Autonics

Photoelectric Sensor with Amplifier BYD SERIES



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

Safety Considerations

- XPlease observe all safety considerations for safe and proper product operation to avoid hazards.
- $extreme \Lambda$ symbol represents caution due to special circumstances in which hazards may occur.
- **Marning** 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 dama

- 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

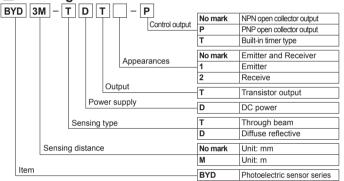
⚠ Caution

- 1. Use the unit within the rated specifications.
- Failure to follow this instruction may result in fire or product damage.

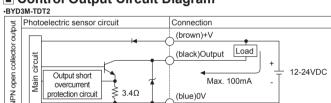
 2. Use dry cloth to clean the unit, and do not use water or organic solvent.
- Failure to follow this instruction may result in fire.

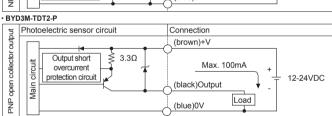
 3. Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present. Failure to follow this instruction may result in fire or explosion

Ordering Information

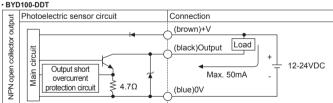


Control Output Circuit Diagram



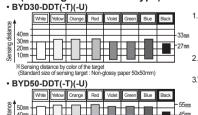


BYD30-DDT(-U), BYD50-DDT(-U) BYD30-DDT-T, BYD50-DDT-T



※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.

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



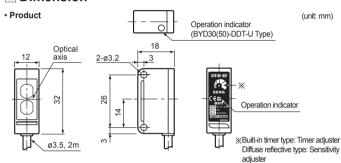
- 1. This sensor, the stable convergent reflective photoelectric sensor, is not influenced by color of material of the sensing target within the sensing distance.
- 2. This sensor is able to sense a target stably
- because of small effect from background. 3. This chart for "Sensing distance by color of target" is when the central axis of photoelectric sensor are matched in a parallel state of a sensing target and the lens surface of the photoelectric sensor. *Standard size of sensing target: Non-glossy paper 50x50mm

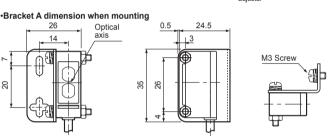
Specifications

| Туре | Convergent reflective | | Diffuse reflective | Through beam | |
|---|---|--|---|---|-----------------|
| Model | BYD30-DDT BYD50-DDT | | | NPN output type | PNP output type |
| | BYD30-DDT-U ^{×1} BYD30-DDT-T ^{×2} | BYD50-DDT-U ^{*1} BYD50-DDT-T ^{*2} | BYD100-DDT | BYD3M-TDT | BYD3M-TDT-P |
| Sensing distance | 10 to 30mm (Non-glossy white paper 50×50mm) | 10 to 50mm (Non-glossy white paper 50×50mm) | 100mm (Non-glossy white paper 50×50mm) | 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 Return: max. 100ms (when the time adjuster is minimum) | | Operation: max. 3ms Return: max. 100ms | Max. 1ms | |
| 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 •Load voltage: max. 30VDC== •Load current: max. 50mA •Residual voltage: max. 1VDC== •Load voltage: max. 1VDC== •Load current: max. 100mA •Residual voltage - NPN: max.1VDC==, PNP: max. | | | | VDC== 0mA |
| 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 ² (50G) in X, Y, Z directions for 3 times | | | | |
| Ambient illumination | Sunlight: max. 11,000 lx, incandescent lamp: max. 3,000 lx (receiver illumination) | | | | |
| Ambient illumination Ambient temperature | -20 to 65°C, storage: -25 to 70°C | | | | |
| 岳 Ambient humidity | 35 to 85%RH, storage: 35 to 85%RH | | | | |
| Protection structure | Standard type: IP64 (IEC standards) / %1, %2: IP50 (IEC standards) IP50 (IEC standards) IP64 (IEC 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) (AWG24, core diameter: 0.08mm, number of cores: 40, insulator diameter: 1mm) | | | | |
| Accessory | Adjustment driver, mounting bracket A, M3 bolt: 2, M3 nut: 2 | | | Mounting bracket A, M3 bolt: 4, M3 nut: 4 | |
| Approval | C€ | | | | |
| Unit weight | Approx. 70g | Approx. 150g | | | |

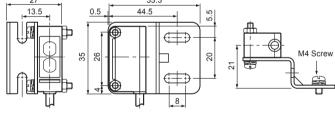
X1: Operation indicator is on top.
 X2: OFF delay timer is built-in.
 XThe temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

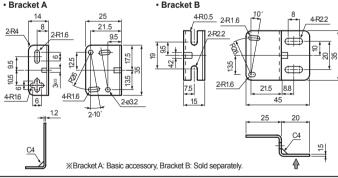
Dimension





Bracket B dimension when mounting





Operation Timing Diagram

| Operation mode | Light ON | | | |
|-------------------------------|------------------|---------------|--|--|
| Receiver | (Standard) | ON OFF < T | | |
| operation | (Built-in timer) | ON OFF | | |
| Operation indicator (Red LED) | | ON OFF | | |
| Transistor output | | ON OFF | | |

- . T: Setting time by timer adjuster (time setting range: 0.1 to 2 sec)
- t: Max. 3ms (when the timer adjuster is minimum)
- 3. To prevent from incorrect operation, output of units keeps the state of OFF for 0.5 sec
- 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 mode. (Above figure is Dark ON for BYD3M series.)

Mounting & Adjustment

- Through beam type

 Supply the power after set the emitter and the receiver facing each other.

 Set them in the middle after checking the operation range of the indicator. by adjusting or rotating the receiver and the emitter right and left slightly.
- Adjust up and down direction in the same way as above.
 After adjustment, fix them after checking the stable operation by putting
- the sensing target at the optical axis.
- XIf the sensing target is translucent or smaller than 6mm, it is not able to sense because the light of the sensor is penetrated.

Diffuse reflective type

- The sensitivity should be adjusted considering the influence of behind objects or mounting side even though it is available to use at max. sensitivity point normally.

 2. Put a sensing target at the sensing distance and check the point ① where
- the operation indicator turns on by adjusting slowly the sensitivity adjuster from the min. sensitive point.
- 3. Remove the sensing target and check the point ⊚ where the operation indicator until turns on by adjusting the sensitivity adjuster. (If the operation indicator does not turn on, max. sensitivity point is ⊚.)
- 4. The optimal point is the center of the point (a) and (b)
- **The sensing distance indicated on the specification chart is that of non-glossy white paper 50x50mm. Be sure that it can be different by size surface and gloss of the sensing target.

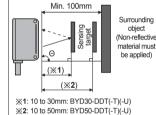
Convergent reflective type

- Convergent reflective type

 1. Supply the power after mounting the photoelectric sensor to the sensing place.

 2. Put the target at sensing position and adjust the sensor right and left or up and down to be at the right angle against optical axis and fix it at the stable operating position. Keep the distance min. 10 to 30mm for BYD30-DDT(-T)(-U) or min. 10 to 50mm for BYD50-DDT(-T)(-U) between photoelectric sensor and sensing target.

 3. In case of built-in timer type, set the response time of the photoelectric sensor to the optimal status by adjusting the timer adjuster. (The timer of a photoelectric sensor is available status.)
- status.)



Right/Left

Photoelectric

Receive

Adjust Up/Down

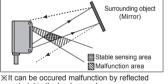
Sensing target

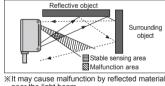
Optimal

point

₩

*The sensing distance indicated on the specification chart is that of non-glossy white paper 50x50mm. Be sure that it can be different by size, surface and gloss of the sensing target





material in the background.

near the light beam *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 0.5Nm.

Accessory (sold separately) • Min. Sensing target and max. sensing distance by ø of slit

Slit (Model: BYD3M-ST)





when attach the slits at both a receiver and an emitter. Slit ø ø1.0

Max. sensing Min. size of sensing target distance Opaque materials of Min.ø0.8 500mm Opaque materials of Min.ø1.5 Opaque materials of Min.ø2.0 ø2.0 1,200mm ø2.5 Opaque materials of Min.ø2.5 2,300mm

*Total 8 pieces (2 pieces of each different ø) are packed and sold separately.

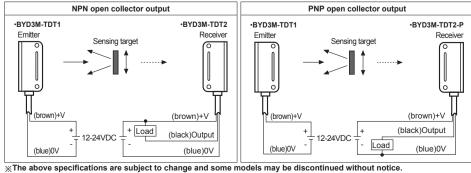
X This slit is sticker for attachment, please remove the dirt on lens of photoelectric sensor before using it.

Cautions during Use

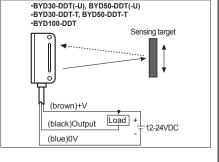
- 1. Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents. 2. When connecting a DC relay or other inductive load to the output, remove surge by using diodes or varistors.
- Use the product, 0.5 sec after supplying power.
 When using separate power supply for the sensor and load, supply power to sensor. 4. 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- 5. 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 condenser between 0V and F.G. terminal to remove noise.
- 7. When using sensor with the equipment which generates noise (switching regulator, inverter, servo motor, etc.), ground F.G. terminal of the equipment.
- 8. This unit may be used in the following environments ①Indoors (in the environment condition rated in 'Specifications')

②Altitude max. 2,000m ③Pollution degree 3 (4) Installation category II

Connections



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



NPN open collector output



■ Photoelectric Sensors ■ Temperature Controllers ■ Fiber Optic Sensors ■ Temperature/Humidity Transducers

SSRs/Power Controllers ■ Door Side Sensors ■ Counters

Timers ■ Area Sensors ■ Proximity Sensors ■ Panel Meters

■ Pressure Sensors ■ Tachometers/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 Controllers

■ Graphic/Logic Panels ■ Field Network Devices

■ Laser Marking System (Fiber, CO₂, Nd: YAG)
■ Laser Welding/Cutting System

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