Autonics

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PHOTOELECTRIC SENSOR **BEN SERIES**



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.

XPlease 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

- In case of using this unit with machinery(Ex: nuclear power control, medical equpment, 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
- Do not disassemble and 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 cause 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.
- It may cause a life or explosion.

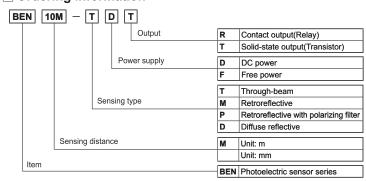
 3. Please observe voltage rated voltage and do not supply AC power.

 It may shorten the life cycle or damage to the product.

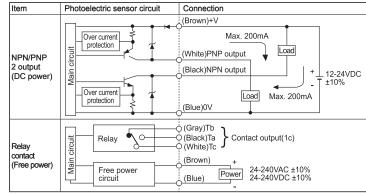
 4. Do not use this unit beyond rated power and do not supply AC power(at DC power type). It may cause damage to this unit.
- 5. Please check the polarity of power and wrong wiring
- It may cause damage to this unit 6. Do not use this unit in place where there is vibration or impact.
- It may cause damage to this unit.

 7. In cleaning the unit, do not use water or an oil-based detergent.
 It may cause electric shock or a fire.

Ordering information

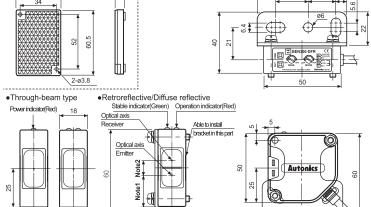


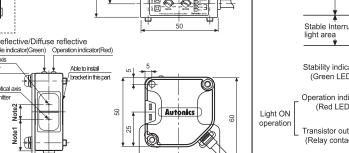
Control output circuit diagram



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

Dimensions (Unit: mm Reflector(MS-2)

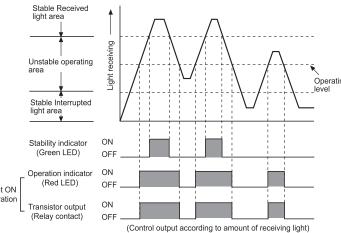




When install the sensor, screw tightening torque should be under 12kgf.cm(1.2N.m).
*Note1)Retroreflective: 21.25mm, Diffuse reflective: 20.25mm
*Note2)Retroreflective: 7.5mm, Diffuse reflective: 9.5mm

M4 Bolt

■ Timing diagram operation



- 1. The waveform of Transistor output and operation indicator are the state of operation for Light ON , but in case of Dark ON, it is opposite operation against Light ON.
- 2. In case of product with the output protection device, if terminals of control output are short or flow over current beyond rated current, the protection device will be run, so control output will not come out.

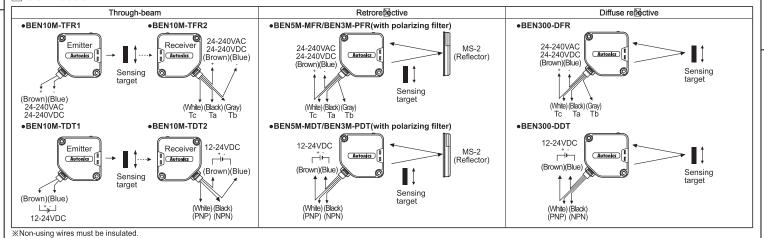
Specifications

Emitter

Туре		Free power, Relay contact output				DC power, Solid state output			
		Through-beam	Retroreflective**1	Retroreflective×1 (with polarizing Mer)	Diffuse reliective	Through-beam	Retroreflective*1	Retroreflective×1 (with polarizing Mer)	Diffuse reliective
Model		BEN10M-TFR	BEN5M-MFR	BEN3M-PFR	BEN300-DFR	BEN10M-TDT	BEN5M-MDT	BEN3M-PDT	BEN300-DDT
Sensing distance		10m	0.1 to 5m	0.1 to 3m	300mm(100 × 100mm non-glossy white paper)	10m	0.1 to 5m	0.1 to 3m	300mm(100 x 100mm non-glossy white paper)
Sensing target		Opaque materials of Min. ø16mm Opaque materials of Min. ø60mm Translucent, Opaque materials				Opaque materials of Min. ø16mm Opaque materials of Min. ø60mm			Translucent, Opaque materia
Hysteresis		- Max. 20% at sensing distance				-	•		Max. 20% at sensing distance
Response time		Max. 20ms				Max. 1ms			
Power supp	oly	24-240VAC ±10% 50/60Hz, 24-240VDC ±10%(Ripple P-P: Max. 10%)				12-24VDC ±10%(Ripple P-P: Max. 10%)			
Power cons	sumption	Max. 4VA							
Current con	sumption	•				Max. 50mA			
Light source	е	Infrared LED(850nm)		Red LED(660nm)	Infrared LED(940nm)	Infrared LED(850nm)		Red LED(660nm)	Infrared LED(940nm)
Sensitivity a	adjustment	-	Adjustable VR			-	Adjustable VR		
Operation n	node	Selectable Light ON or Dark ON by VR				•			
Control outp	put	Relay contact output •Relay contact capacity: 30V •Relay contact composition:	DC 3A of resistive load, 250VAC 3A of resistive load			NPN open collector/PNP open collector simultaneous output Load voltage: Max. 30VDC			
Relay lifetim	ne	Mechanically: Min. 50,000,00	00 operation, Electrically: Min.	-					
Protection of	circuit	•				Reverse polarity protection, Short-circuit protection			
Light receiv	ring element	Photo IC							
Indication		Operation indicator: Red, Stable indicator: Green(The red lamp on Emitter of through-beam type is for power indication)							
Insulation re	esistance	Min. 20MΩ(at 500VDC megger)							
Insulation ty	уре	Double or strong insulation (Mark: 🔲, Dielectric voltage between the measured input and the power: 1kV)			-				
Noise stren	gth	±1000V the square wave noise(pulse width: 1μs) by the		noise simulator		±240V the square wave noise(pulse width: 1μs) by the noise simulator			
Dielectric st	trength	1000VAC 50/60Hz for 1minute							
Vibration	Mechanical	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours							
VIDIAUOII	Malfunction	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 10 minutes				-			
Shock	Mechanical	500m/s²(50G) in X, Y, Z directions for 3 times							
SHOCK	Malfunction	100m/s²(10G) in X, Y, Z directions for 3 times							
	Ambient illumination	Sunlight: Max. 11,0001x, Incandescent lamp: Max. 3,0001x (Receiver illumination)							
Environ- ment	Ambient temperature	-20 to 65°C(non-freezing condition), Storage : -25 to 70°C							
	Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH							
Protection		IP50(IEC standard)							
Material		•Case, Case cover: Heat resistant ABS •Sensing part: PC(with polarizing ider: PMMA)							
Cable		ø5.0mm, 5-wire, Length: 2m(Emitter of through-beam type: ø5.0mm, 2-wire, Length: 2m) (AWG22, Core diameter: 0.08mm, Number of cores: 60, Insulator diameter: ø1.25mm)				ø5.0mm, 4-wire, Length: 2m(Emitter of through-beam type: ø5.0mm, 2-wire, Length: 2m) (AWG22, Core diameter: 0.08mm, Number of cores: 60, Insulator diameter: ø1.25mm)			
Accessory	Individual	-	Refector(MS-2)		-	-	Refléctor(MS-2)		-
	Common	VR adjustment driver, Mounting bracket, Bolts/nuts							·
A	•					C€			
Approval									

*1: The sensing range and the sensing object of the retroreflective sensor are specified with using the MS-2 reflector. The sensing ranges of the retroreflective sensor in the above table are indentified as the possible setting ranges of the MS-2 reflector. The sensor can detect on object under 0.1m apart *The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment

Connection



■ Mounting & Adjustment

⊚Through-beam type

- 1. Supply the power to the photoelectric sensor, after setting the emitter and the receiver in face to face.
- 2 Set the receiver in center of position where indicator turns on
- as adjusting the receiver and the emitter right and left. 3. Adjust up and down direction as the same
- 4. After adjustment, check the stability of operation putting the object at the optical axis.
- XIf the sensing target is translucent body or smaller than ø16mn it might not detect the target cause light passed.



Retroreflective type

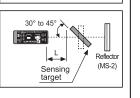
- 1. Supply the power to the photoelectric sensor, after setting the photoelectric sensor and the reflector(MS-2) in face to face.
- 2. Set the photoelectric sensor in the position which indicator turns on as adjusting the mirror or the sensor right and left.
- 3. Adjust up and down direction as the same.
- 4. After adjustment, check the stability of operation putting the object at the optical axis.
- XIf use more than 2 photoelectric sensors in parallel, the space between them should be more than 30cm.
- $\ensuremath{\mathbb{X}}\xspace$ If reflectance of target is higher than non-glossy white paper, it might cause malfunction by reflection from the target when the target is near to photoelectric sensor. Therefore put enough space between the target and photoelectric sensor or the surface of target should be installed at an angle of 30 to 45° against optical axis. (When sensing target with high reflectance near by, photoelectric sensing with the polarizing filter should be used.)
- X Sensitivity adjustment: Please see the diffuse reflective type

Diffuse reflective type

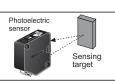
- 1. Even though the diffuse reflective type is set at max, sensitive position, sensitivity of the sensor must be adjusted the according to the existence of the reflective material in background.
- 2. Set the target at a position to be detected by the beam, then turn the adjuster until point (a) where the indicator turn on from min. position of the adjuster.
- 3. Take the target out of the photoelectric sensor, then turn the adjuster until point

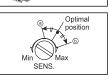
 which the indicator turns on, if the indicator does not turn on, max. sensitive position will be point ⓑ.
- 4. Set the adjuster at the middle of two switching point ⓐ, ⓑ.
- *The sensing distance indicated on specification chart is against 100 x100mm of non-glossy white paper. Be sure that it can be different by size, surface and gloss of target.





Adjust Up/Dow





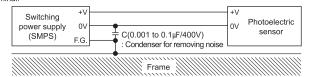
Caution for using

- 1. Intercept a strong source of light as like sunlight, spotlight within inclination angle range of photoelectric 2. The photoelectric sensor may cause malfunction under the fluorescent lamp light, so be sure to use
- cut-off light with panel. 3. When more than 2 sets of Through-beam types sensors are used closely, it might cause interference each other. Be sure to install the emitter and the receiver to shift by each set in order to avoid
- malfunction . When more than 2 sets of diffuse reflection types are installed adjacently, it may cause malfunction
- by light beam from the other target. So it must be installed at an enough interval.

 5. 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.

 6. When wire the photoelectric sensor with high voltage line, power line in the same conduit, it may cause malfunction or mechanical trouble.
- Therefore please wire separately or use different conduit. Avoid installing the unit as following place. Corrosive gas, oil or dust, strong flux, noise, sunlight, strong alkali, acid
- 8. In case of connect DC relay as inductive load to output, please remove surges by using diode or varistor.
- 9. The photoelectric sensor cable shall be used as short as possible, if not 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, but do not use an organic materials such as alkali, acid, chromic acid.
- 11. When use switching power supply as the source of supplying power, Frame Ground(F.G.) terminal shall be good earth ground and condenser for removing noise shall be installed between 0V and F.G.



12. Installation environment ①It shall be used indoor 3Pollution Degree 2

@Altitude Max. 2.000m (4) Installation Category II It may cause malfunction if above instructions are not followed

Major products



Connector/Sockets Sensor controller

■ Switching mode power supplies

Control switches/Lamps/Buzzers

■ I/O Terminal Blocks & Cables

Graphic/Logic panels

Field network devices

■Laser marking system(Fiber, CO₂, Nd:YAG) Laser welding/soldering system

Autonics Corporation Satisfiable Partner For Factory Automation

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