

# Autonics

## PHOTOELECTRIC SENSOR BJ SERIES (BGS REFLECTIVE TYPE)

### INSTRUCTION MANUAL



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

#### ■ Safety Considerations

- ⊗ Please observe all safety considerations for safe and proper product operation to avoid hazards.
- ⊗ Safety considerations are categorized as follows.
  - ⚠ 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.
- ⊗ The symbols used on the product and instruction manual represent the following
  - ⚠ symbol represents caution due to special circumstances in which hazards may occur.

#### ⚠ Warning

- 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, fire, or economic loss.
- Do not disassemble or modify the unit. Please contact us if necessary.** Failure to follow this instruction may result in product damage or fire.

#### ⚡ Caution

- Do not use the unit outdoors.** Failure to follow this instruction may shorten the life cycle of the unit or malfunction. Use the unit indoors only. Do not use the unit outdoors, where it may be affected out external environmental factors. (e.g. rain, dust, frost, sunlight, condensation, etc.)
- Do not use the unit where flammable or explosive gas, humidity, direct sunlight, radiant heat may be present.** Failure to follow this instruction may result in fire or explosion.
- Use the unit within the rated specifications.** Failure to follow this instruction may shorten the life cycle of the unit.
- Do not use loads beyond the rated voltage range. Do not supply AC power.** Failure to follow these instructions may result in product damage.
- Check the polarity of the power before wiring the unit.** Failure to follow this instruction may result in product damage.
- Do not use the unit where heavy vibration or impact may be present.** Failure to follow this instruction may result in product damage.
- Do not use water or oil-based detergent when cleaning the unit.** Failure to follow this instruction may result in fire.

#### ■ Ordering information

Item	BJ 30 - T 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 reflective type
Sensing distance	Number	Sensing distance (unit: mm)
	BJ	Photoelectric sensor series

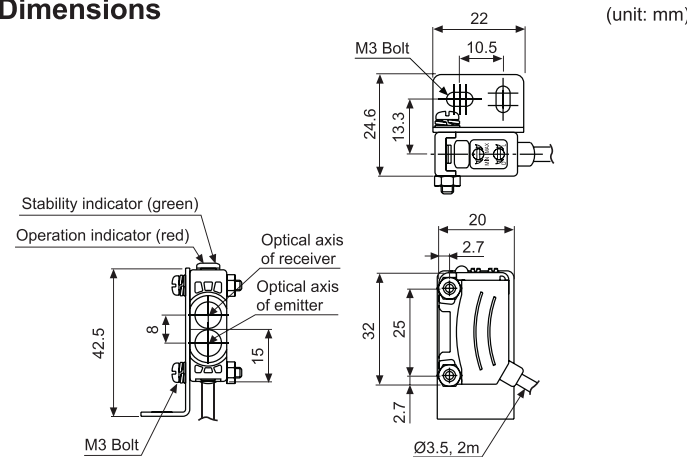
⊗ The above specifications are subject to change and some models may be discontinued without notice.

#### ■ Specifications

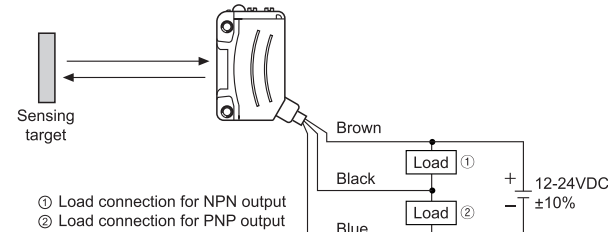
Model	NPN open collector output PNP open collector output	BJ30-BDT BJ30-BDT-P	BJ50-BDT BJ50-BDT-P
Sensing type	BGS reflective		
Sensing distance*1	10 to 30mm (Non-glossy white paper 50×50mm)		10 to 50mm (Non-glossy white paper 50×50mm)
Sensing target	Translucent, Opaque materials		
Hysteresis	Max. 10% at sensing distance		
Black/White Difference	Max. 10% at sensing distance		
Sensitivity Adjustment Range	Max. -10 % at 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	Built-in the adjustment VR		
Operation mode	Light ON/Dark ON selectable by VR		
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, Output short-circuit protection		
Indicator	Operation indicator: red LED, Stability indicator: green LED		
Connection	Cable type		
Insulation resistance	Min. 20MΩ (at 500VDC megger)		
Noise resistance	±240V the square wave noise (pulse width: 1μs) by the noise simulator		
Dielectric strength	1,000VAC 50/60Hz for 1 min.		
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z direction for 2 hours		
Shock	500m/s <sup>2</sup> (approx. 50G) 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°C, Storage: -40 to 70°C	
	Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH	
Protection structure	IP65 (IEC standards)		
Material	Case: PC+ABS, LED Cap: PC, Sensing part: PMMA		
Cable	Ø3.5mm, 3-wire, Length: 2m (AWG 24, Core diameter: 0.08mm, Number of cores: 40, Insulator out diameter: Ø1mm)		
Accessory	Mounting bracket, Bolt, Nut, VR adjustment driver		
Approval	CE		
Weight*2	Approx. 105g (approx. 50g)		

- \*1: The sensing distance is based on non-glossy white paper and varies from colors or materials.
- \*2: The weight includes packaging. The weight in parentheses is for unit only.
- \*3: The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

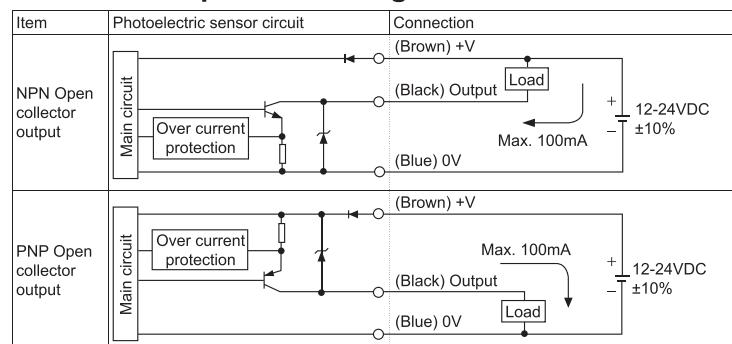
#### ■ Dimensions



#### ■ Connections



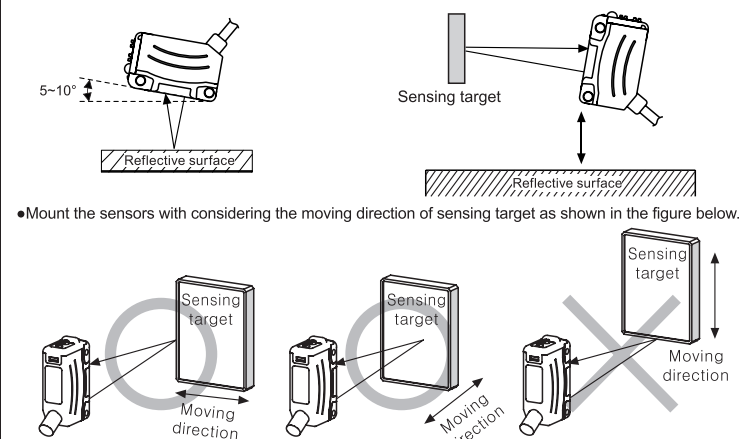
#### ■ Control output circuit diagram



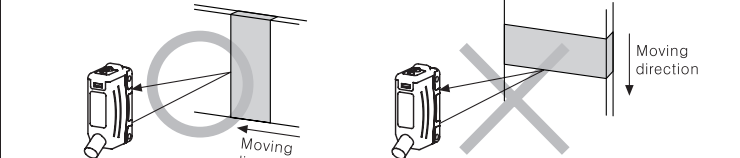
#### ■ Mounting & Adjustment

##### ○ Mounting

- Please use M3 bolts to mount the sensor, and make sure that the tightening torque is under 0.5 N·m.
- The sensing side of the unit and the surface of the target object should be parallel when installed.
- If the sensing target has a glossy or reflective surface, mount the sensor at a 5 to 10° angle as shown in the figure. Check to see that there is no influence from background objects.
- If there is a reflective surface beneath the sensor, the reflected light may reflect off the surface of the reflective object. Make sure that the sensor is tilted upwards as shown in the figure, or install the sensor distant to the reflective surface.

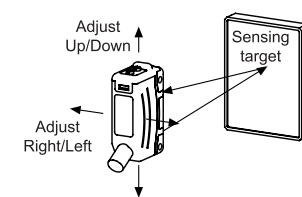


Mount the sensors as shown in the figure below when sensing target's color or materials is radically changing.



##### ○ Optical axis adjustment

Place the sensing target. Move the sensor slightly in each direction and check the operation of the stability indicator. Fix the sensor at the center point.

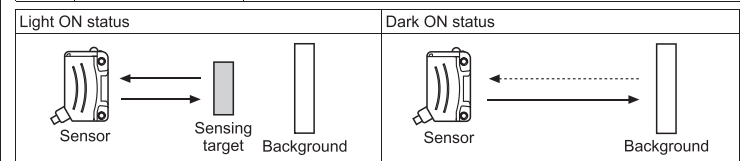


##### ○ Operation mode switching

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

##### ○ Sensitivity adjustment

Order	Distance setting	Description
1		From Light ON status, turn the sensitivity adjustment VR to the right from MIN distance and check the position where operation indicator turns on (A).
2		From Dark ON status, turn the sensitivity adjustment VR further right and check the position where the operation indicator turns on (B). Turn the adjuster left and check the position where the operation indicator turns off (C). ⊗ If the operation indicator does not turn on at MAX distance, the maximum setting distance is set at position (C).
3		Set the adjuster at the center position between (A) and (C) for optimal sensitivity. Also, check if the stability indicator turns off with or without the sensing target. If it does not turn off, please review the operation mode again, as sensitivity may be unstable.

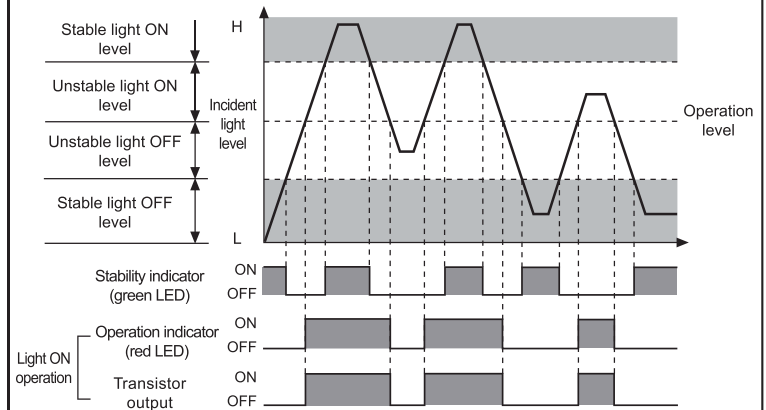


⊗ Please set the sensitivity adjustment VR is executed in stable Light ON area and the reliability of environment (temperature, supply, dust etc.) is increased after the mounting it in a stable area.  
⊗ It may cause breakdown when the sensitivity adjustment VR or the operation mode selection VR is turned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

#### ■ Operation mode

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

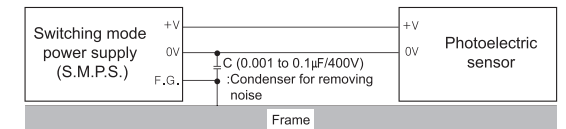
#### ■ Operation timing diagram



⊗ The waveforms of 'Operation indicator' and 'Transistor output' are for Light ON operation. The waveforms are reversed for Dark ON operation.

#### ■ Caution for using

- The sensor will be able to detect objects after 500ms of supplying power. If the sensor and the load are using separate power sources, power must be supplied to the sensor first.
- In case using photoelectric sensors with inverters or servo motors, ground F.G. terminals and 0V. Unless it may cause malfunctions.
- Use a visor or a hood so that excessive light (e.g. sunlight, spotlight) does not directly enter into the inclination angle of the sensor.
- The sensor may malfunction under fluorescent lighting. Please use a visor if necessary.
- If the sensor is installed directly on a flat surface, the reflection off the surface may cause malfunction. Make sure there is enough space between the sensor and the surface.
- If the sensor is wired with a high voltage line or power line, it may cause product damage or malfunction. Use separate wiring or a dedicated conduit.
- Avoid installation in places where dust or corrosion may be present, as it may cause product malfunction.
- When connecting a DC relay or other inductive load to the output, remove power surge by using diodes or varistors.
- Please use short cables for wiring the sensors. Power surge from extended wiring may cause product malfunction.
- When the lens is stained by foreign substances, clean the lens lightly with dry cloth. Do not use chemical or organic solvents.
- When using switching mode power supplies (S.M.P.S.) to supply power, the F.G. terminal must be grounded, and a noise removing condenser must be installed between 0V and F.G. terminals.



- This unit may be used in the following environments.
  - ① It shall be used indoor.
  - ② Altitude up to 2,000m
  - ③ Pollution degree 3
  - ④ Installation category II

⊗ Failure to follow these instructions may result in product damage.

#### ■ 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, Co2, Nd:Yag)
- Laser Welding/Cutting System
- Temperature Controllers
- Temperature/Humidity Transducers
- SSRs/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometers/Pulse (Rate) Meters
- Display Units
- Sensor Controllers

**Autonics Corporation**  
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**Trusted Partner in Industrial Automation**

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