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

- Sail-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.

 2. Do not disassemble or modify the unit.

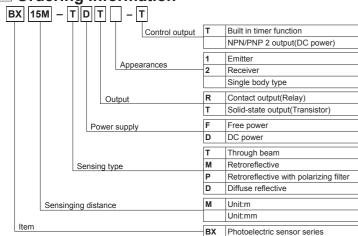
 Failure to follow this instruction may result in electric shock or fire.
- Failure to follow this instruction may result in electric shock or fire.
- 3. Do not connect, repair, or inspect the unit while connected to a power source.
- Failure to follow this instruction may result in electric shock or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

 Failure to follow this instruction may result in fire

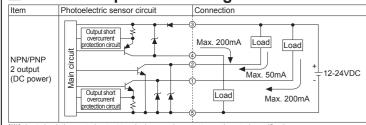
⚠ Caution

- Use the unit within the rated specifications.
 Failure to follow this instruction may result in fire or product damage
- 2. 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.
- 3. Do not use the unit in the place where flamma sive gas, humidity, direct sunlight, radi
- 3. Do not use the unit in the place where naminable explosive/corrosive gas, naminary, anext saminging, radiant heat, vibration, impact, or salinity may be present. Failure to follow this instruction may result in fire or explosion.
 4. 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.

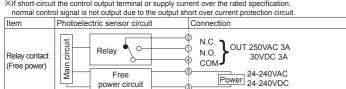
Ordering Information



Control Output Circuit Diagram



If short-circuit the control output terminal or supply current over the rated specification



- *The product is not equipped with the output short over current protection circuit. If short-circuit the control
- output terminal or supply current over the rated specification, it may result in product damage.

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

 **Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog,

Specifications

		Free power, Relay contact	output			DC power, Solid state output						
Туре		Through-beam	Retroreflective	Retroreflective (with polarizing filter)	Diffuse reflective	Through-beam	Retroreflective	Retroreflective (with polarizing filter)	Diffuse reflective			
	Standard type	BX15M-TFR	BX5M-MFR	BX3M-PFR	BX700-DFR	BX15M-TDT	BX5M-MDT	BX3M-PDT	BX700-DDT			
lodel	Built-in Timer	BX15M-TFR-T	BX5M-MFR-T	BX3M-PFR-T	BX700-DFR-T	BX15M-TDT-T	BX5M-MDT-T	BX3M-PDT-T	BX700-DDT-T			
Detecting distance		15m	0.1~5m(Mirror MS-2)	0.1~2m(Mirror MS-2), 0.1~3m(Mirror MS-3)	700mm(200×200mm non-glossy white paper)	15m	0.1~5m(Mirror MS-2)	0.1~2m(Mirror MS-2), 0.1~3m(Mirror MS-3)	700mm(200×200mm non-glossy white page			
Detecting target		Opaque materials of Min. ø15mm				Opaque materials of Min. ø15mm	Opaque materials of Min. ø60mm		Translucent, Opaque materials			
Hysteresis		_			Max. 20% at detecting distance	Max. 20% at dete			Max. 20% at detecting distance			
Response time		Max. 20ms				Max. 1ms						
Power supply		24-240VAC~ ±10% 50/60	Hz, 24-240VDC== ±10%(R	ipple 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)	Infrared LED(850nm) Red LED(660nn			Infrared LED(850nm) Red LED(660nm)		Red LED(660nm)	Infrared LED(940nm			
ensitivi		Adjustable VR		. ,	Infrared LED(940nm)	. ,						
	n mode	Selectable Light ON or Da	rk ON by switch									
Control o		Relay contact output • Relay contact cutput • 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				NPN open collector output - Load voltage: Max. 30VDC= - Load current: Max. 50mA - Residual voltage: Max. 1VDC= (load current: 50mA), Max. 0.4VDC (load current: 16mA)						
		Green LED turns on at uns	stable operation			Green LED turns on at unstable operation and output(transistor output) turns on						
rotectio	on circuit	Reverse polarity protection, Short-circuit protection										
imer fur	nction	Selectable ON Delay, OFF Delay, One Shot Delay by slide switch Delay Time:0.1 to 5sec(VR adjustable)										
ndicatio	n	Operation indicator: Yellow LED, Stable indicator: Green LED										
Connecti	ion	Outgoing cable										
nsulatio	n resistance	Min. 20MQ(500VDC megger)										
Insulation type		Double or strong insulation (Mark: [g], Dielectric voltage between the measured input and the power: 1.5kV)										
Noise strength Dielectric 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 1500VAC 50/60Hz for 1minute										
Jielectiile				of X, Y, Z directions for 2 ho								
Vibration	Mechanical											
	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										
		400 (-2/400) ! V : / = !!										
	Malfunction	100m/s²(10G) in X, Y, Z di	rections for 3 times									
	Ambient illumination	Sunlight: Max. 11,000/x, In	rections for 3 times candescent lamp: Max. 3,0	000/x(Receiver illumination)								
nviron	Ambient illumination Ambient temperature	Sunlight: Max. 11,000/x, In -20 to 55°C, Storage: -25 t	rections for 3 times candescent lamp: Max. 3,0 o 70°C	00/x(Receiver illumination)								
Environ ment	Ambient illumination Ambient temperature Ambient humidity	Sunlight: Max. 11,000/x, In -20 to 55°C, Storage: -25 to 35 to 85%RH, Storage: 35	rections for 3 times candescent lamp: Max. 3,0 o 70°C	001x(Receiver illumination)								
Environ ment Protectio	Ambient illumination Ambient temperature Ambient humidity	Sunlight: Max. 11,000/x, In -20 to 55°C, Storage: -25 t 35 to 85%RH, Storage: 35 IP66(IEC standard)	rections for 3 times candescent lamp: Max. 3,0 o 70°C to 85%RH	00/x(Receiver illumination)								
Environ ment Protectio	Ambient illumination Ambient temperature Ambient humidity	Sunlight: Max. 11,000/x, In -20 to 55°C, Storage: -25 to 35 to 85%RH, Storage: 35	rections for 3 times candescent lamp: Max. 3,0 o 70°C to 85%RH * Sensing part: Acryl									
Environ ment	Ambient illumination Ambient temperature Ambient humidity	Sunlight: Max. 11,000/x, In -20 to 55°C, Storage: -25 t 35 to 85%RH, Storage: 35 IP66(IEC standard)	rections for 3 times candescent lamp: Max. 3,0 o 70°C to 85%RH	001x(Receiver illumination) Mirror(MS-3)	-		Mirror(MS-2)	Mirror(MS-3)	-			
Environ -ment Protectio Material	Ambient illumination Ambient temperature Ambient humidity On	Sunlight: Max. 11,000/x, In -20 to 55°C, Storage: -25 t 35 to 85%RH, Storage: 35 IP66(IEC standard)	rections for 3 times candescent lamp: Max. 3,0 o 70°C to 85%RH * Sensing part: Acryl Mirror(MS-2)			VR adjustment driver, mounting bracket, Z bolt 2, washer 2, 26 weleproof nubber 2, 2 (01) weleproof nubber 2010 well-proof nubber 2010 well-proo		Mirror(MS-3) ting bracket, Z bolt: 1, washer:				
Environ -ment Protectio Material Accesso Approval	Ambient illumination Ambient temperature Ambient humidity Individual Common	Sunlight: Max. 11,000/x, In -20 to 55°C, Storage: -25 ti 35 to 85%RH, Storage: 35 IP66(IEC standard) - Case, Lens cover: PC	rections for 3 times candescent lamp: Max. 3,0 o 70°C to 85%RH • Sensing part: Acryl Mirror(MS-2) VR adjustment driver, mount	Mirror(MS-3)		VR adjustment driver, mounting bracket, Z bolt: 2, washer: 2, Ø6 waterproof rubber: 2,	VR adjustment driver, moun		— 1, 0/6 waterproof rubber: 1			

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

Retroreflective

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.

Connections

OUT2 : PNP O C output

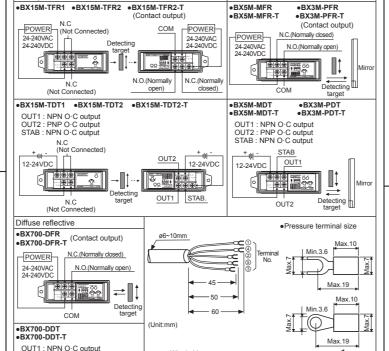
STAB : NPN O·C output

12-24VDC

OUT1

OUT2

Through-beam



When you wiring please connect as like above

When you select a wire in order to maintain water-proof, the wi should be ø6-10mm and tighten wire holder with 1.0 to 1.5N.m

2. When wiring, tighten the terminal screw with a tightening torque o

Operation Mode Stable Received light area Unstable operating area Stable Interrupted light area Stable indicator(Green LED) ON Self diagnosis output Operation indicator (Orange LED) Transistor output (Control output according to amount of receiving light)

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

■ Timer Mode

Timer mode	SW position		Status of detection	Received light
Timer mode	SW1	SW2	Operation mode	Interrupted light
Normal	ON	ON	Light ON	ON OFF
Mode	ON		Dark ON	ON OFF
One Shot	ON	OFF	Light ON	ON T T T
Delay Mode	ON		Dark ON	ON T T
ON Delay	OFF	ON	Light ON	ON TOFF
Mode	Orr		Dark ON	ON T T
OFF Dwelay	OFF	OFF	Light ON	ON T T T
Mode	OFF		Dark ON	ON I

T: Time set by timer VR ∴ Conversion to another mode of timer modes will be applied after a former mode is finished.

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

○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 or the emitter right and left, up and down.
- 3. Fix both units up tightly after checking that the units detects the
- XIf the detecting target is translucent body or smaller than ø16mm, might not detect the target cause light passed.
- Sensitivity adjustment: Please see the diffuse reflective type

ORetroreflective type

- 1. Supply the power to the photoelectric sensor, after setting the photo sensor and the mirror(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, up and
- 3. Fix both units tightly after checking that the units detect the target. ×If use more than 2 photo sensors in parallel, the space between them should be more than 30cm.
- XIf 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 photo sensor.
- Therefore, put enough space between the target and photo sensor or the surface of target should be installed at an angle of 30° to 45° against optical axis. (When detecting target with high reflectance near by, photo sensor with the polarizing filter should be used.)
- XSensitivity adjustment : Please see the diffuse reflective type.



When the beam passes through polarizing filter from emitter, it will be converted as horizontal transverse beam and reaches to mirror MS-2(MS-3), afterwards it is converted by mirror

function as vertical beam and reaches to receiver through polarizing filter. Even it can detect normal mirror.

- **©Diffuse reflective type**1. Even though the diffuse reflective type is set at Max. sensitive position, the sensitivity of the sensor must be adjusted according the existence of the reflective material in background.
- 2. Set the target at detecting position and turn sensitivity volume from minimum sensitivity position slowly, confirm

 position where indicator(Yellow LED) is ON and self-diagnosis indicator(Green LED) is OFF 3. If turning volume higher slowly when a target is removed, the
- operation indicator(Yellow LED) will be OFF and self-diagnosis indicator(Green LED) will be ON. Confirm this position as (6). [When self-diagnosis indicator(Green LED) and operation indicator(Yellow LED) are OFF, the Max. sensitivity position will be (b).]
 4. Set the adjuster at the center of two switching point (a), (b).
- **The detecting distance indicated on specification chart is against 200×200mm of non-glossy white paper, may be changed by the size of the target, reflectance of the target.

- 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 firs
- 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply
- . Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise. 6. When using switching mode power supply to supply the power, ground F.G. terminal and connect a condense
- 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.

 ①Indoors (in the environment condition rated in 'Specifications')
- ②Altitude max. 2.000m
- ③Pollution degree 2 ④Installation category II

Major Products

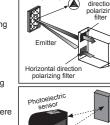
- Photoelectric Sensors Temperature Controllers
- Fiber Optic Sensors Temperature/Humidity Transducers
 Door Sensors SSRs/Power Controllers
- Door Side Sensors
- Area Sensors ■ Timers
- Proximity Sensors
- Pressure Sensors Tachometer/Pulse (Rate) Meters
- Rotary Encoders ■ Display Units
- Connectors/Sockets Sensor Controllers
- Switching Mode Power Supplies
- Control Switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper Motors/Drivers/Motion Controller
- Graphic/Logic Panels
- Field Network Devices
- Laser Marking System (Fiber, CO₂, Nd: YAG)
- Laser Welding/Cutting System

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DRW171451AA



Adjust Right/Left direction

30°to 45°

Detecting target

f #:

♣ Rece





