

# Autonics Photoelectric Sensor with Amplifier BYD SERIES INSTRUCTION MANUAL



Thank you for choosing our Autonics product.

Please read the following safety considerations before use.

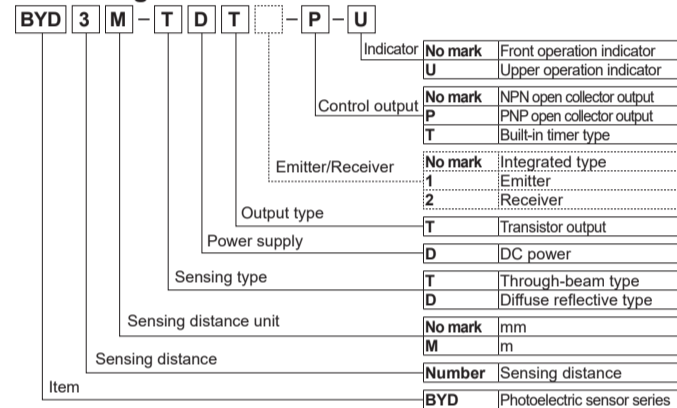
## ■ Safety Considerations

- ⚠ 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 personal injury, economic loss or fire.
  - Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.  
Failure to follow this instruction may result in explosion or fire.
  - Do not disassemble or modify the unit.  
Failure to follow this instruction may result in fire.
  - Do not connect, repair, or inspect the unit while connected to a power source.  
Failure to follow this instruction may result in fire.
  - Check 'Connections' before wiring.  
Failure to follow this instruction may result in fire.

## ⚠ Caution

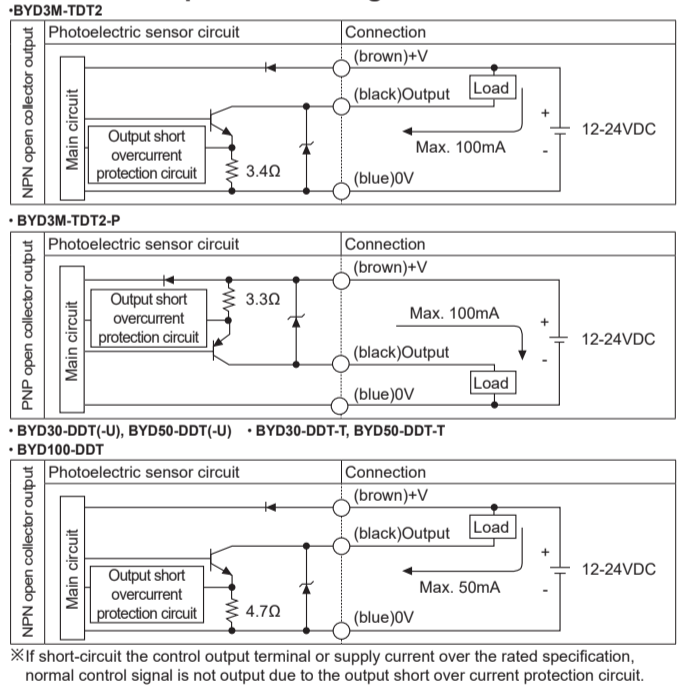
- Use the unit within the rated specifications.  
Failure to follow this instruction may result in fire or product damage.
- Use a dry cloth to clean the unit, and do not use water or organic solvent.  
Failure to follow this instruction may result in fire.

## ■ Ordering Information

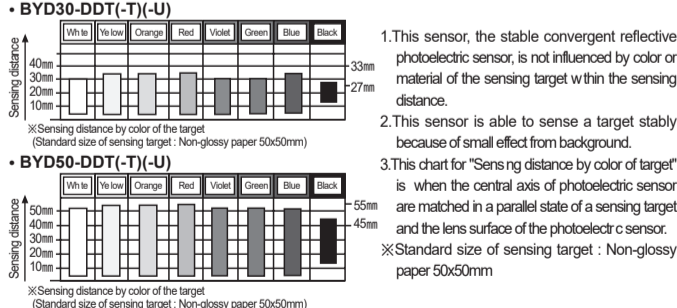


⚠ This information is intended for product management of through-beam type. (no need to refer when selecting model)  
⚠ Randomly combining model components can make a model which is not existing.

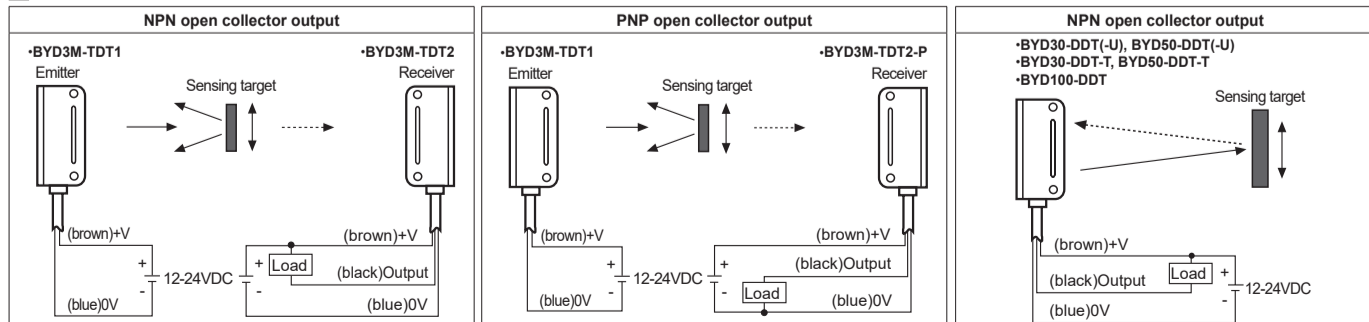
## ■ Control Output Circuit Diagram



## ■ Sensing Distance by Color of the Target (Convergent reflective type)



## ■ Connections

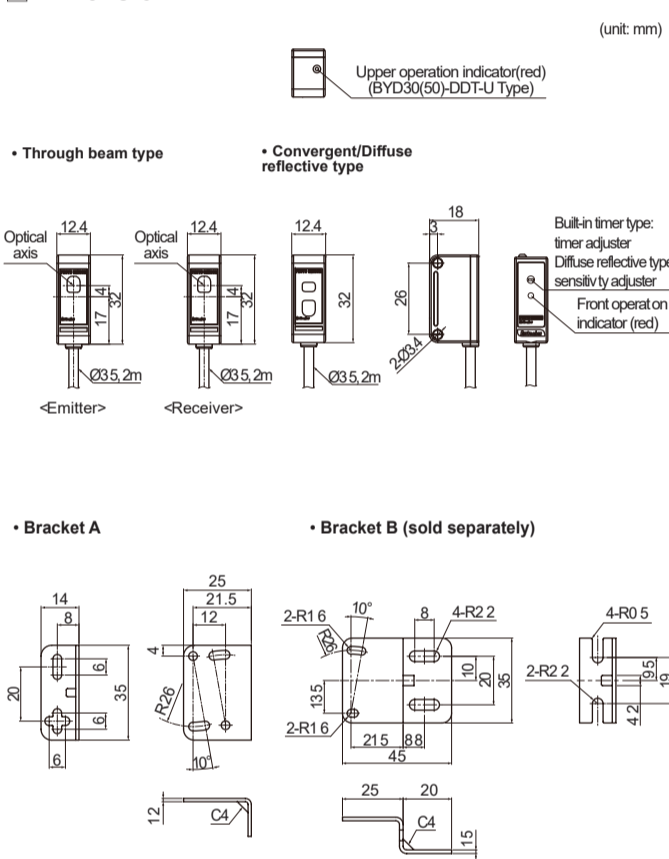


## ■ Specifications

|                        |   |   |   |
|------------------------|---|---|---|
| Type                   | Convergent reflective   | Diffuse reflective  | Through beam                              |
| Model                  | BYD30-DDT<br>BYD30-DDT-U <sup>※1</sup><br>BYD30-DDT-T <sup>※2</sup>   | BYD50-DDT<br>BYD50-DDT-U <sup>※1</sup><br>BYD50-DDT-T <sup>※2</sup> | BYD100-DDT<br>BYD3M-TDT<br>BYD3M-TDT-P    |
| Sensing distance       | 10 to 30mm <sup>※3</sup>  | 10 to 50mm <sup>※3</sup>  | 100mm <sup>※3</sup><br>3m                 |
| Sensing target         | Translucent, opaque materials   |   | Opaque materials of min. Ø6mm             |
| Hysteresis             | Max. 10% at sensing distance  |   | Max. 25% at sensing distance              |
| Response time          | Operation: max. 3ms<br>Return: max. 100ms (when the time adjuster is minimum)   |   | Operation: max. 3ms<br>Return: max. 100ms |
| Power supply           | 12-24VDC ±10% (ripple P-P: max. 10%)  |   |   |
| Current consumption    | Max. 35mA   |   | Max. 30mA                                 |
| Light source           | Infrared LED  |   |   |
| Sensitivity adjustment | Fixed   | Sensitivity Adjuster  | Fixed                                     |
| Operation mode         | Light ON fixed  |   | Dark ON (light ON: option)                |
| Control output         | NPN open collector output<br>•Load voltage: max. 30VDC=   | •Load current: max. 50mA  | •Residual voltage: max. 1VDC=             |
| Protection circuit     | Reverse polarity protection circuit, output short overcurrent protection circuit  |   |   |
| Timer function         | Built-in (OFF delay) delay time: max. 0.1 to 2 sec (timer adjuster)   |   |   |
| Indication             | Operation indicator: red LED  |   |   |
| 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 1 minute   |   |   |
| Vibration              | 1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z direction for 2 hours   |   |   |
| Shock                  | 500m/s <sup>2</sup> (50G) 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 65°C, storage: -25 to 70°C  |   |   |
|                        | Ambient humidity: 35 to 85%RH, storage: 35 to 85%RH   |   |   |
| Protection structure   | Standard type: P64 (EC standards) / ※1, ※2: P50 (IEC standards)   | IP50 (IEC standards)  | P64 (EC standards)                        |
| Material               | Case: ABS, sensing part: acryl  |   |   |
| Cable                  | Ø3 5mm, 3-wire, length: 2m (emitter of through-beam type: Ø3 5mm, 2-wire, length: 2m)<br>(AWG24, core diameter: 0.08mm, number of cores: 40, insulator diameter: 1mm) |   |   |
| Accessory              | Adjustment screwdriver, fixing bracket A, M3 bolt: 2, M3 nut: 2   |   | Mounting bracket A, M3 bolt: 4, M3 nut: 4 |
| Approval               | CE  |   |   |
| Weight <sup>※4</sup>   | Approx. 75g (approx. 38g)   |   | Approx. 105g (approx. 80g)                |

※1: Operation indicator is on top.  
※2: OFF delay timer is built-in.  
※3: Non-glossy white paper 50x50mm.  
※4: The weight includes packaging. The weight in parenthesis is for unit only.  
⚠ The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

## ■ Dimension



## ■ Accessory (sold separately)

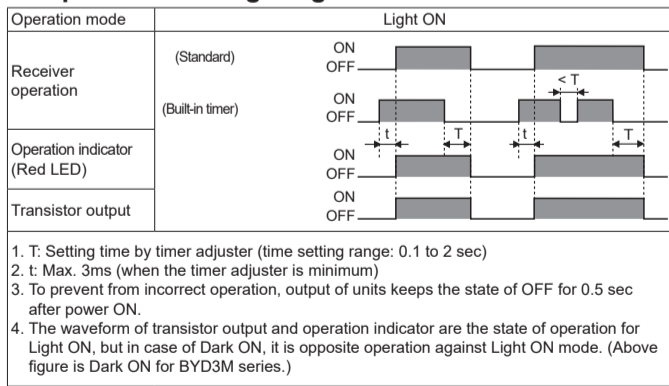
• Slit (Model BYD3M-ST)

• Min. Sensing target and max. sensing distance by Ø of slit when attach the slits at both a receiver and an emitter.

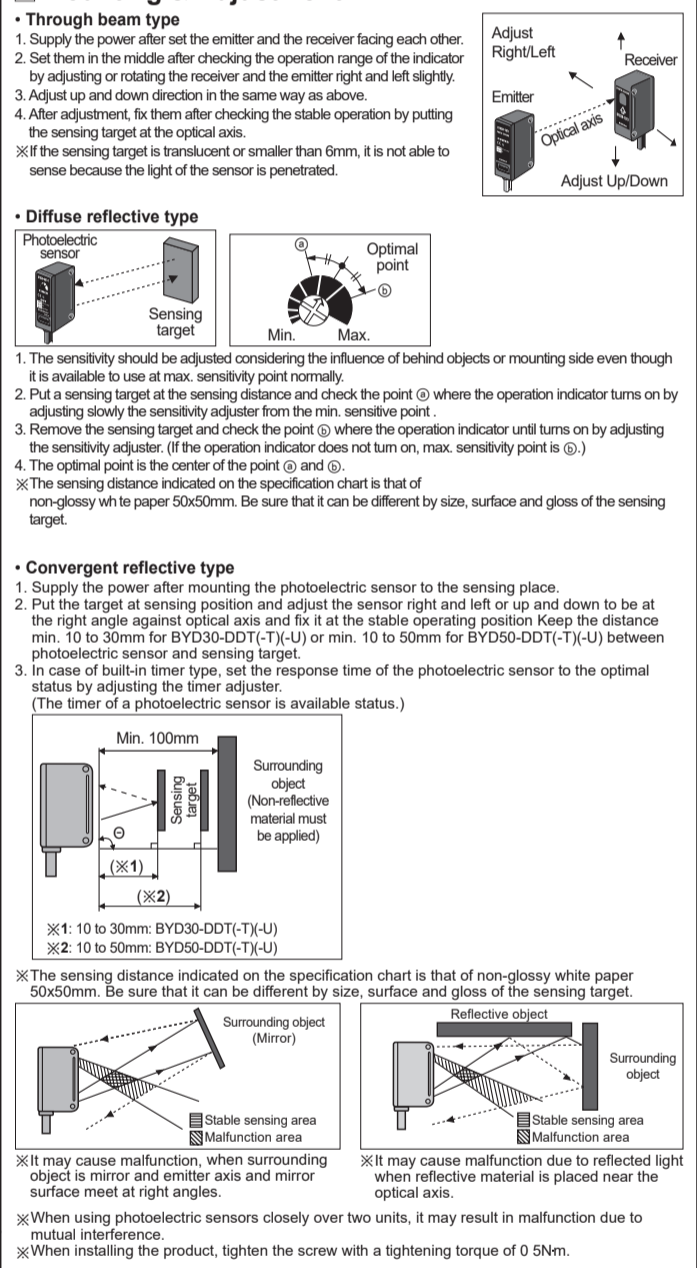
| Slit Ø | Min. size of sensing target  | Max. sensing distance |
|--------|------------------------------|-----------------------|
| Ø1.0   | Opaque materials of Min.Ø0.8 | 500mm                 |
| Ø1.5   | Opaque materials of Min.Ø1.5 | 700mm                 |
| Ø2.0   | Opaque materials of Min.Ø2.0 | 1,200mm               |
| Ø2.5   | Opaque materials of Min.Ø2.5 | 2,300mm               |

⚠ This slit is for BYD3M-TDT(-P) only.  
⚠ Total 8 pieces (2 pieces of each different Ø) are packed and sold separately.  
⚠ This slit is sticker for attachment, please remove the dirt on lens of photoelectric sensor before using it.

## ■ Operation Timing Diagram



## ■ Mounting & Adjustment



## ■ 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.  
① Indoors (in the environment condition rated in 'Specifications')  
② Altitude max. 2,000m  
③ Pollution degree 3  
④ 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, 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