


# BYD Series

## Small diffuse reflective and convergent reflective type

### ■ Features

- Easy installation by compact size
- Superior detection not affected by color of target (Convergent reflective type)
- Operation indicator is located on the top (BYD30-DDT-U, BYD50-DDT-U)
- Easy to adjust the response time via Timer function (OFF delay time : 0.1 to 2sec. variable)
- Built-in output short-circuit protection circuit / reverse polarity protection circuit



 Please read "Caution for your safety" in operation manual before using.



### ■ Specifications

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 type	Convergent reflective		Diffuse reflective	Through-beam	
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 adjustment 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				
Sensitivity adjustment	Fixed		Built-in the adjustment VR	Fixed	
Operation mode	Light ON			Dark ON(Light ON : Option)	
Control output	NPN open collector output ●Load voltage : Max. 30VDC,●Load current : Max. 50mA, ●Residual voltage : Max. 1V			NPN or PNP open collector output ●Load voltage :Max. 30VDC, ●Load current : Max. 100mA, ●Residual voltage - NPN: Max. 1V, PNP: Max. 2.5V	
Protection circuit	Reverse polarity protection, output short-circuit protection				
Timer function	Built-in(OFF delay) delay Time : Max. 0.1 to 2 sec.(adjustment VR)		—		
Indication	Operation indicator : Red LED				
Insulation resistance	Min. 20MΩ(at 500VDC megger)				
Noise resistance	±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(for 1 min.) in each of X, Y, Z directions for 2 hours				
Shock	500m/s <sup>2</sup> (50G) in each of 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	Standard type: IP64(IEC standards)/ ※1,※2: IP50(IEC standards)		IP50(IEC standard)	IP64(IEC standard)	
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 out diameter: ø1mm)				
Accessory	VR adjustment driver, Mounting bracket A, M3 Screws, Nuts			Mounting bracket A, M3 Screws, Nuts	
Approval	CE				
Unit weight	Approx. 70g			Approx. 150g	

※1: Operation indicator is on the top.

※2: OFF delay timer is built-in. (Delay time : Max. 0.1 to 2sec.)

※3: Sensing distance for Non-glossy white paper(50×50mm)

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

# Small and Amplifier Built-in type

## ■ Feature data

### ◎ Sensing distance(Convergent/Diffuse reflective type)

Measuring method	BYD30-DDT(-U) / BYD30-DDT-T	BYD50-DDT(-U) / BYD50-DDT-T	BYD100-DDT
<p>Standardsensing target : Non-glossy white paper 50×50mm</p>	<p>Non-glossy white paper</p> <p>Sensing distance L(mm)</p> <p>Left ← Center → Right Sensing area(mm)</p>	<p>Non-glossy white paper</p> <p>Sensing distance L(mm)</p> <p>Left ← Center → Right Sensing area(mm)</p>	<p>Non-glossy white paper</p> <p>Sensing distance L(mm)</p> <p>Left ← Center → Right Sensing area(mm)</p>

### ◎ Parallel shifting(Through-beam type)

Measuring method	BYD3M-TDT	BYD3M-TDT(SLIT)
<p>Receiver</p> <p>Emitter</p>	<p>Non-glossy white paper</p> <p>Sensing distance L (mm)</p> <p>Left ← Center → Right Sensing area(mm)</p>	<p>Non-glossy white paper</p> <p>Sensing distance L (mm)</p> <p>Left ← Center → Right Sensing area(mm)</p> <p>Slit<math>\phi</math>2.5 Slit<math>\phi</math>2.0 Slit<math>\phi</math>1.5 Slit<math>\phi</math>1.0</p>

※ Above characteristic is from 400mm sensing distance to install transmitted beam type slit( $\phi$ 1,  $\phi$ 1.5,  $\phi$ 2,  $\phi$ 2.5).

### ◎ Sensor angle(Through-beam type)

Measuring method	BYD3M-TDT	BYD3M-TDT(SLIT)
<p>Receiver</p> <p>Emitter</p> <p>Operation angle <math>\theta</math></p>	<p>Non-glossy white paper</p> <p>Sensing distance L (mm)</p> <p>Left ← Center → Right Operation angle <math>\theta</math></p>	<p>Non-glossy white paper</p> <p>Sensing distance L (mm)</p> <p>Left ← Center → Right Operation angle <math>\theta</math></p> <p>Slit<math>\phi</math>2.5 Slit<math>\phi</math>2.0 Slit<math>\phi</math>1.5 Slit<math>\phi</math>1.0</p>

※ Above characteristic is from 400mm sensing distance to install transmitted beam type slit( $\phi$ 1,  $\phi$ 1.5,  $\phi$ 2,  $\phi$ 2.5).

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/ Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/ Speed/ Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor& Driver&Controller

(R) Graphic/ Logic panel

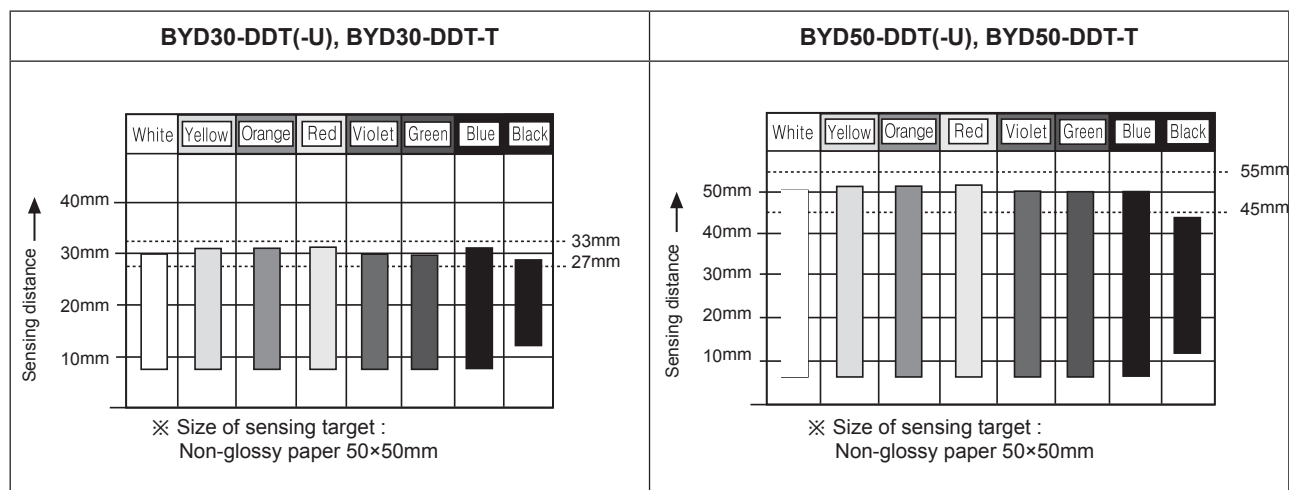
(S) Field network device

(T) Software

(U) Other

# BYD Series

## ■ Sensing distance by color(Convergent reflective type)



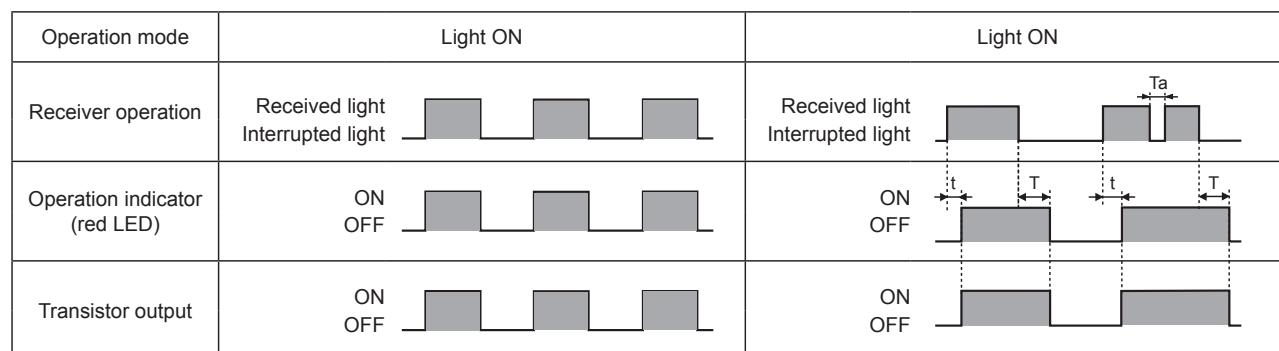
1) This model is stable convergent detection photoelectric sensor, therefore it is not affected by color or material within range of sensing distance as specified in chart.

2) It is able to detect target stably because of small effect from background.

## ■ Operation mode and timing diagram

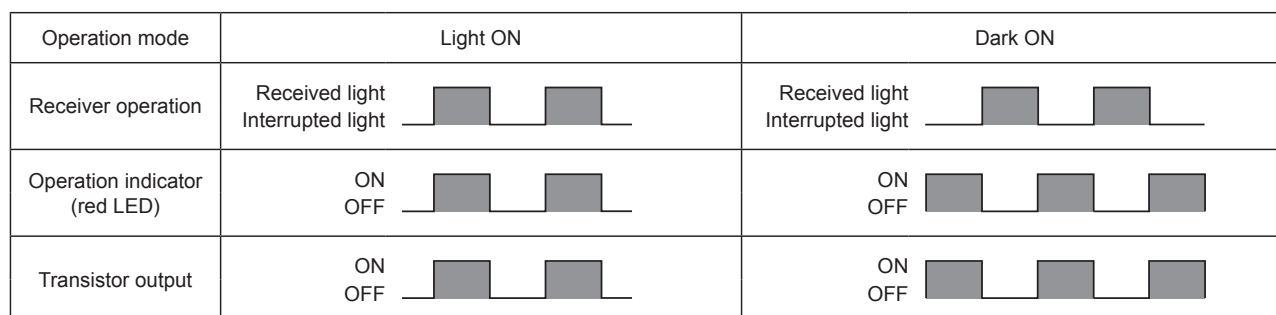
### ● BYD30-DDT(-U), BYD50-DDT(-U), BYD100-DDT

### ● BYD30-DDT-T, BYD50-DDT-T



※T : Setting time by the timer adjustment VR(0.1 to 2sec.)  
 ※t : Max. 3ms(When the timer adjustment VR is minimum)  
 ※If (Ta) is shorter than (T), TR output will be ON.

### ● BYD3M-TDT, BYD3M-TDT-P



※ To prevent incorrect operation, output of units keeps the state of OFF for 0.5sec. after power ON.

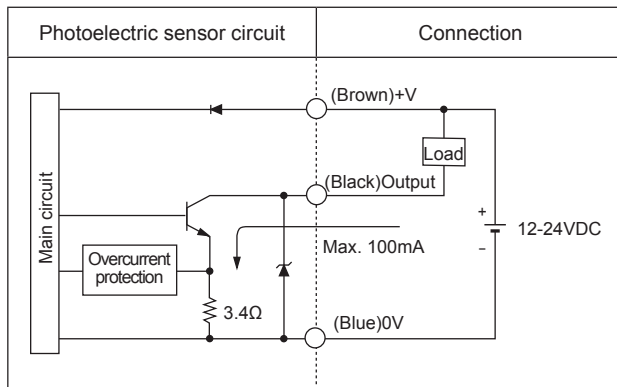
※ If the control output terminal is short-circuited or overcurrent condition is existed, the control output will turn off due to protection circuit.

※ Light ON mode is customizable.

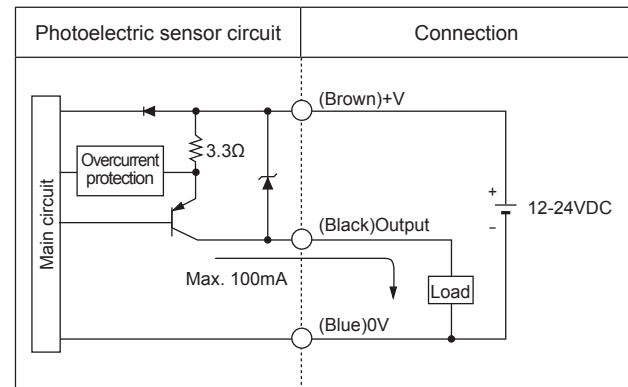
# Small and Amplifier Built-in type

## ■ Control output diagram

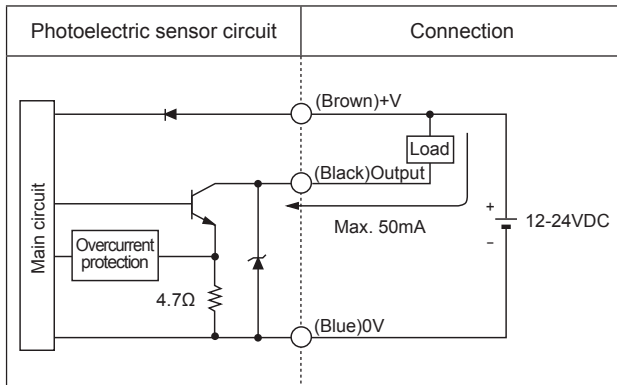
### • BYD3M-TDT2



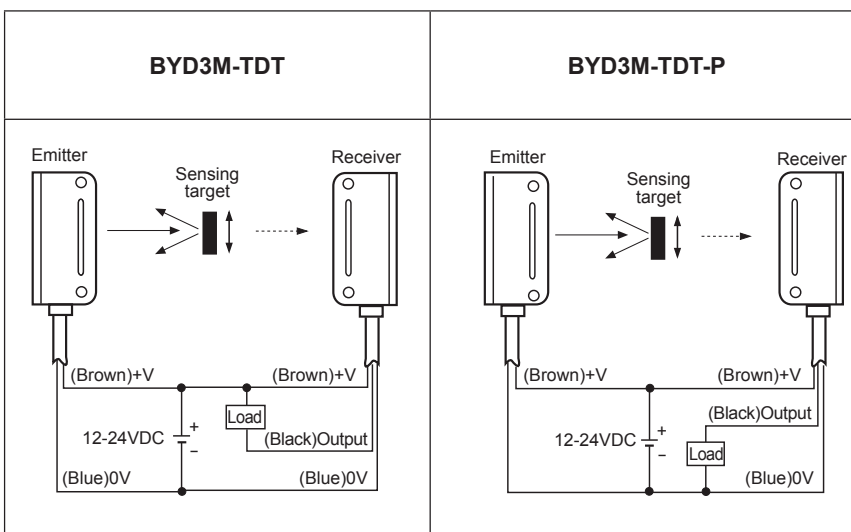
### • BYD3M-TDT2-P



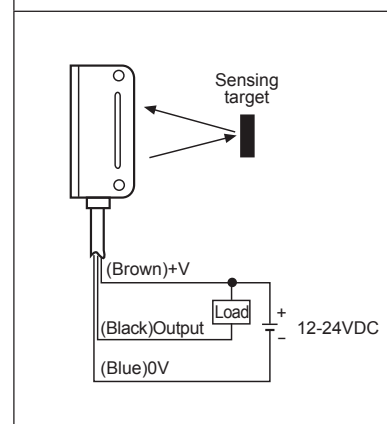
- BYD30-DDT(-U), BYD50-DDT(-U)
- BYD30-DDT-T, BYD50-DDT-T
- BYD100-DDT



## ■ Connections



### BYD30-DDT(-U), BYD50-DDT(-U), BYD30-DDT-T, BYD50-DDT-T, BYD100-DDT



(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor& Driver&Controller

(R) Graphic/Logic panel

(S) Field network device

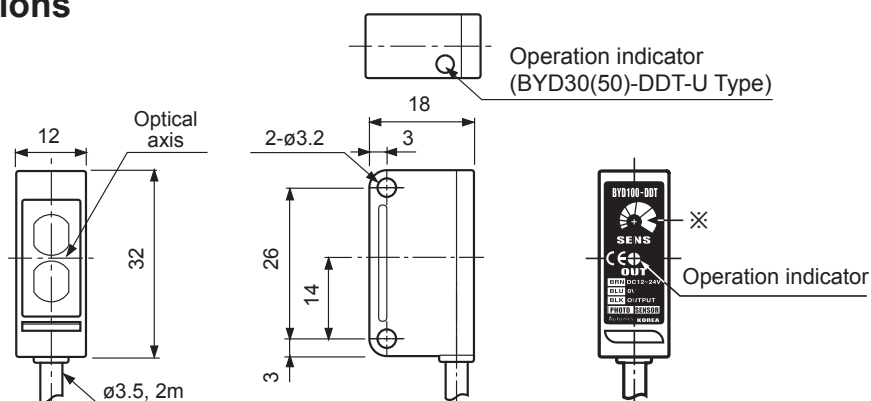
(T) Software

(U) Other

# BYD Series

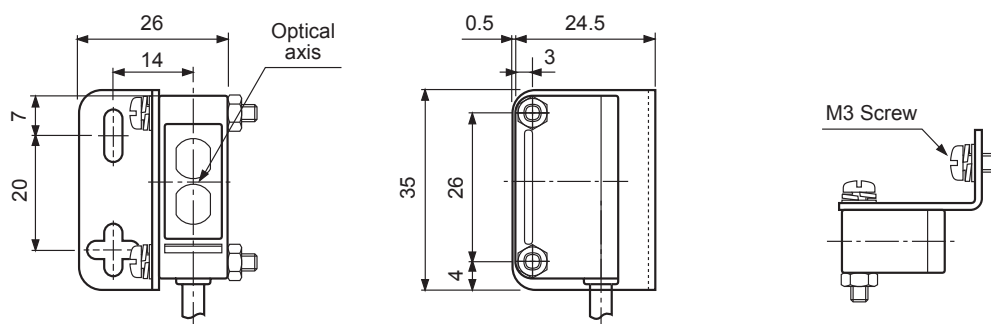
## ■ Dimensions

(unit: mm)

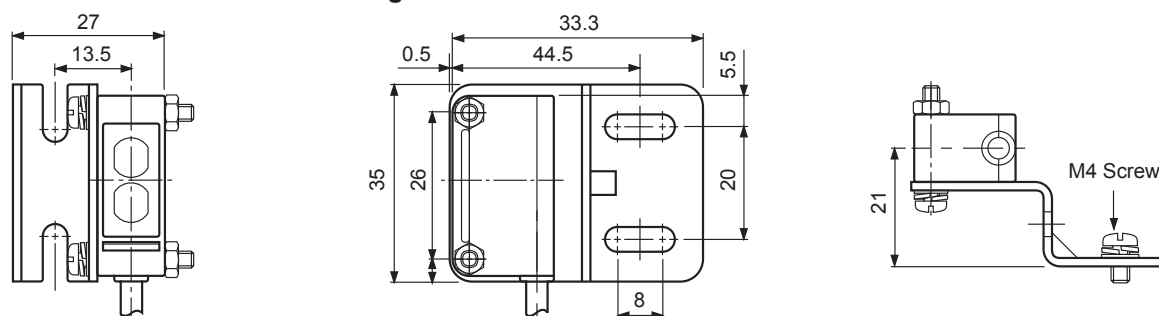


※ Built-in timer type: Timer adjustment VR,  
Diffuse reflective type: Sensitivity adjustment VR

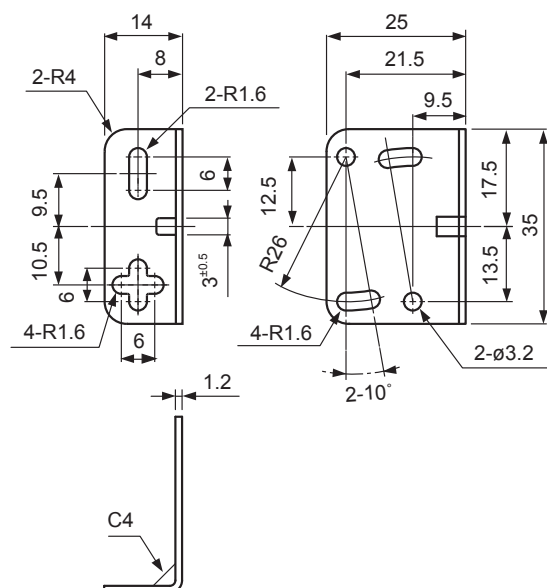
### ● Bracket A dimension when mounting



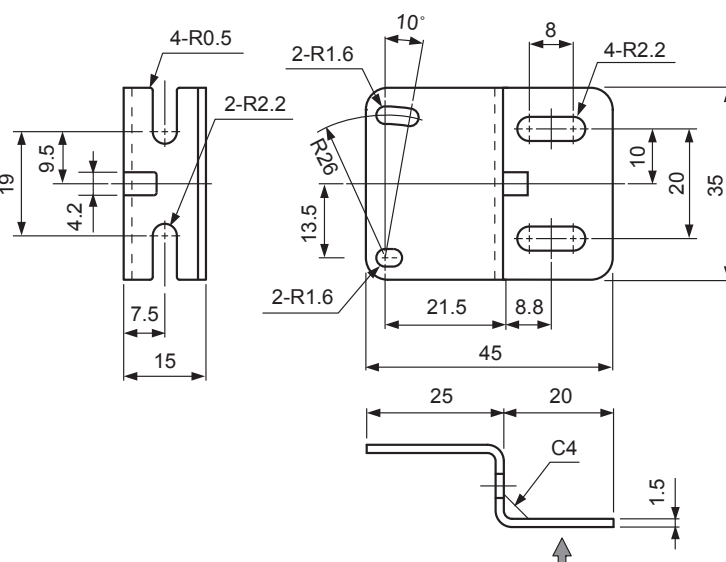
### ● Bracket B dimension when mounting



### ● Bracket A



### ● Bracket B

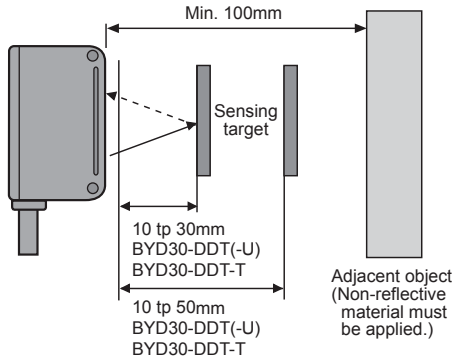


# Small and Amplifier Built-in type

## ■ Mounting and sensitivity adjustment

### ◎ Convergent reflective type

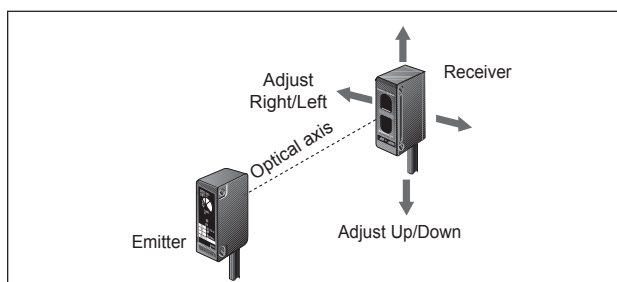
1. Supply the power to the sensor after install the sensor.



2. Install a target at sensing position and adjust the sensor to right and left or up and down to be at the right angle against the optical axis and fix it at stable operating position.  
Keep the distance BYD30-DDT, (-T), (-U): 10 to 30mm  
BYD50-DDT, (-T), (-U): 10 to 50mm between the photoelectric sensor and the target.
  3. Adjust the response time up to the optimum status in case of timer built-in type. Keep the distance min. 100mm between the photoelectric sensor and the background of the target. It may cause malfunction by reflection light of the background.
- ※ The sensing distance indicated in the specification chart is that of non-glossy white paper in the target size 50×50mm. The sensing distance may be changed by the size of the target, reflectance of the target.

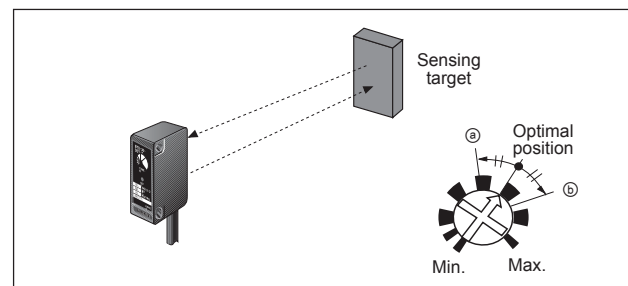
### ◎ Through-beam type

1. Supply the power to the photoelectric sensor, after setting the emitter and the receiver facing each other.
  2. Set the receiver in the middle of the operation range of the operation indicator adjusting the receiver and the emitter right and left, up and down.
  3. After adjustment, check the stability of operation putting the object at the optical axis.
- ※ If the sensing target is translucent body or smaller than  $\phi 6\text{mm}$ , it can be missed by sensor because light penetrate it.



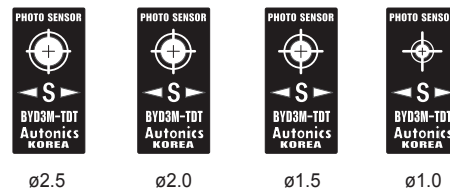
### ◎ Diffuse reflective type

1. The sensitivity should be adjusted depending on a sensing target or mounting place.
  2. Set the target at a position to be detected by the beam, then turn the adjustment VR until position ㉓ where the operation indicator turns ON from min. position of the adjustment VR.
  3. Take the target out of the sensing area, then turn the adjustment VR until position ㉔ where the operation indicator turns ON. If the indicator dose not turn ON, max. position is ㉔.
  4. Set the adjustment VR at the center of two switching position ㉓, ㉔.
- ※ The sensing distance indicated on specification chart is for 50×50mm of non-glossy white paper. Be sure that it can be different by size, surface and gloss of target.



## ■ Accessory(sold separately)

### ● Slit(Model name : BYD3M-Slit)



### ● Min. sensing target and Max. sensing distance by slit $\phi$ - Attach the slit on receiver and emitter together.

SLIT $\phi$	Min. sensing target	Min. sensing distance
$\phi 1.0$	Opaque materials of Min. $\phi 0.8$	500mm
$\phi 1.5$	Opaque materials of Min. $\phi 1.5$	700mm
$\phi 2.0$	Opaque materials of Min. $\phi 2.0$	1200mm
$\phi 2.5$	Opaque materials of Min. $\phi 2.5$	2300mm

- ※ This slit is for BYD3M-TDT(-P) only.  
 ※ Total 8 pieces, 2 pieces of each  $\phi$ , are packed.  
 ※ This slit is sticker for attachment, please remove the dirt on lens of the photoelectric sensor before using it.

(A) Photo electric sensor

(B) Fiber optic sensor

(C) Door/Area sensor

(D) Proximity sensor

(E) Pressure sensor

(F) Rotary encoder

(G) Connector/Socket

(H) Temp. controller

(I) SSR/Power controller

(J) Counter

(K) Timer

(L) Panel meter

(M) Tacho/Speed/ Pulse meter

(N) Display unit

(O) Sensor controller

(P) Switching power supply

(Q) Stepping motor& Driver&Controller

(R) Graphic/ Logic panel

(S) Field network device

(T) Software

(U) Other