

# Photoelectric Sensors :BJ SERIES

## Compact and Long Distance Sensing Type Photoelectric Sensor

BGS Reflective Type BGS reflective type which reduces the influence of background objects by adopting background suppress function realizes more stable and upgraded sensing performance by minimizing error range regardless of materials and colors of sensing objects. Connector Type Cable outgoing connector types guarantee more convenient maintenance and wiring work than cable outgoing types and implement enhanced performance by realizing IP67 the excellent protection structure.

### Features

#### Long distance sensing type

- \* High performance lens with long sensing distance
- Through-beam type: 15m
- Diffuse reflective type: 1m
- Polarized retroreflective type: 3m (MS-2A)
- \* M.S.R. (Mirror Surface Rejection) function (polarized retroreflective type) for detecting mirrors or highly reflective targets
- \* Compact size: W10.6 × H32 × L20mm
- \* Light ON/Dark ON operation mode switch
- \* Sensitivity adjuster
- \* Built-in reverse polarity protection circuit and output overcurrent (short-circuit) protection circuit
- \* Mutual interference prevention function (except through-beam type)
- \* Excellent noise immunity and minimal influence from ambient light
- \* IP65 protection structure (IEC standard) / IP67 for BJ-C connector types



#### BGS reflective type

- \* BGS (background suppression) minimizes detection errors from Zbackground objects and the color or material of target objects. Also the detecting distance can be configured with the sensitivity adjuster.
- \* Visible light source allows users to identify the sensing area, and the tiny spot size minimizes influence from surrounding objects

#### Transparent glass sensing type / Micro spot type

- \* Stable detection of transparent targets (LCD, PDP, glass etc.) (Transparent glass sensing types)
- \* Check sensing area with visible micro spot (micro spot types)
- \* Detect tiny objects (minimum target size: Ø0.2mm copper wire)

#### Commonness

- \* Compact size: W10.6 × H32 × L20mm
- \* Light ON/Dark ON operation mode switch (except BJG30-DDT)
- \* Sensitivity adjuster (except BJG3-DDT)
- \* Built-in reverse polarity protection circuit and output overcurrent (short-circuit) protection circuit
- \* Mutual interference prevention function (except BGS reflective type)
- \* Excellent noise immunity and minimal influence from ambient light
- \* IP65 protection structure (IEC standard)

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Background Suppression



Mirror Surface Rejection (MSR) Function



Detect Transparent Targets (BJG30-DDT)



Detect Tiny Targets (micro spot type)



Operation Indicator Stability Indicator



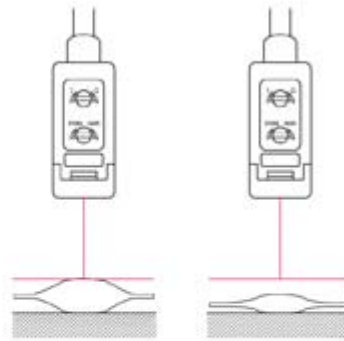
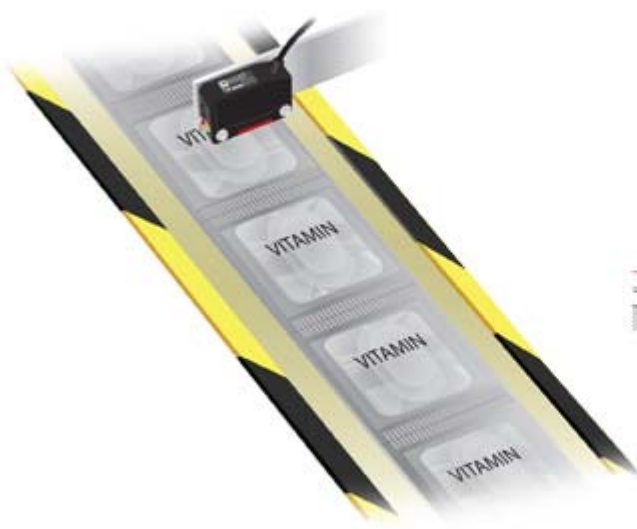
Dark ON / Light ON Switch



Minimal Errors From Ambient Light



(connector type)



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Type		Long distance sensing type						
Model	NPN open collector output	BJ15M-TDT BJ15M-TDT-C	BJ10M-TDT BJ10M-TDT-C	BJ7M-TDT	BJ3M-PDT BJ3M-PDT-C	BJ1M-DDT BJ1M-DDT-C	BJ300-DDT BJ300-DDT-C	BJ100-DDT BJ100-DDT-C
	PNP open collector output	BJ15M-TDT-P BJ15M-TDT-C-P	BJ10M-TDT-P BJ10M-TDT-C-P	BJ7M-TDT-P	BJ3M-PDT-P BJ3M-PDT-C-P	BJ1M-DDT-P BJ1M-DDT-C-P	BJ300-DDT-P BJ300-DDT-C-P	BJ100-DDT-P BJ100-DDT-C-P
Sensing type		Through-beam			Polarized retroreflective type	Diffuse reflective		
Sensing distance		15m	10m	7m	3m <sup>※1</sup>	1m <sup>※2</sup>	300mm <sup>※3</sup>	100mm <sup>※3</sup>
Sensing target		Opaque material of min. Ø12mm		Opaque material of min. Ø8mm	Opaque material of min. Ø75mm	Translucent, opaque materials		
Hysteresis		—			Max. 20% at sensing distance			
Response time		Max. 1ms						
Power supply		12-24VDC $\pm$ 10% (ripple P-P: max.10%)						
Current consumption		Emitter/Receiver: Max. 20mA			Max. 30mA			
Light source		Infrared LED (850nm)	Red LED (660nm)	Red LED (650nm)	Red LED (660nm)	Infrared LED (850nm)	Red LED (660nm)	Infrared LED (850nm)
Sensitivity adjustment		Sensitivity adjuster						
Operation mode		Light ON/Dark ON operation mode switch						
Control output		NPN or PNP open collector output ●Load voltage: max. 26.4VDC $\pm$ ●Load current: max. 100mA ●Residual voltage - NPN: max. 1VDC $\pm$ , PNP: max. 2.5VDC						
Protection circuit		Reverse polarity protection circuit, output overcurrent (short-circuit) protection circuit, mutual interference prevention function (except through-beam type)						
Indicator		Operation indicator: red LED, stable indicator: green LED (emitter's power indicator: green)						
Insulation resistance		Over 20MΩ (at 500VDC megger)						
Noise immunity		$\pm$ 240V the square wave noise (pulse width:1μs) by the noise simulator						
Dielectric strength		1000VAC 50/60Hz for 1minute						
Vibration		1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours						
Shock		500m/s <sup>2</sup> (approx. 50G) in each X, Y, Z direction 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		BJ: IP65 (IEC standard), BJ-C: IP67 (IEC standard)						
Material		Case: polycarbonate+acrylonitrile butadiene styrene, LED cap: polycarbonate, sensing part: polymethyl methacrylate, bracket: SUS304 (steel use stainless 304), bolt: steel chromium molybdenum, nut: steel chromium molybdenum, sleeve: brass, ni-plate						
Cable <sup>※4</sup>		BJ: Ø3.5mm, 3-wire, 2m (emitter of through-beam type: Ø3.5mm, 2-wire, 2m) (AWG24, core diameter: 0.08mm, number of cores: 40, insulator out diameter: Ø1mm)						
Accessories	Common	Fixing bracket, bolt, nut, adjuster driver				Reflector (MS-2A)		
	Individual	—				—		
Approval		CE						
Unit weight		BJ: approx. 90g, BJ-C: approx. 20g			BJ: approx. 60g BJ-C: approx. 30g	BJ: approx. 45g, BJ-C: approx. 10g		

※1: The sensing distance is specified with using the MS-2A reflector. The distance between the sensor and the reflector should be set over 0.1m. The sensing distance is extended from 0.1 to 4m or 0.1 to 5m when using optional reflector MS-2S or MS-3S. When using reflective tapes, the reflectivity will vary by the size of the tape. Please refer to the "Reflectivity By Reflective Tape Model" table before using the tapes.

※2: Non-glossy white paper 300×300mm.

※3: Non-glossy white paper 100×100mm.

※4: M8 connector cable is sold separately. (cable - AWG22, Core diameter: 0.08mm, Number of cores: 60, Insulator out diameter: Ø1.25mm)

※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

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Type	Transparent glass sensing type	BGS reflective type <sup>※1</sup>		Micro spot type	
Model	NPN open collector output	<b>BJG30-DDT</b>	<b>BJ30-BDT</b>	<b>BJ50-BDT</b>	<b>BJN50-NDT</b>
	PNP open collector output	—	<b>BJ30-BDT-P</b>	<b>BJ50-BDT-P</b>	<b>BJN50-NDT-P</b>
Sensing type	Diffuse reflective		BGS reflective		Narrow beam reflective
Sensing distance	30mm <sup>※2</sup>	15mm <sup>※3</sup>	10 to 30mm <sup>※4</sup>	10 to 50mm <sup>※4</sup>	30 to 70mm   70 to 130mm
Sensing target	Transparent glass, opaque materials, translucent		Translucent, opaque materials		Translucent, opaque materials
Min. diameter of transmitting spot	—		Approx. Ø5.0mm	Approx. Ø4.5mm	Approx. Ø2.0mm   Approx. Ø2.5mm
Min. sensing target	—		—		Approx. min. Ø0.2mm (copper wire)
Hysteresis	Max. 20% at sensing distance		Max. 10% at sensing distance		Max. 25% at sensing distance   Max. 20% at sensing distance
Response time	Max. 1ms		Max. 1.5ms		Max. 1ms
Power supply	12-24VDC $\pm$ 10% (ripple P-P: max.10%)				
Current consumption	Max. 30mA				
Light source	Infrared LED (850nm)		Red LED (660nm)		Red LED (650nm)
Sensitivity adjustment	—		Sensitivity adjuster		
Operation mode	Light ON fixed		Light ON/Dark ON operation mode switch		
Control output	NPN open collector output ●Load voltage: max. 26.4VDC $\pm$ ●Load current: max. 100mA ●Residual voltage: max. 1V		NPN or PNP open collector output ●Load voltage: max. 26.4VDC $\pm$ ●Load current: max. 100mA ●Residual voltage - NPN: max. 1VDC $\pm$ , PNP: min. 2.5VDC		
Protection circuit	Reverse polarity protection circuit, output overcurrent (short-circuit) protection circuit, mutual interference prevention function (except BGS reflective type)				
Indicator	Operation indicator: red LED, stability indicator: green LED				
Insulation resistance	Over 20M $\Omega$ (at 500VDC megger)				
Noise immunity	$\pm$ 240V the square wave noise (pulse width:1 $\mu$ s) by the noise simulator				
Dielectric strength	1,000VAC 50/60Hz for 1 min				
Vibration	1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours				
Shock	500m/s <sup>2</sup> (approx. 50G) in each X, Y, Z direction 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 standard)				
Material	Case: polycarbonate+acrylonitrile butadiene styrene, LED cap: polycarbonate, sensing part: polymethyl methacrylate, bracket: SUS304 (steel use stainless 304), bolt: steel chromium molybdenum, nut: steel chromium molybdenum, sleeve: brass, ni-plate				
Cable	Ø3.5mm, 3-wire, 2m (AWG24, core diameter: 0.08mm, number of cores: 40, insulator out diameter: Ø1mm)				
Accessories	Fixing bracket, bolt		Fixing bracket, bolt, nut, adjuster driver		
Approval	CE				
Unit weight	Approx. 45g		Approx. 50g		Approx. 45g

※1: In case of BGS sensing type, black/white difference is max. 10% of sensing distance and sensitivity adjustment range is -10% of max. sensing distance (based on non-glossy white paper).

※2: Non-glossy white paper 100×100mm.

※3: Transparent glass 50×50mm, t=3.0mm.

※4: Non-glossy white paper 50×50mm.

※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

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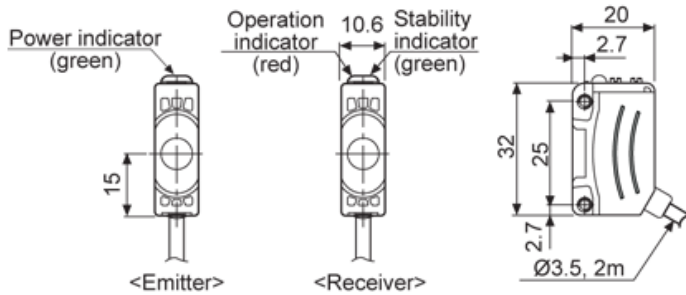


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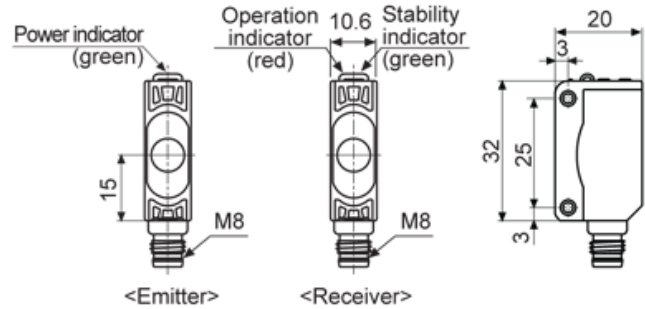


(unit: mm)

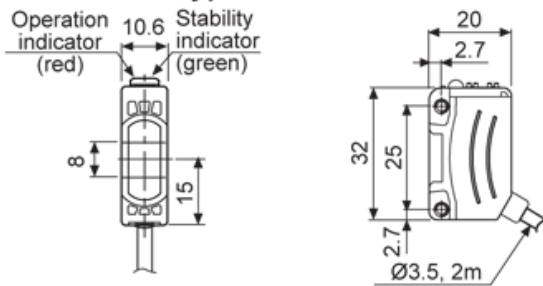
• **Through-beam type**



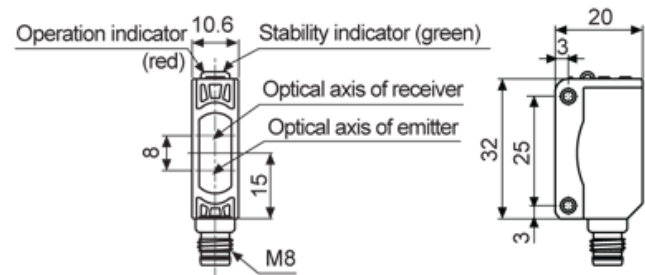
• **Through-beam type (connector type)**



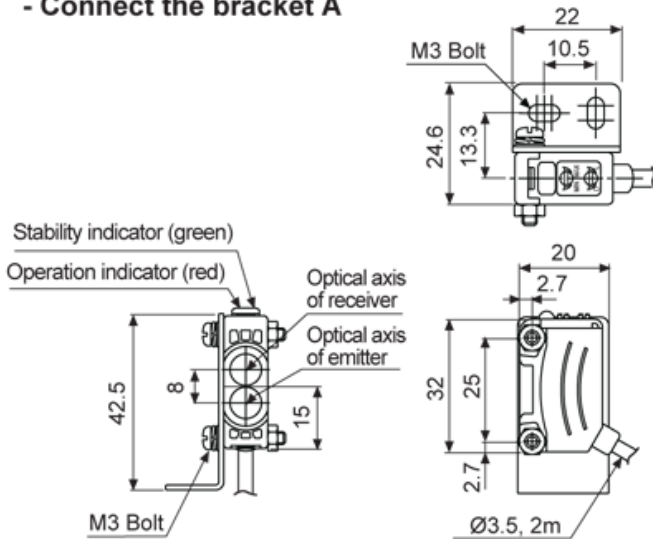
• **Retroreflective type**



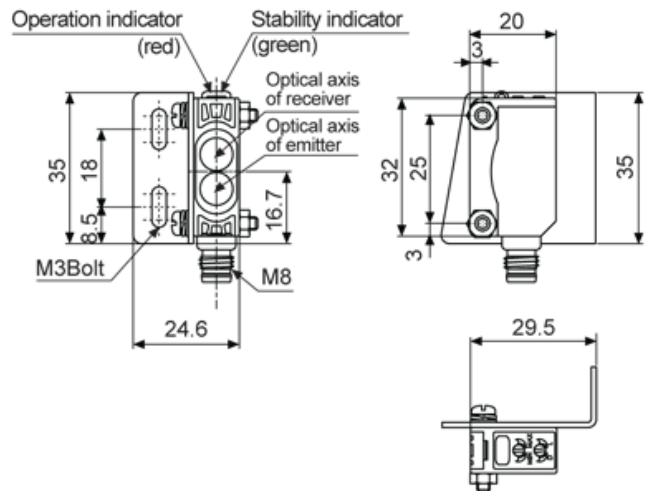
• **Retroreflective type (connector type)**



• **Diffuse/Narrow beam/BGS reflective type - Connect the bracket A**

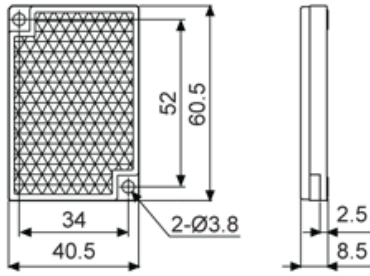


• **Diffuse reflective type (connector type) - Connect the bracket B**

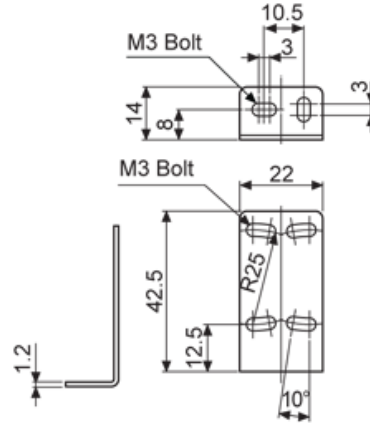


● **Reflector**

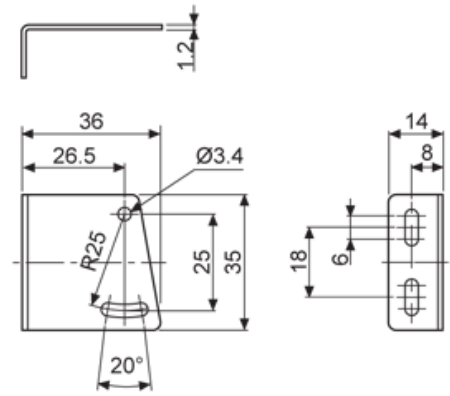
(accessory: MS-2A,  
sold separately: MS-2S, MS-3S)



● **Bracket A**

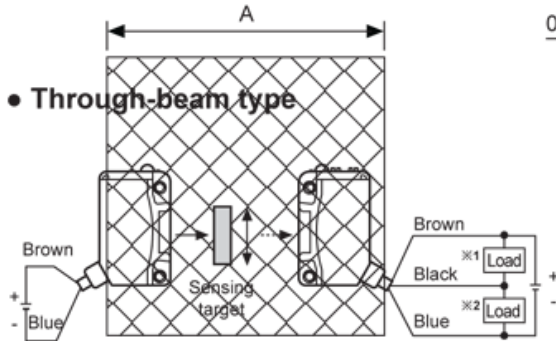


● **Bracket B (sold separately)**

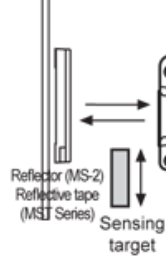


● **Reflective tape (sold separately)**

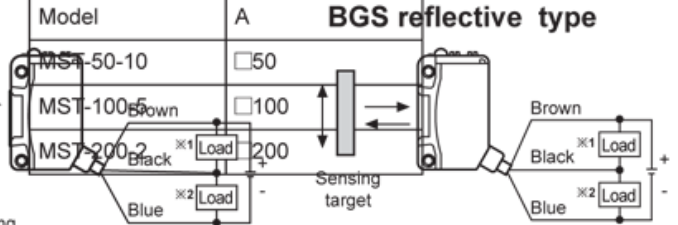
● **Through-beam type**



● **Retroreflective type**



● **Diffuse/Narrow beam/ BGS reflective type**



※1: Load connection for NPN output  
※2: Load connection for PNP output