:Green(Emitter of power indicator for transmitted beam:Red)				
Material	Case : PC+ABS, Lens : PMMA, LED CAP : PC				
Cable	φ3.5mm, 3P, Length:2m(Emitter of transmitted beam type: φ3.5mm, 2P, Length:2m)				
Accessories	Individual	Reflector(MS-2A)			
Common	Mounting bracket, Bolt, Driver				
Unit weight	Approx. 90g	Approx. 60g	Approx. 45g		

**Control output circuit diagram**



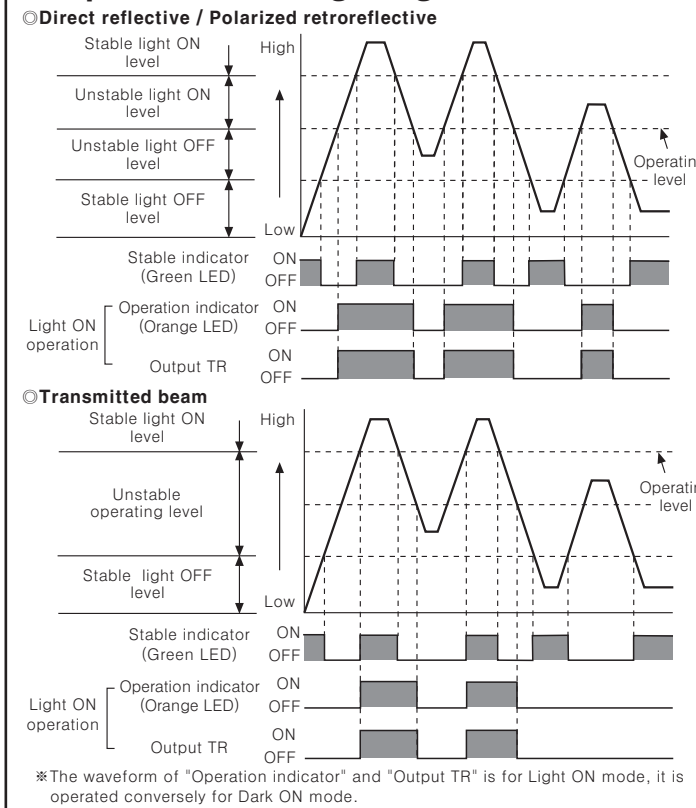
**Connections**



**Operation mode**

Operation mode	Light ON mode	Dark ON mode
Receiver	Received light Interrupted light	
Operation indicator (Red LED)	ON OFF	ON OFF
Output TR	ON OFF	ON OFF

**Operation timing diagram**



**Mounting & Adjustment**

**For mounting**  
Please use screw M3 for mounting of sensor, set the tightening torque under 0.5N.m.

**Switching of operation mode**

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

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

**Optical axis adjustment**

- Transmitted beam
  - Supply the power after setting the emitter and the receiver in opposite each other.
  - 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.
  - 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 φ16mm, it may not sense the target because light is passed.
- Polarized retroreflective
  - Set sensor and reflector in opposite each other and turn on the power.
  - 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.
  - After mounting, check the operation is correct and the lighting of stable indicator with sensing material or without it.

**Sensitivity adjustment**

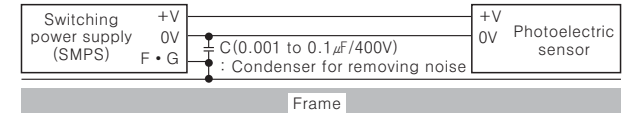
Order	Sensitivity adjuster	Description
1	(A) MIN MAX	Turn the sensitivity adjuster to the right from min. sensitivity position and check(A) where the indicator is turned on in "Light ON status".
2	(A) MIN MAX (C) MIN MAX (B)	Turn the sensitivity adjuster more to the right from min. sensitivity position, 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) MIN MAX (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"
Transmitted beam		
Polarized retroreflective		
Direct reflective		

※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.

**Caution for using**

- The sensor will be in a sensible status within 500ms after supply the power. If the power line of the load and the sensor is different, you must supply power voltage to the sensor.
- Shade a strong source of light as like sunlight, spotlight not to be let in the inclination angle range of photoelectric sensor directly.
- The photoelectric sensor may cause malfunction under the fluorescent lamp light, so be sure to use the cover or the shutter to shade the light.
- When more than 2 sets of transmitted 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.
- If photoelectric sensor is installed at flat part, it might cause malfunction by reflection light from flat part. Be sure to put space between photoelectric sensor and ground.
- When wiring the photoelectric sensor with high voltage line, power line in the same conduit, it may cause malfunction or mechanical trouble.  
Please wire separately or use different conduit.
- Avoid installing the unit in place with corrosive gas, oil or dust, strong flux, noise, sunlight, strong alkali, acid.
- In case of connecting relay as inductive load to output, please remove surges by using diode or varistor.
- The photoelectric sensor cable shall be used as short as possible, because it may cause malfunction by noise through the cable.
- 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, chromic acid.
- 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.



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

**Major products**

■ PROXIMITY SENSOR ■ PHOTOELECTRIC SENSOR ■ AREA SENSOR  
 ■ FIBER OPTIC SENSOR ■ DOOR/DOOR SIDE SENSOR ■ PRESSURE SENSOR  
 ■ ROTARY ENCODER ■ COUNTER  
 ■ TIMER ■ TEMPERATURE CONTROLLER  
 ■ TEMPERATURE/HUMIDITY TRANSDUCER  
 ■ POWER CONTROLLER ■ PANEL METER  
 ■ TACHO/LINE SPEED/PULSE METER  
 ■ DISPLAY UNIT ■ SENSOR CONTROLLER  
 ■ SWITCHING POWER SUPPLY  
 ■ GRAPHIC PANEL  
 ■ 5-PHASE STEPPING MOTOR & DRIVER  
 ■ CONTROLLER  
 ■ LASER MARKING SYSTEM(CO<sub>2</sub>, Nd:YAG)

**Autonics Corporation**  
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