Autonics Photoelectric Sensor with Amplifier BYD SERIES



Thank you for choosing our Autonics product. ${\color{red} \textbf{Please}} \ \underline{\textbf{read the following safety considerations before use}.}$

Safety Considerations

× Please observe all safety considerations for safe and proper product operation to avoid hazards $leph \Lambda$ symbol represents caution due to special circumstances in which hazards may occur.

▲ 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.

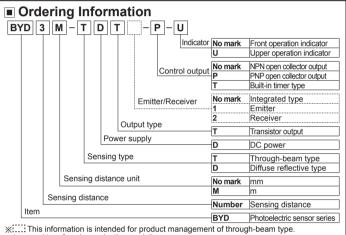
 3. Do not connect, repair, or inspect the unit while connected to a power source.

 Failure to follow this instruction may result in fire.
- Failure to follow this instruction may result in fire.
- 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.

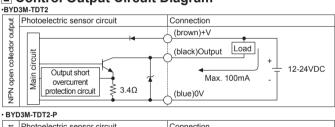
 3. Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present. Failure to follow this instruction may result in fire or explosion.

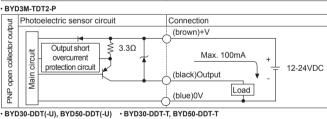


(no need to refer when selecting model)

**Randomly combining model components can make a model which is not existing

Control Output Circuit Diagram

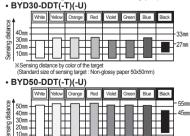




· BYD100-DDT Photoelectric sensor circuit Connection (brown)+V (black)Output Load 12-24VDC Output short Max. 50mA overcurrent ≸ 4.7Ω protection circuit (blue)0V

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)



- photoelectric sensor, is not influenced by color or 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.
- 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

Type	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 ^{*3}	10 to 50mm ^{*3}	100mm ^{×3}	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)			ion)	
Control output	NPN open collector output *Load voltage: max. 30VDC== *Load current: max. 50mA *Residual voltage: max. 1VDC==			NPN or PNP open collector output ●Load voltage: max. 30VDC:: ●Load current: max. 100mA •Residual voltage - NPN: max.1VDC::-, PNP: max. 2.5VDC	
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/s²(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 Ambient humidity	-20 to 65°C, storage: -25 to 70°C				
≦ 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 screwdriver, fixing bracket A, M3 bolt: 2, M3 nut: 2 Mounting bracket A, M3 bolt: 4, M3 nut: 4				
Approval	C€				
Weight ^{**4}	Approx. 75g (approx. 38g)			Approx. 105g (approx. 80g)	

|Weight" Approx. 75g (approx. 38g) ※1: Operation indicator is on top.

Ø3.5, 2m

26

14

13.5

Bracket A dimension when mounting

Bracket B dimension when mounting

4-R1.6

Operation mode

Receiver

operation

(Red LED)

Transistor output

Operation Timing Diagram

(Standard)

(Built-in timer)

t: Max. 3ms (when the timer adjuster is minimum)

figure is Dark ON for BYD3M series.)

. T: Setting time by timer adjuster (time setting range: 0.1 to 2 sec)

2-Ø3.2

Optical

Dimension

Product

%2: OFF delay timer is built-in.

(unit: mm)

×3: Non-glossy white paper 50×50mm ※4: The weight includes packaging. The weight in parenthesis is for unit only.

Operation indicator

24.5

4R0.5 2R1.6

[]]] 2-R2.2

Light ON

33.3

44.5

※Bracket A: basic accessory, Bracket B: sold separately.

OFF

ON

ON

ON

. 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

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

Operation indicator

adjuster

※Built-in timer type: timer adjuster

M3 Screw

Diffuse reflective type: sensitivity

Mounting & Adjustment

Through beam type

- 1. Supply the power after set the emitter and the receiver facing each other.
 2. 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.
- $\times \mbox{If the sensing target is translucent or smaller than 6mm, it is not able to$ 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 ③ 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.)

(**※1**) **%2**: 10 to 50mm: BYD50-DDT(-T)(-U)

Min. 100mm

Right/Left

Photoelectric

Receive

Adjust Up/Down

Sensing target

Optimal

point

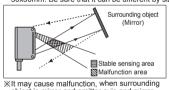
-B

Surrounding

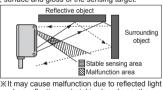
material must be applied)

Max. sensing

*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



XIt may cause malfunction, when surrounding object is mirror and emitter axis and mirror surface meet at right angles



optical axis.

When using photoelectric sensors closely over two units, it may result in malfunction due to
mutual interference.

Output

Description

Output

Description

When installing the product, tighten the screw with a tightening torque of 0.5Nm.

Accessory (sold separately)

· Slit (Model: BYD3M-ST)

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



4-R22

₩

20

<u>C4</u>

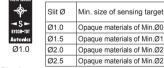
1

T

21.5 8.8







distance Opaque materials of Min.Ø0.8 Opaque materials of Min.Ø1.5 Opaque materials of Min.Ø2.0 1.200mm 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.

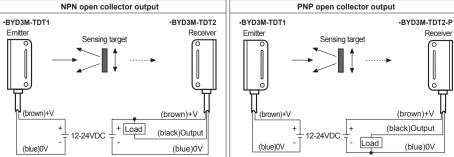
Cautions during Use 1, Follow instructions in 'Cautions during Use', Otherwise, it may cause unexpected accidents,

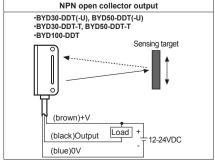
*This slit is sticker for attachment, please remove the dirt on lens of photoelectric sensor before using it

- When connecting a DC relay or other inductive load to the output, remove surge by using diodes or varistors.
- When using separate power supply for the sensor and load, supply power to sensor first. 4. 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV Note that the content of the co
- inductive noise
- 6. When using switching mode power supply to supply the power, ground F.G. terminal and connect a condenser between 0V and E.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.
- This unit may be used in the following environments.
 Olndoors (in the environment condition rated in 'Specifications') @Altitude max 2 000m

③Pollution degree 3 (4) Installation category II

ance by color of the target e of sensing target : Non-glossy paper 50x50mm) Connections





■ Major Products

- Photoelectric Sensors Temperature Controllers Fiber Optic Sensors Temperature/Humidity Transducers
- Door Sensors ■ SSRs/Power Controllers
- Door Side Sensors Counters
- Area Sensors Timers
- 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 Controller
- Graphic/Logic Panels
- Laser Marking System (Fiber, CO₂, Nd: YAG) ■ Laser Welding/Cutting System
- Autonics Corporation http://www.autonics.com **HEADQUARTERS**

■ E-mail: sales@autonics.com

DRW171452AB

**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).