

Autonics

**Photoelectric Sensor
BX SERIES**

INSTRUCTION MANUAL



Thank you for choosing our Autonics product.
Please read the following safety considerations before use.

■ Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.
※⚠ symbol represents caution due to special circumstances in which hazards may occur.

⚠ 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.

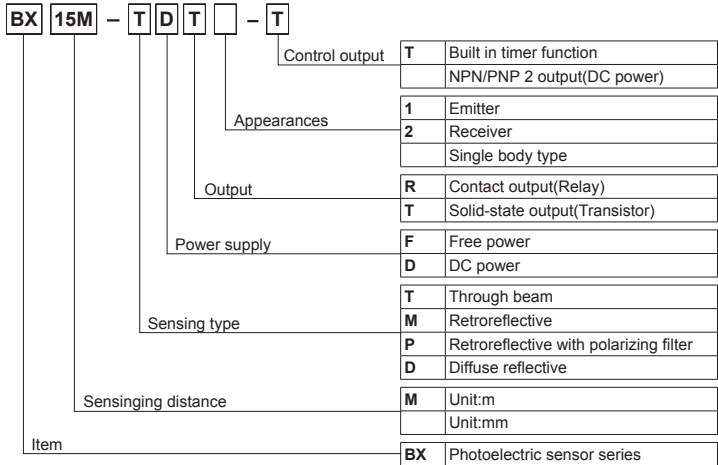
⚠ Warning

- 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 fire, personal injury, or economic loss.
- Do not disassemble or modify the unit. Failure to follow this instruction may result in electric shock or fire.
- Do not connect, repair, or inspect the unit while connected to a power source. Failure to follow this instruction may result in electric shock or fire.
- Check 'Connections' before wiring. Failure to follow this instruction may result in fire.

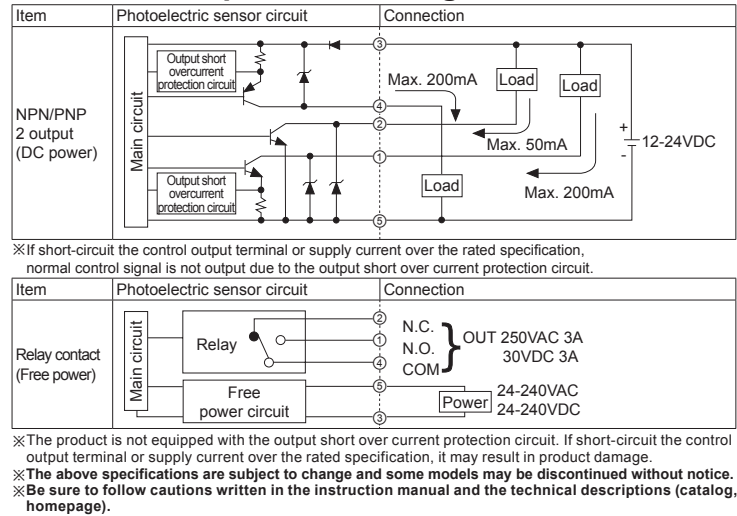
⚠ Caution

- Use the unit within the rated specifications. Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent. Failure to follow this instruction may result in electric shock or fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present. Failure to follow this instruction may result in fire or explosion.
- Do not use a load over the range of rated relay specification. Failure to follow this instruction may result in insulation failure, contact melt, contact failure, relay broken, or fire.

■ Ordering Information



■ Control Output Circuit Diagram

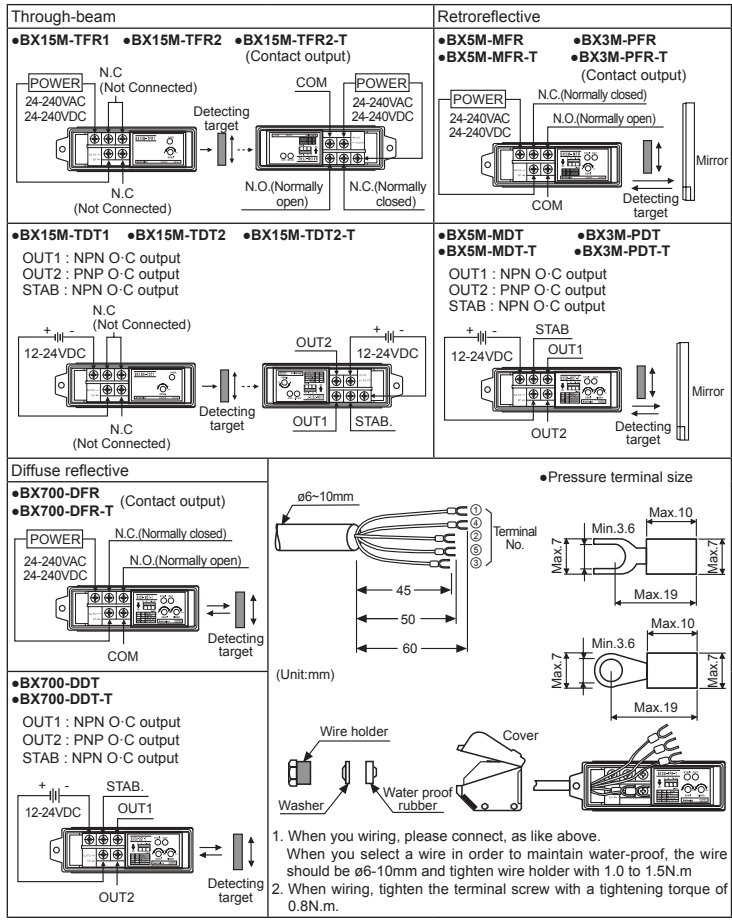


■ Specifications

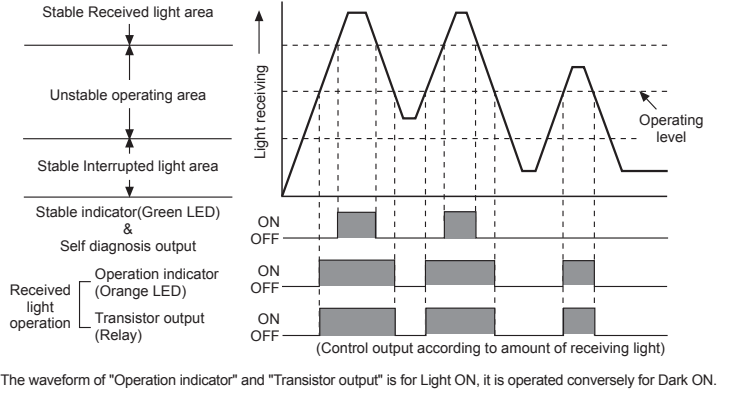
Type	Free power, Relay contact output				DC power, Solid state output				
	Through-beam	Retroreflective	Retroreflective (with polarizing filter)	Diffuse reflective	Through-beam	Retroreflective	Retroreflective (with polarizing filter)	Diffuse reflective	
Model	Standard type Built-in Timer	BX15M-TFR BX15M-TFR-T	BX5M-MFR BX5M-MFR-T	BX3M-PFR BX3M-PFR-T	BX700-DFR BX700-DFR-T	BX15M-TDT BX15M-TDT-T	BX5M-MDT BX5M-MDT-T	BX3M-PDT BX3M-PDT-T	BX700-DDT BX700-DDT-T
Detecting distance	15m	0.1~5m(Mirror MS-2)	0.1~3m(Mirror MS-3)	700mm(200×200mm non-glossy white paper)	15m	0.1~5m(Mirror MS-2)	0.1~3m(Mirror MS-3)	700mm(200×200mm non-glossy white paper)	
Detecting target	Opaque materials of Min. ø15mm	Opaque materials of Min. ø60mm		Translucent, Opaque materials of Min. ø15mm	Opaque materials of Min. ø15mm	Opaque materials of Min. ø60mm		Translucent, Opaque materials of Min. ø15mm	
Hysteresis				Max. 20% at detecting distance				Max. 20% at detecting distance	
Response time		Max. 20ms			Max. 1ms				
Power supply		24-240VAC~ ±10% 50/60Hz, 24-240VDC= ±10%(Ripple P-P: Max. 10%)				12-24VDC= ±10%(Ripple P-P: Max. 10%)			
Power consumption		Max. 3VA							
Current consumption					Max. 50mA				
Light source		Infrared LED(850nm)	Red LED(660nm)	Infrared LED(940nm)	Infrared LED(850nm)	Red LED(660nm)	Infrared LED(940nm)		
Sensitivity		Adjustable VR							
Operation mode		Selectable Light ON or Dark ON by switch							
Control output		Relay contact output • Relay contact capacity: 30VDC= 3A at resistive load, 250VAC~ 3A at resistive load • Relay contact composition:1c				NPN or PNP open collector output • Load voltage: Max. 30VDC= • Load current: Max. 200mA • Residual voltage - NPN: Max. 1VDC=, PNP : Max. 2.5VDC			
Self-diagnosis output		Green LED indicator Green LED turns on at unstable operation				NPN open collector output • Load voltage: Max. 30VDC= • Load current: Max. 50mA • Residual voltage: Max. 1VDC= (load current: 16mA) Green LED turns on at unstable operation and output(transistor output) turns on			
Protection circuit		Reverse polarity protection, Short-circuit protection							
Timer function		• Selectable ON Delay, OFF Delay, One Shot Delay by slide switch • Delay Time:0.1 to 5sec(VR adjustable)							
Indication		Operation indicator: Yellow LED, Stable indicator: Green LED							
Connection		Outgoing cable							
Insulation resistance		Min. 20MΩ(500VDC megger)							
Insulation type		Double or strong insulation (Mark: ⊠, Dielectric voltage between the measured input and the power: 1.5kV)							
Noise strength		±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 strength		1500VAC 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							
	Malfunction	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 10 minutes							
Shock	Mechanical	500ms*(50G) in X, Y, Z directions for 3 times							
	Malfunction	100ms*(10G) in X, Y, Z directions for 3 times							
Environment	Ambient illumination	Sunlight: Max. 11,000lx, Incandescent lamp: Max. 3,000lx(Receiver illumination)							
	Ambient temperature	-20 to 55°C, Storage: -25 to 70°C							
	Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH							
Protection		IP66(IEC standard)							
Material		Case, Lens cover: PC				Sensing part: Acryl			
Accessory	Individual		Mirror(MS-2)	Mirror(MS-3)			Mirror(MS-2)	Mirror(MS-3)	
	Common	VR adjustment driver, mounting bracket, Z bolt, 2 washer, 1, ø6 waterproof rubber: 1, ø6 waterproof rubber: 2, ø10 waterproof rubber: 2				VR adjustment driver, mounting bracket, Z bolt, 1 washer, 1, ø6 waterproof rubber: 1, ø6 waterproof rubber: 2, ø10 waterproof rubber: 2			
Approval		CE							
Unit weight		TFR : Approx. 225g, TFR-T : Approx. 226g	MFR : Approx. 130g, MFR-T : Approx. 131g	PFR : Approx. 148g, PFR-T : Approx. 149g	DFR : Approx. 115g, DFR-T : Approx. 116g	TDT : Approx. 211g, TDT-T : Approx. 212g	MDT : Approx. 123g, MDT-T : Approx. 124g	PDT : Approx. 141g, PDT-T : Approx. 142g	DDT : Approx. 116g, DDT-T : Approx. 117g

※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.
※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 identified as the possible setting ranges of the MS-2 reflector. The sensor can detect on object under 0.1m apart.

■ Connections

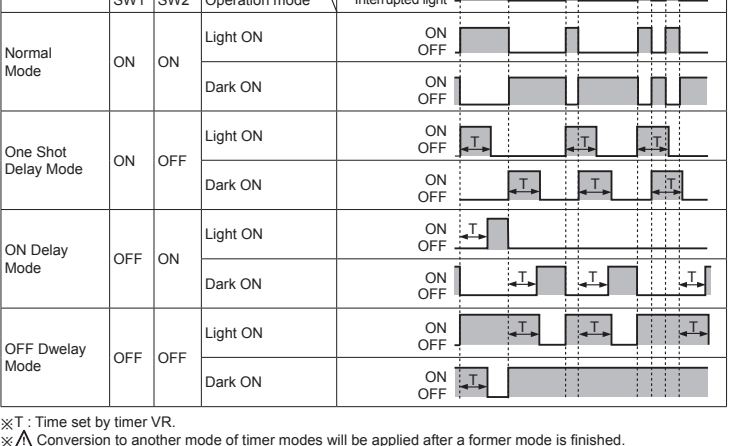


■ Operation Mode



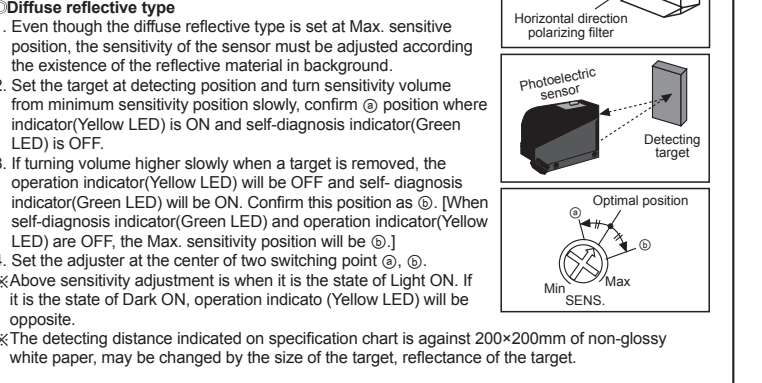
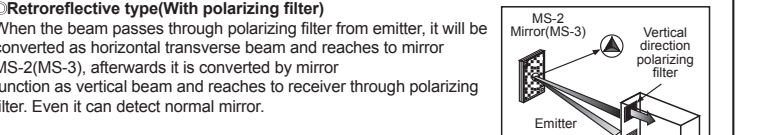
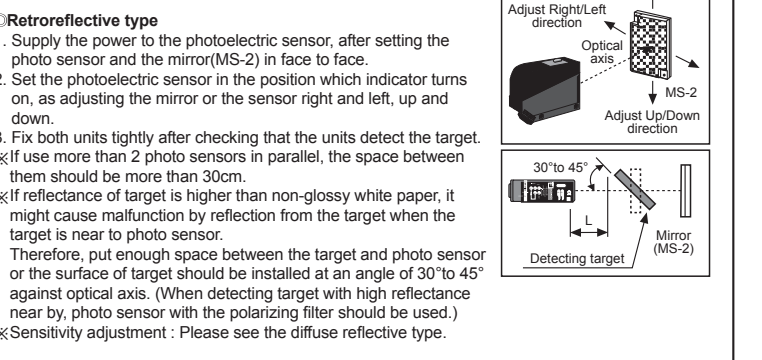
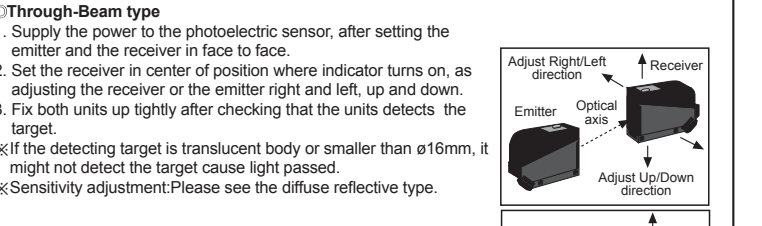
The waveform of "Operation indicator" and "Transistor output" is for Light ON, it is operated conversely for Dark ON.

■ Timer Mode



■ Mounting and Adjustment

Use the product with the protective cover in the place. Failure to follow this instruction may result in electric shock. When extending wire, use AWG20 cable or over within 100m. When using photoelectric sensors closely over two units, it may result in malfunction due to mutual interference. When installing the product, tighten the wire holder with a tightening torque of 1.0 to 1.5N.m. When installing the cover, tighten the screw with a tightening torque of 0.3 to 0.5 N.m.



■ Cautions during Use

- Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents.
- When connecting a DC relay or other inductive load to the output, remove surge by using diodes or varistors.
- Use the product, 0.5 sec after supplying power. When using separate power supply for the sensor and load, supply power to sensor first.
- 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
- When using switching mode power supply to supply the power, ground F.G. terminal and connect a condenser between 0V and F.G. terminal to remove noise.
- When using sensor with the equipment which generates noise (switching regulator, inverter, servo motor, etc.), ground F.G. terminal of the equipment.
- This unit may be used in the following environments.
 - ⊙Indoors (in the environment condition rated in 'Specifications')
 - ⊙Altitude max. 2,000m
 - ⊙Pollution degree 2
 - ⊙Installation category II

■ Major Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door Side Sensors
- Area Sensors
- Proximity Sensors
- Pressure Sensors
- Rotary Encoders
- Connectors/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
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers

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