

# Autonics Photoelectric Sensor BA 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.

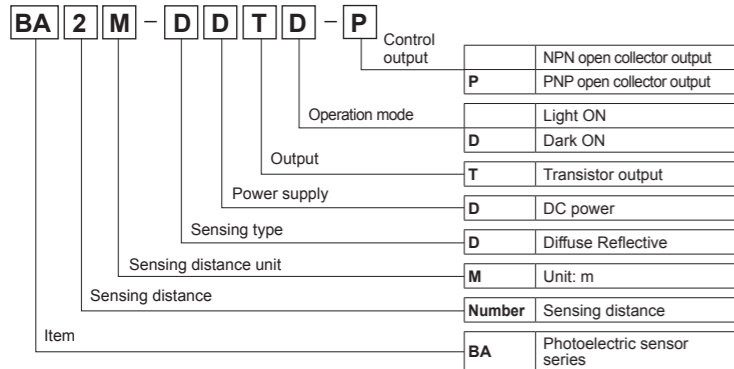
### ⚠ Warning

- 1. 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.
- 2. Do not disassemble or modify the unit.**  
Failure to follow this instruction may result in fire.
- 3. Do not connect, repair, or inspect the unit while connected to a power source.**  
Failure to follow this instruction may result in fire.
- 4. Check 'Connections' before wiring.**  
Failure to follow this instruction may result in fire.

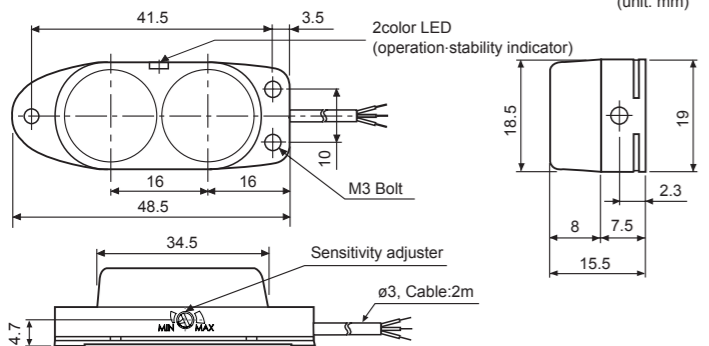
### ⚠ Caution

- 1. 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 fire.
- 3. 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.

### ■ Ordering Information



### ■ Dimensions



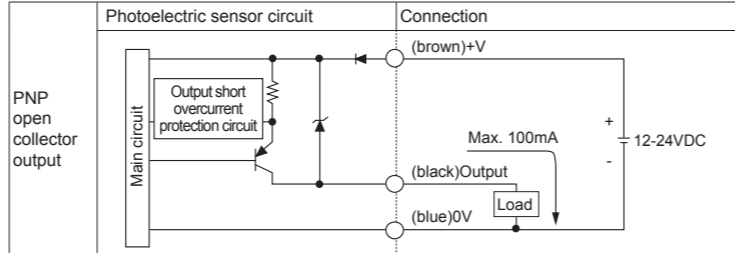
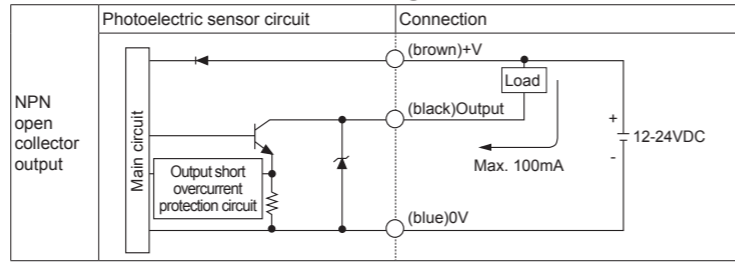
※The above specifications are subject to change and some models may be discontinued without notice.  
※Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

### ■ Specification

Model	NPN output	BA2M-DDT	BA2M-DDTD
	PNP output	BA2M-DDT-P	BA2M-DDTD-P
Sensing type	Diffuse Reflective		
Sensing distance	2m (non-glossy white paper 200×200mm)		
Sensing target	Translucent, opaque materials		
Hysteresis	Max. 20% at sensing distance		
Response time	Max. 1ms		
Power supply	12-24VDC ±10% (ripple P-P: max. 10%)		
Current consumption	Max. 15mA (max. 30mA when the output is ON)		
Light source	Infrared LED (850nm)		
Sensitivity adjustment	Sensitivity adjuster		
Operation mode	Light ON	Dark ON	
Control output	NPN or PNP open collector output ●Load voltage: max.26.4VDC ●Load current: max.100mA ●Residual voltage - NPN: max.1VDC, PNP: max. 2.5VDC		
Protection circuit	Reverse polarity protection circuit, output short overcurrent protection circuit		
Receiver	Photo IC		
Indicator	Operation: red, stability: orange (Light On), green (Dark On)		
Insulation resistance	Over 20MΩ (at 500VDC megger)		
Noise immunity	±240V the square wave noise (pulse width:1μs) by the noise simulator		
Dielectric strength	1,000VAC 50/60Hz for 1minute		
Vibration resistance	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours		
Shock resistance	100m/s <sup>2</sup> 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: -25 to 70°C	
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH	
Protection	IP64 (IEC standards)		
Material	Case: ABS, Sensing part: PC, Indicator: PC, VR: IXEF		
Cable	ø3mm, 3-wire, Length: 2m(AWG24, Core diameter: 0.08mm, Number of cores: 40, Insulator diameter: ø1mm)		
Accessory	Adjuster screwdriver		
Approval	CE		
Weight	Approx. 50g		

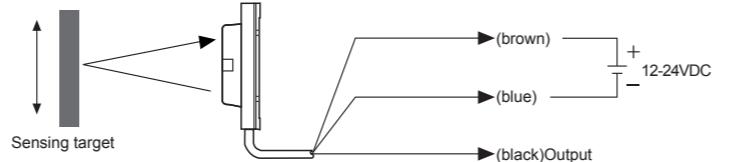
※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

### ■ Control Output Circuit Diagram

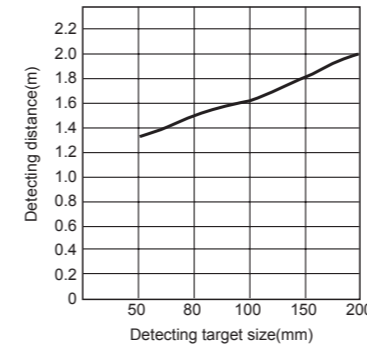


※If short-circuit the control output terminal or supply current over the rated specification, normal control signal is not output due to the output short over current protection circuit.

### ■ Connection

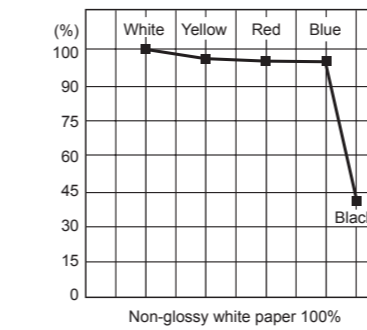


### ■ Detecting Distance against the Target Size



※It shows the change of detecting distance by size of targets.  
Standard targets: □ 200×200mm non-glossy white paper.

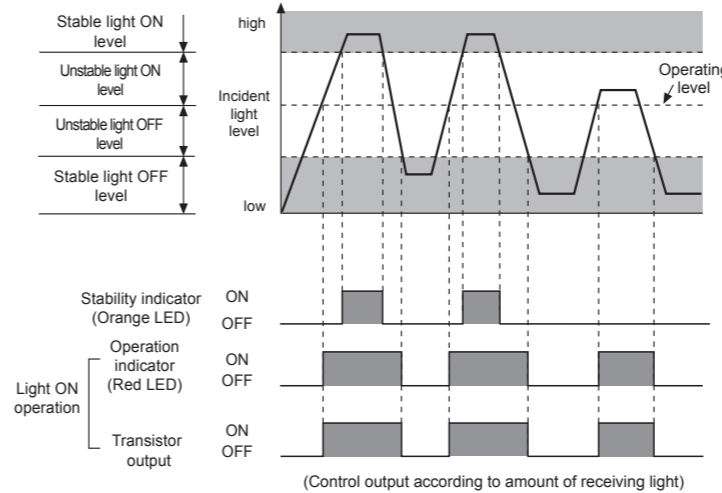
### ■ Detecting Distance against the Target Color



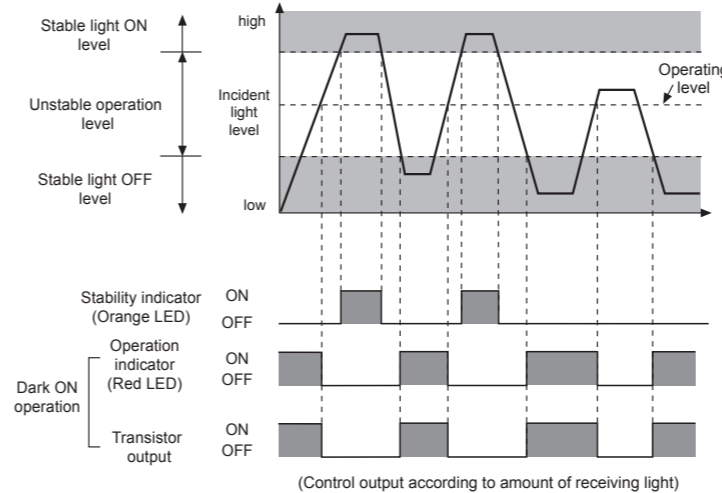
※It shows the rate of detecting distance by color of targets.

### ■ Operation Mode

#### ● Light ON



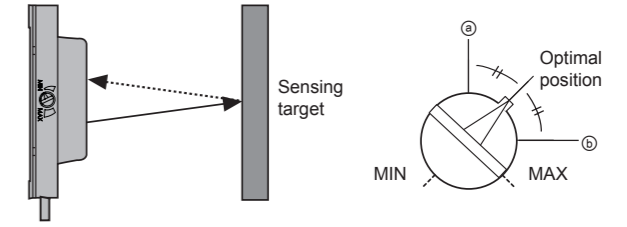
#### ● Dark ON



### ■ Mounting and Adjustment

Please check wiring after setting the target and supply the power to this sensor.  
When using photoelectric sensors closely over two units, it may result in malfunction due to mutual interference.  
When installing the product, tighten the screw with a tightening torque of 0.5N·m.

#### ● Optical axis adjustment



Mount this unit at center position where operation LED turns on as moving the unit toward right or left, up or down

#### ● Adjustment

- When sensing the object, set the sensitivity adjustment in stable Light ON area (orange: Light On, green: Dark On) as shown 'operation mode chart'.
  - The sensitivity should be adjusted depending on a sensing target or mounting place.
  - Set the target at a position to be detected by the beam, then turn the adjuster until position ① where the indicator turns on from min. position of the adjuster.
  - Take the target out of the sensing area, then turn the adjuster until position ② where the indicator turns on. If the indicator dose not turn on, Max. position ③.
  - Set the adjuster at the center of two switching position ①, ②.
- ※The sensing distance indicated on specification chart is for 200 X 200mm of non-glossy white paper. Be sure that it can be different by size, surface and gloss of target.

### ■ 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.
  - ①Indoors (in the environment condition rated in 'Specifications')
  - ②Altitude max. 2,000m
  - ③Pollution degree 3
  - ④Installation 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, CO<sub>2</sub>, 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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