

# Autonics PHOTOELECTRIC SENSOR BYD SERIES

## M A N U A L



Thank you very much for selecting Autonics products.  
For your safety, please read the following before using.

### Caution for your safety

- Please keep these instructions and review them before using this unit.
- Please observe the cautions that follow;
- Warning** Serious injury may result if instructions are not followed.
- Caution** Product may be damaged, or injury may result if instructions are not followed.
- The following is an explanation of the symbols used in the operation manual.
- Injury or danger may occur under special conditions.

### Warning

- In case of using this unit with machineries(Nuclear power control, medical equipment, vehicle, train, airplane, combustion apparatus, entertainment or safety device etc), it requires installing fail-safe device, or contact us for information on type required.  
It may result in serious damage, fire or human injury.
- Do not disassemble and modify this unit, when it requires. If needs, please contact us.  
It may give an electric shock and cause a fire.

### Caution

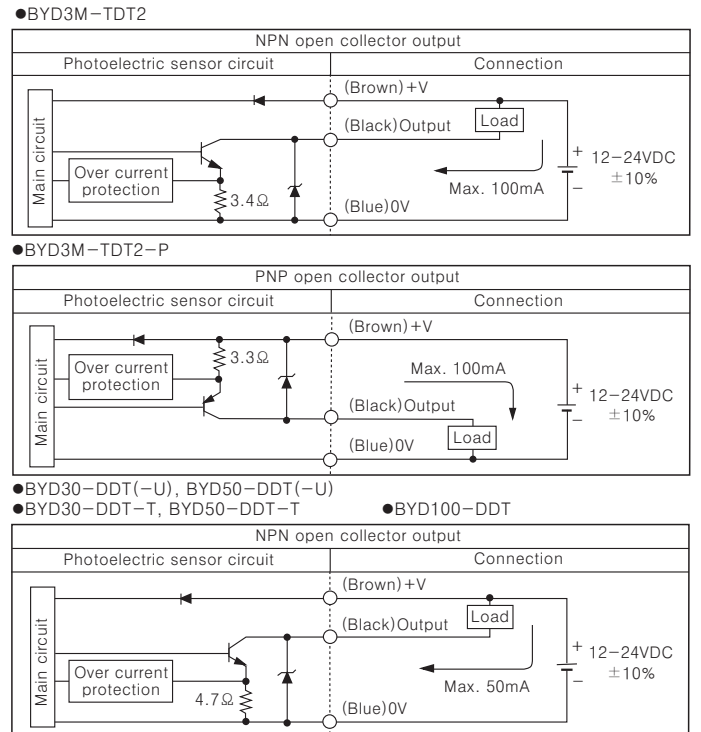
- This unit shall not be used outdoors.  
It might shorten the life cycle of the product or give an electric shock.
- Do not use this unit in place where there is flammable or explosive gas.  
It may cause a fire or explosion.
- Please check the polarity of power and wrong wiring.  
It may result in damage to this unit.
- Do not use this unit in place where there is vibration or impact.  
It may result in damage to this unit.
- In cleaning the unit, do not use water or an oil-based detergent.  
It might cause an electric shock or fire that will result in damage to this product.
- Do not short circuit the load.  
It may result in damage to this unit.

### Ordering information

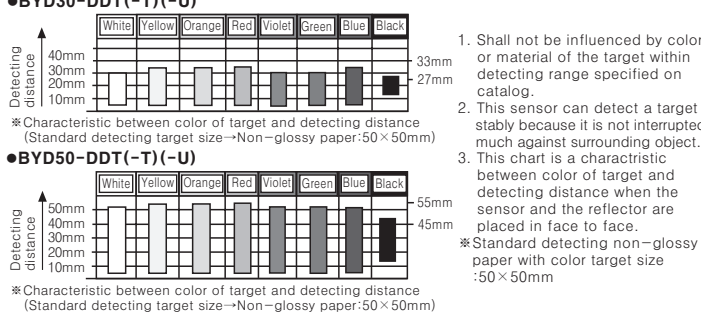
BYD 3M - T D T □ - P

Control output	P NPN open collector output T PNP open collector output □ Built-in timer type
Appearances	1 Emitter 2 Receiver □ Single body type
Output	T Solid-state output(TR)
Power supply	D DC power
Detecting type	T Through-beam D Diffuse reflective
Detecting distance	M Unit:m □ Unit:mm
Photoelectric sensor	BYD Series name

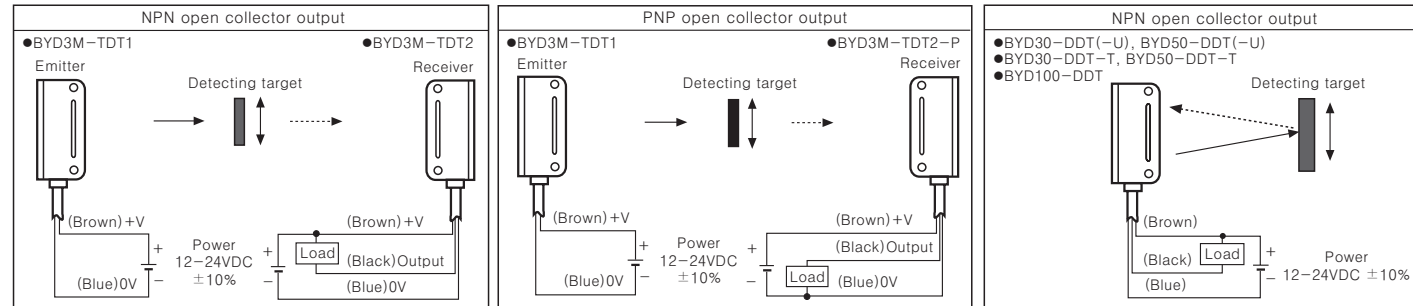
### Control output circuit diagram



### Detecting distance ratio against color of a target (Limited distance reflective)



### Connections



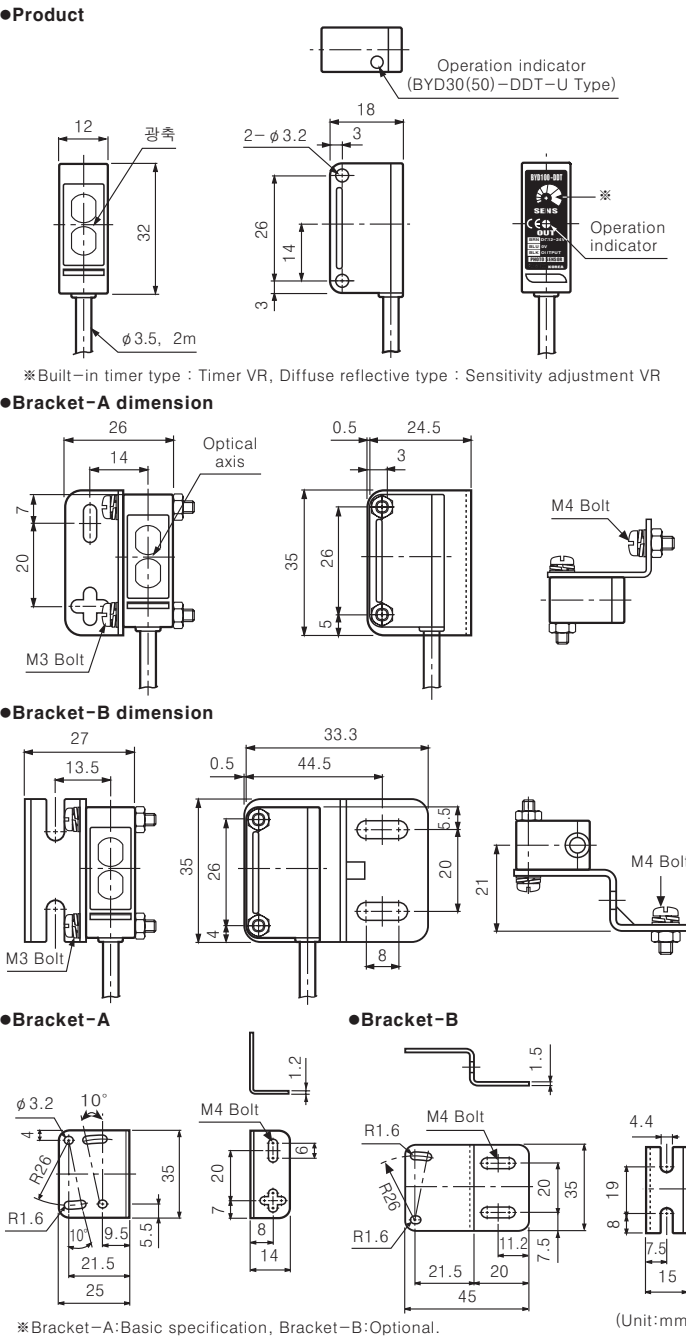
\*The above specifications are changeable without notice anytime.

### Specifications

Type	Limited distance reflective	Diffuse reflective	Through-beam
Model	BYD30-DDT(-S) (Note2) BYD30-DDT-T (Note1)	BYD50-DDT(-S) (Note2) BYD50-DDT-T (Note1)	BYD100-DDT NPN output type: BYD3M-TDT PNP output type: BYD3M-TDT-P
Detecting distance	10 to 30mm (50×50mm Non-glossy white paper)	10 to 50mm (50×50mm Non-glossy white paper)	100mm (50×50mm Non-glossy white paper) 3m
Detecting target	Transparent, Translucent, Opaque materials		Opaque materials of Min. φ6mm
Hysteresis	Max. 10% at detecting distance		Max. 25% at detecting distance
Response time	Operation : Max. 3ms Return : Max. 100ms(When the timer VR 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(modulated)		
Sensitivity adjustment	Fixed	Adjustable VR	Fixed
Operation mode	Light ON mode fixed		
Control output	• NPN open collector output ⊕ Load voltage : Max. 30VDC, Load current : Max. 50mA, Residual voltage : Max. 1V		• NPN open collector output ⊕ Load voltage:Max. 30VDC, Load current:Max. 100mA, Residual voltage:Max. 1V • PNP open collector output ⊕ Output voltage: Min. (Power supply-2.5)V, Load current:Max. 100mA
Protection circuit	Reverse polarity protection, Short-circuit protection		
Timer function	Built-in(OFF delay) delay time:Max. 0.1 to 2sec(VR adjustable)		
Indication	Operation indicator : Red LED		
Connection	Outgoing cable(2m)		
Insulation resistance	Min. 20MΩ(500VDC)		
Noise strength	±240V the square wave noise(pulse width:1μs) by the noise simulator		
Dielectric strength	1,000VAC 50/60Hz for 1minute		
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours		
Shock	500m/s <sup>2</sup> (50G) in X, Y, Z directions for 3 times		
Ambient illumination	Sunlight : Max. 11,000lx, Incandescent lamp : Max. 3,000lx		
Ambient temperature	-20 to +65°C(non-freezing condition), Storage : -25 to +70°C		
Ambient humidity	35 to 85%RH, Storage : 35 to 85%RH		
Protection	Standard type : IP64 / (Note1), (Note2) : IP50	IP50	IP64
Material	Case:ABS, Lens:Acryl		
Cable	φ 3.5mm, 3P, Length:2m(Emitter of through-beam type: φ 3.5mm, 2P, Length:2m)		
Accessory	Driver, Mounting bracket A, Bolts/nuts		Mounting bracket A, Bolts/nuts
Weight	Approx. 70g		Approx. 150g

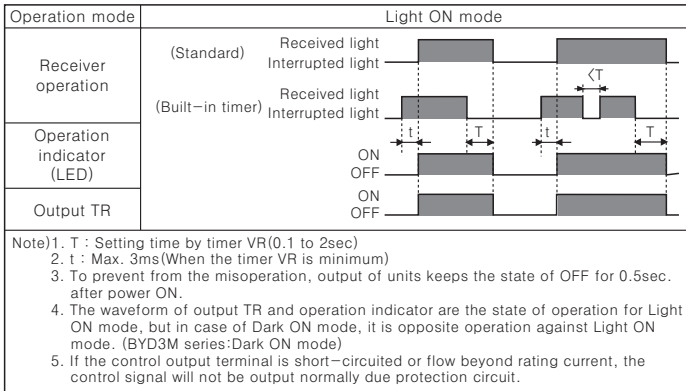
\* (Note1) "-T" : This timer built-in type.  
\* (Note2) "-U" : Operation indicator is on top.

### Dimension

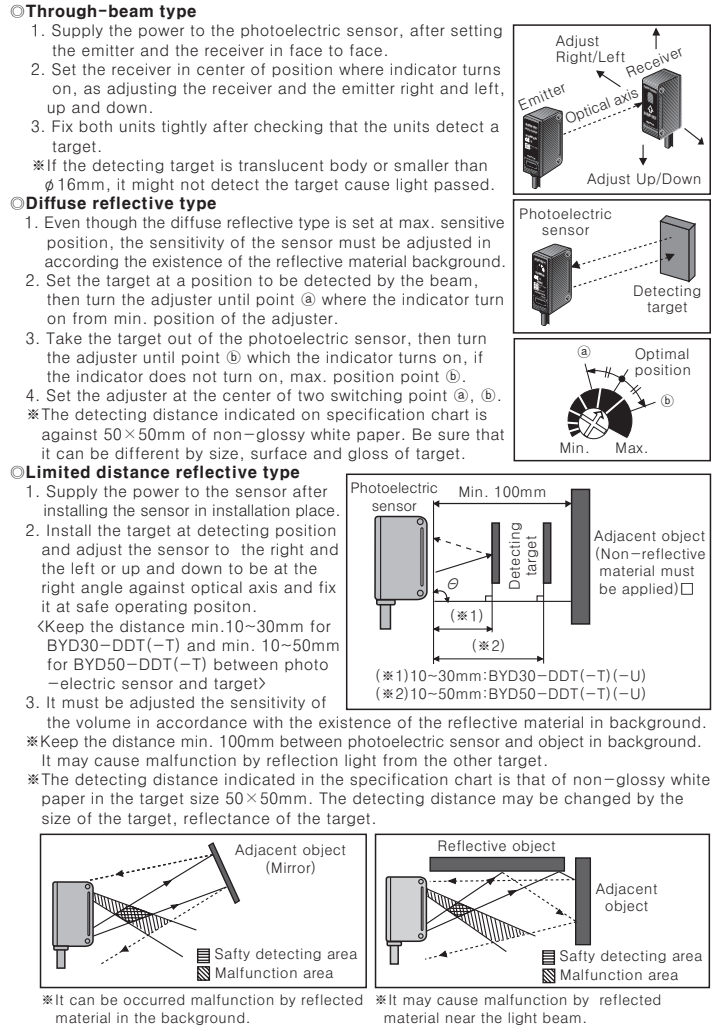


\*Bracket-A:Basic specification, Bracket-B:Optional. (Unit:mm)

### Operation mode



### Mounting & Adjustment



### Accessory(Optional)

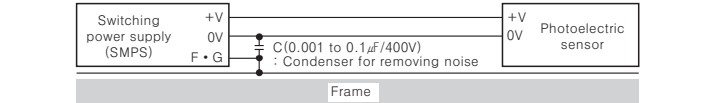
• Slit (Model name: BYD3M-Slit) • Min. detecting target and max. detecting distance by slit's φ - When attach the slit at receiver and emitter together.

SLIT φ	Min. size of target	Max. detecting distance
φ 1.0	Opaque materials of Min. φ 0.8	500mm
φ 1.5	Opaque materials of Min. φ 1.5	700mm
φ 2.0	Opaque materials of Min. φ 2.0	1200mm

\* This slit is for BYD3M-TDT(-P) only.  
\* 2 pieces of each different φ and total 8 pieces packed.  
\* This slit is sticker for attachment, please remove the dirt on lens of photoelectric sensor before using it.

### Caution for using

- Intercept a strong source of light as like sunlight, spotlight within inclination angle range of photoelectric sensor.
- The photoelectric sensor may cause malfunction under the fluorescent lamp light, so be sure to use cut-off light with panel.
- When more than 2 sets of Through-beam type sensor are used closely, it might cause interference each other. Be sure to put enough space between them in order to avoid malfunction.
- When more than 2 sets of diffuse reflection types are installed adjacently, it can be occurred malfunction by light beam from the other target. So it must be installed at an enough interval.
- If photoelectric sensor is installed at flat part, it might cause malfunction by reflection light from flat part. Be sure to put space between photoelectric sensor and ground.
- When wire the photoelectric sensor with high voltage line, power line in the same conduit, it may cause malfunction or mechanical trouble. Therefore please wire separately or use different conduit.
- Avoid installing the unit as following place.  
Corrosive gas, oil or dust, strong flux, noise, sunlight, strong alkali, acid.
- In case of connect DC relay as inductive load to output, please remove surges by using diode or varistor.
- The photoelectric sensor cable shall be used as short as possible, because it may cause malfunction by noise through the cable.
- When it is stained by dirt at lens, please clean the lens with dry cloth, but don't use an organic materials such as alkali acid, chromic acid.
- When use switching power supply as the source of supplying power, F.G terminal shall be good earth ground and condenser for removing noise shall be installed between 0V and F.G terminal.



\*It may cause malfunction if above instructions are not followed.

### Main products

- COUNTER
- TIMER
- TEMPERATURE CONTROLLER
- PANEL METER
- TACHO/LINE SPEED/PULSE METER
- DISPLAY UNIT
- PROXIMITY SENSOR
- PHOTOELECTRIC SENSOR
- FIBER OPTIC SENSOR
- PRESSURE SENSOR
- ROTARY ENCODER
- SENSOR CONTROLLER
- POWER CONTROLLER
- STEPPING MOTOR & DRIVER & CONTROLLER
- LASER MARKING SYSTEM(CO<sub>2</sub>, Nd:YAG)

**Autonics Corporation**  
http://www.autonics.com

**Satisfiable Partner For Factory Automation**

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