

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 fire, personal injury, or economic loss.
 - 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

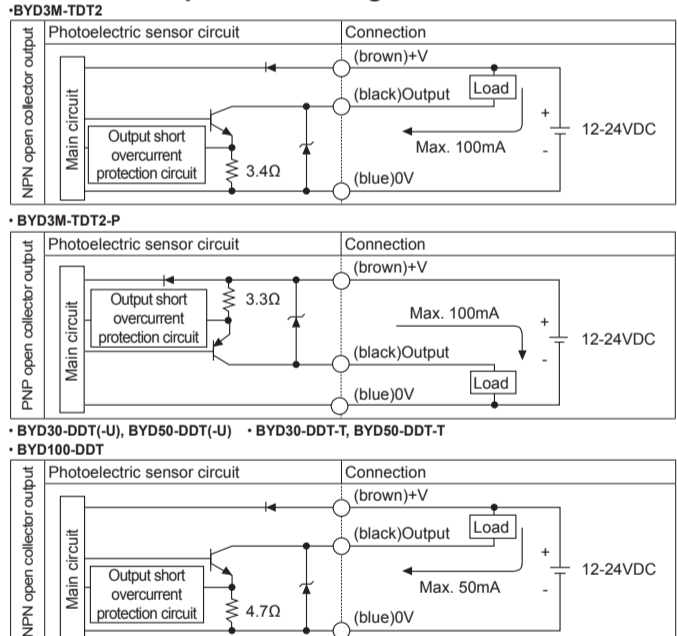
- Use the unit within the rated specifications. Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent. Failure to follow this instruction may result in fire.
- Do not use the unit in the place where flammable/explosive/corrosive 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

BYD	3	M	T	D	T	-	P	-	U
Indicator	No mark	U	No mark	U	No mark	U	No mark	U	No mark
Control output	No mark	P	T	No mark	P	T	No mark	P	T
Emitter/Receiver	No mark	1	2	No mark	1	2	No mark	1	2
Output type	No mark	T	D	No mark	T	D	No mark	T	D
Power supply	No mark	T	D	No mark	T	D	No mark	T	D
Sensing type	No mark	T	D	No mark	T	D	No mark	T	D
Sensing distance unit	No mark	m	M	No mark	m	M	No mark	m	M
Sensing distance	No mark	10	20	No mark	10	20	No mark	10	20
Item	No mark	BYD	BYD	No mark	BYD	BYD	No mark	BYD	BYD

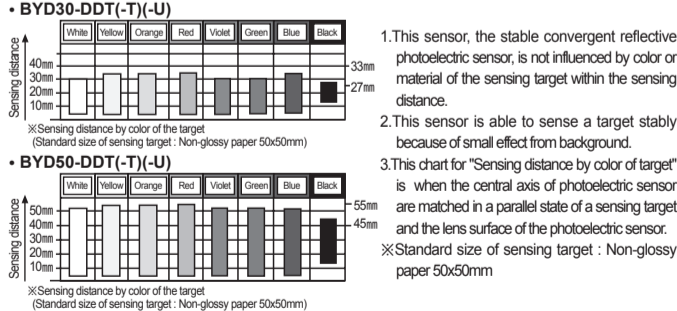
⚠ This information is intended for product management of through-beam type. (no need to refer when selecting model)
 ⚠ Randomly combining model components can make a model which is not existing.

■ Control Output Circuit Diagram



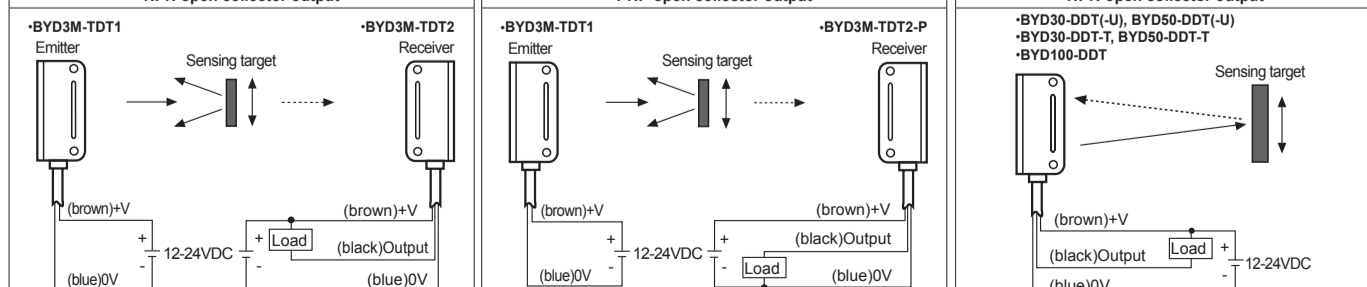
⚠ If short-circuit the control output terminal or supply current over the rated specification, normal control signal is not output due to the output short over current protection circuit.

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



⚠ Sensing distance by color of the target (Standard size of sensing target: Non-glossy paper 50x50mm)

■ Connections



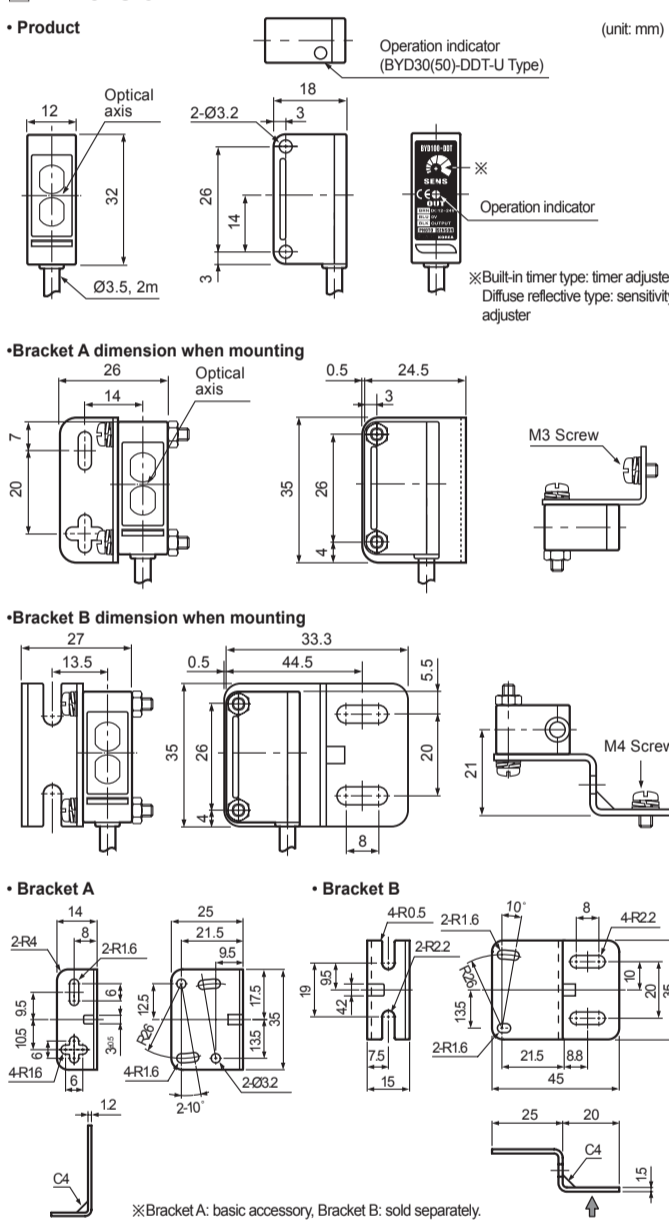
⚠ The above specifications are subject to change and some models may be discontinued without notice.
 ⚠ Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

■ Specifications

Type	Convergent reflective	Diffuse reflective	Through beam
Model	BYD30-DDT BYD30-DDT-U ^{※1} BYD30-DDT-T ^{※2}	BYD50-DDT 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}	3m
Sensing target	Translucent, opaque materials	100mm ^{※3}	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		
Light source	Infrared LED		
Sensitivity adjustment	Fixed	Sensitivity Adjuster	Fixed
Operation mode	Light ON fixed		
Control output	NPN open collector output •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 ² (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: 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	CE		
Weight ^{※4}	Approx. 75g (approx. 38g)		Approx. 105g (approx. 80g)

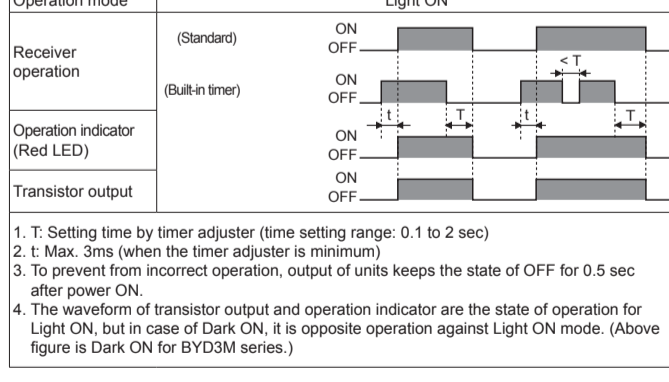
※1: Operation indicator is on top. ※2: OFF delay timer is built-in.
 ※3: Non-glossy white paper 50x50mm. ※4: The weight includes packaging. The weight in parenthesis is for unit only.
 ※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

■ Dimension



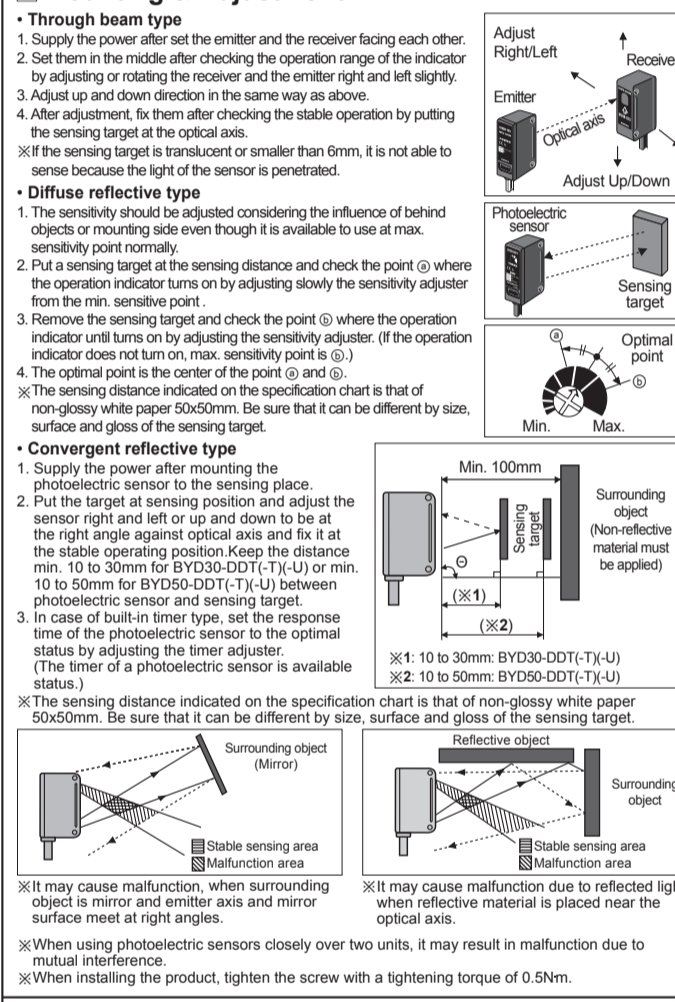
⚠ Bracket A: basic accessory, Bracket B: sold separately.

■ Operation Timing Diagram



1. T: Setting time by timer adjuster (time setting range: 0.1 to 2 sec)
 2. 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 after power ON.
 4. 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



⚠ It may cause malfunction, when surrounding object is mirror and emitter axis and mirror surface meet at right angles.
 ⚠ 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)

Slit (Model: BYD3M-ST)	Min. size of sensing target	Max. sensing distance
Ø2.5	Opaque materials of Min. Ø0.8	500mm
Ø2.0	Opaque materials of Min. Ø1.5	700mm
Ø1.5	Opaque materials of Min. Ø2.0	1,200mm
Ø1.0	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.

■ 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.
 - Ⓐ Indoors (in the environment condition rated in 'Specifications')
 - Ⓑ Altitude max. 2,000m
 - Ⓒ Pollution degree 3
 - Ⓓ 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, CO₂, 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

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