Autonics

PHOTOELECTRIC SENSOR

BJ SERIES

(BGS REFLECTIVE TYPE)

M A N U A L

CE

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

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 when required.
It may give an electric shock and cause 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 indoors only. Do not use the product outdoors at locations subject to the temperatures or humidity outdoors.(Example: rain, dirty, frost, sunlight, condensation, etc.)
2. Do not use this unit where flammable or explosive gas exists.
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. Do not use this unit beyond rated power and do not supply AC power to a DC power type product.
It may result in damage to the product.
5. Please check the polarity of power and wrong wiring.
It may result in damage to the product.
6. Do not use this unit where there is vibration or impact.
It may result in damage to the product.
7. When cleaning the unit, do not use water or an oil-based detergent.
It might cause a fire, give an electric shock or damage to the product.

▣ Ordering information

BJ 30 - B D T - P

Control Output	**No mark**	NPN open collector output
	P	PNP open collector output
Output	**T**	Solid-state output(Transistor)
Power supply	**D**	DC power
Sensing type	**B**	BGS(Background Suppression) Reflective
Sensing distance	**Number**	Sensing distance(Unit: mm)
Item	**BJ**	Photoelectic sensor series

※The above specifications are subject to change without notice.

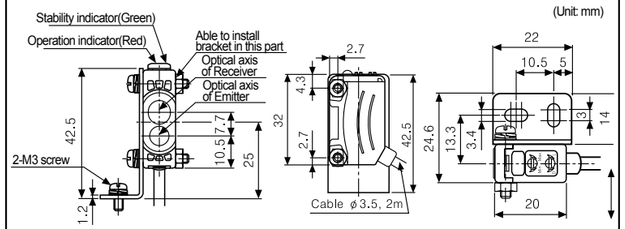
▣ Specifications

Model		BJ30-BDT	BJ50-BDT	BJ100-BDT
	NPN open collector output			
	PNP open collector output	BJ30-BDT-P	BJ50-BDT-P	BJ100-BDT-P
Sensing type		Background Suppression(BGS)		
Sensing distance※1		10 to 30mm (Non-glossy white paper 50×50mm)	10 to 50mm (Non-glossy white paper 50×50mm)	10 to 100mm (Non-glossy white paper 100×100mm)
Sensing target		Translucent, Opaque materials		
Hysteresis		±10% of setting distance		
Black/White Difference		±10% of setting distance		
Sensitivity Adjustment Range		-10 % of max. rated sensing distance (non-glossy white paper)		
Response time		Max. 1.5ms		
Power supply		12-24VDC ±10% (Ripple P-P: Max. 10%)		
Power consumption		Max. 30mA		
Light source / Wavelength		Red LED(660nm)		
Sensitivity adjustment		Short rotator volume(210°)		
Operation mode		Light ON/Dark ON switching type (Short rotator volume)		
Control output		NPN or PNP Open collector type • Load voltage: Max. 26.4VDC • Load current: Max. 100mA • Residual voltage: NPN ☞ Max.1V, PNP ☞ Max. 2V		
Protection circuit		Reverse polarity protection circuit, Output short-circuit(overcurrent) protection circuit		
Indicator		Operation indicator: Red, Stability indicator: Green		
Connection		Cable outgoing type		
Insulation resistance		Min. 20MΩ (at 500VDC megger)		
Noise strength		±240V the square wave noise(pulse width: 1μs) by the noise simulator		
Dielectric strength		1000VAC 50/60Hz for 1minute		
Vibration resistance		1.5mm amplitude or 300m/s at frequency of 10 to 55Hz in each of X,Y,Z direction for 2 hours		
Shock resistance		500m/s² in X, Y, Z directions for 3 times		
Environment	Ambient illumination	Sunlight: Max. 11,000/ℓ_x, Incandescent lamp: Max. 3,000/ℓ_x(Receiver illumination)		
	Ambient temperature	-25 to 55℃, Storage: -40 to 70℃		
	Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH		
Protection		IP65(IEC standards)		
Material		Case: PC+ABS, LED CAP: PC, Lens: PMMA		
Cable		ø3.5mm, 3P, Length: 2m (AWG 24, Core wire diameter: 0.08mm, No. of core wire: 40, Insulator out diameter: 1mm)		
Accessory		Mounting bracket, Screw, Nut, VR adjustment driver		
Approval		CE		
Unit weight		Approx. 50g		

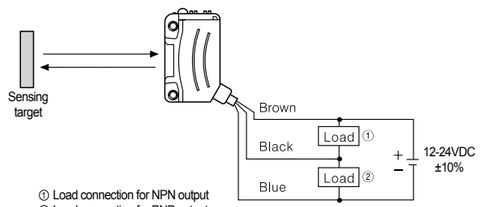
※1: The sensing distance is based on non-glossy white paper and varies from colors or materials.
※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

▣ Dimensions

(Unit: mm)



▣ Connections



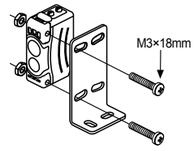
▣ Control output circuit diagram

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

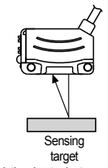
▣ Mounting & Adjustment

Mounting

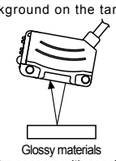
●For mounting this sensor with bracket, please use M3 screws and nuts (accessory). (Tightening torque is under 0.5N•m)



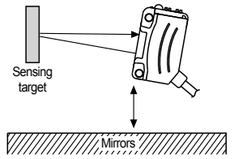
●Place the sensing target in parallel with sensor's detecting part.



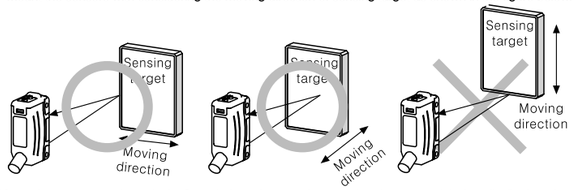
●In case sensing targets are glossy materials or mirrors, mount the sensor with the angle of incline 5 to 10°as shown in the figure. Make sure that there is no effect of background on the target.



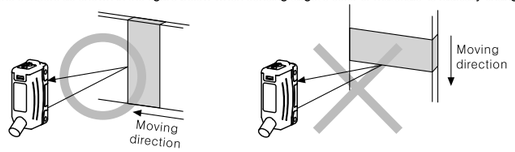
●Mount the sensor slightly slanted at a certain distance between the sensor and the surface of a mirror. If not, it might cause malfunction by reflection from the mirror to the sensor.



●Mount the sensors with considering the moving direction of sensing target as shown in the figure below.



Mount the sensors as shown in the figure below when sensing target's color or materials is radically changing.

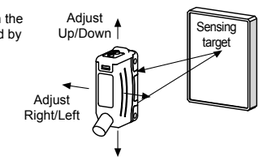


Switch of operation mode

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

Optical axis adjustment

After placing the sensing target, fix the sensor in the center of position where the indicator is operated by adjusting it up and down or left and right.



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(A), check (B) where the indicator is turned on. And turn the adjuster to the left, check (C) where the indicator is turned on in "Dark ON status". ※If the indicator does not turn on although the adjuster is turned to the max. sensitivity position, the max. sensitivity position is (C).
3	Optimal sensitivity (A) (C) MIN MAX	Set the adjuster at the center of (A) and (C). To set the optimum sensitivity, check the operation 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.

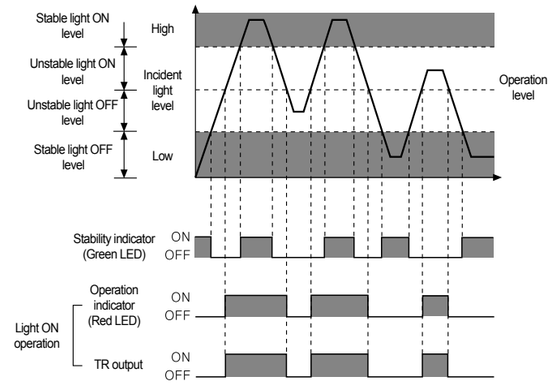
Light ON status	Dark ON status
Sensor, Sensing target, Background	Sensor, Background

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

▣ Operation mode

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

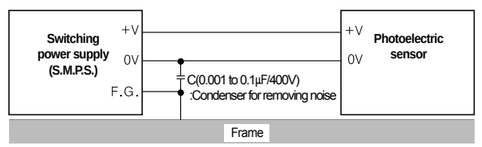
▣ Operation timing diagram



※The waveforms of "Operation indicator" and "TR output" are for Light ON mode, They are opposite operation for Dark ON mode.

▣ Caution for using

1. The sensor will be in a sensable 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. In case using photoelectric sensors with inverters or servo motors, ground F.G. terminals and 0V. Unless it may cause malfunctions.
3. Shade a strong source of light as like sunlight, fluorescent lamp, spotlight not to be let in the inclination angle range of photoelectric sensor directly.
4. The photoelectric sensor may cause malfunction under the fluorescent lamp light, be sure to use the cover or the shutter to shade the light.
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 installing 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

- Proximity sensors
- Photoelectric sensors
- Area sensors
- Fiber optic sensors
- Door/Door side sensors
- Pressure sensors
- Counters
- Timers
- Rotary encoders
- Display uanits
- Power controllers
- Stepping motors/drivers/motion controllers
- Panel meters
- Graphic/Logic panels
- Temperature controllers
- Tachometer/Pulse(Rate) meters
- Temperature/Humidity transducers
- Switching power supplies
- Field network devices
- Sensor controllers
- Laser welding/soldering system
- Laser marking system(CO_2, Nd:YAG)

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