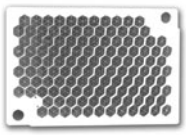
Upgraded cylindrical photoelectric sensor

▣Features

- ●Detects up to 20m(Through-beam type)
- ●Superior noise resistance with digital signal processing
- ●High-speed response time under 1ms
- ●Reverse power polarity and short-circuit(overcurrent) protection circuit
- ●Suitable for sensing in narrow space(Narrow beam type)
- ●External sensitivity adjustment (Diffuse reflective, Retroreflective type)
- ●Light ON, Dark ON switchable by control wire (Diffuse reflective, Retroreflective type)
- ●Excellent heat-resistance performance with glass lens(BR4M)
- ●Protection structure IP66(IEC standard)

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

CE



(MS-2A)

Line-up

Connector Type

▣Specifications

※The model name with '-C' is connector type.

Model											
	NPN open collector	BRP100-DDT	BR100-DDT	BRP400-DDT	BR400-DDT	BRP200-DDTN	BR200-DDTN	BRP3M-MDT	BR3M-MDT	BR4M-TDTD BR20M-TDTD	BR4M-TDTL BR20M-TDTL
		BRP100-DDT-C	BR100-DDT-C	BRP400-DDT-C	BR400-DDT-C	BRP200-DDTN-C	BR200-DDTN-C	BRP3M-MDT-C	BR3M-MDT-C	BR4M-TDTD-C BR20M-TDTD-C	BR4M-TDTL-C BR20M-TDTL-C
	PNP open collector	BRP100-DDT-P	BR100-DDT-P	BRP400-DDT-P	BR400-DDT-P	BRP200-DDTN-P	BR200-DDTN-P	BRP3M-MDT-P	BR3M-MDT-P	BR4M-TDTD-P BR20M-TDTD-P	BR4M-TDTL-P BR20M-TDTL-P
		BRP100-DDT-C-P	BR100-DDT-C-P	BRP400-DDT-C-P	BR400-DDT-C-P	BRP200-DDTN-C-P	BR200-DDTN-C-P	BRP3M-MDT-C-P	BR3M-MDT-C-P	BR4M-TDTD-C-P BR20M-TDTD-C-P	BR4M-TDTL-C-P BR20M-TDTL-C-P
Sensing type		Diffuse reflective				Narrow beam reflective		Retroreflective		Through-beam	
Sensing distance		100mm(★1)		400mm(★2)		200mm(★2)		0.1 to 3m(★3)		4m / 20m	
Sensing target		Translucent, Opaque materials						Opaque materials of Min. ϕ60mm		Opaque materials of Min. ϕ15mm	
Hysteresis		Max. 20% at rated setting distance						———			
Response time		Max. 1ms									
Power supply		12-24VDC ±10%(Ripple P-P : Max. 10%)									
Current consumption		Max. 45mA									
Light source		Infrared LED(940nm)		Infrared LED(850nm)				Red LED(660nm)		Infrared LED(850nm)	
Sensitivity adjustment		Built-in VR								Fixed	
Operation mode		Light ON / Dark ON selectable by control wire(White)								Dark ON	Light ON
Control output		NPN or PNP open collector output • Load voltage : Max. 30VDC • Load current : Max. 200mA • Residual voltage☞ NPN : Max. 1V, PNP : Min. (Power voltage -2.5V)									
Protection circuit		Short-circuit protection, Reverse polarity protection									
Indication		Power indicator(Emitter) : Red LED, Operation indicator(Receiver) : Red LED									
Connection		Outgoing cable									
Insulation resistance		Min. 20MΩ(at 500VDC megger)									
Noise strength		±240V the square wave noise(pulse width : 1μs) by the noise simulator									
Dielectric strength		1000VAC 50/60Hz for 1 minute									
Vibration		1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours									
Shock		500m/s² (50G) in X, Y, Z directions for 3 times									
Ambient illumination		Sunlight : Max. 11,000ℓx, Incandescent lamp : Max. 3,000ℓx									
Storage temperature		-10 to 60℃(at non-freezing status) Storage : -25 to 70℃									
Ambient humidity		35 to 85%RH, Storage : 35 to 85%RH									
Protection		IP66(IEC standard)									
Material		• BRP ☞ Case : PA(Nylon, Black), Lens : PC • BR ☞ Case : Brass, Ni-plate(BR-C : Ni-plate), Lens : PC						• Case ☞ BRP3M : PA(Nylon, Black) BR3M : Brass, Ni-plate (BR-C : Ni-plate) • Lens ☞ Acrylic		• Case ☞ Brass, Ni-plate (BR-C : Ni-plate) • Lens ☞ BR4M : Glass BR20M : PC	
Cable		• BR(P) ☞ 4P, Ø5mm, Length:2m(Emitter of through-beam type:2P, Ø5mm, Length:2mm / Receiver:3P, Ø5mm, Length:2mm) • BR(P)-C ☞ M12									
		• BR(P)-C Series : M12 socket type : ϕ5mm 4P, Length 3/5m, 22AWG, Core wire diameter : 0.08mm, No. of core wire : 60, Insulator diameter : ϕ1.2mm									
Acce-ssory	Individual	Adjustment driver						Adjustment driver, Reflector(MS-2)		———	
	Common	BR : Fixing nuts, Washer / BRP : Fixing nuts									
Approval		CE									
Unit weight		• BRP Series : Approx. 100g, BR Series : Approx. 120g • BRP-C Series : Approx. 20g, BR-C Series : Approx. 35g								• BR Series:Approx. 300g • BR-C Series:Approx. 110g	

※(★1)Non-glossy white paper 50×50mm (★2)Non-glossy white paper 100×100mm.
(★3)Detecting distance and detecting target for Retroreflective type is rated based on mirror(MS-2). Detecting distance indicates possible reflective mirror setting range. Sensing under 0.1m is also available.

▣Feature data

◎Diffuse reflective/Narrow beam reflective

●BR100-DDT-□(-P)/BRP100-DDT-□(-P) ●BR200-DDTN-□(-P)/BRP200-DDTN-□(-P) ●BR400-DDT-□(-P)/BRP400-DDT-□(-P)

Sensing area(Diffusion type)		Sensing area(Narrow beam type)		Sensing area(Diffusion type)	
Measuring method	Data	Measuring method	Data	Measuring method	Data
Standard sensing target:Non-glossy white paper 50×50mm	Sensing distance L(mm) 100 70 40 10 0 / 20 10 0 10 20 / Left ← Center → Right / Operation position ℓ1 (mm)	Standard sensing target:Non-glossy white paper 50×50mm	Sensing distance L(mm) 200 150 100 50 0 / 20 10 0 10 20 / Left ← Center → Right / Operation position ℓ1 (mm)	Standard sensing target:Non-glossy white paper 100×100mm	Sensing distance L(mm) 400 300 200 100 0 / 20 10 0 10 20 / Left ← Center → Right / Operation position ℓ1 (mm)
ℓ1, L, Diffuse reflective		ℓ1, L, Diffuse reflective		ℓ1, L, Diffuse reflective	

◎Retroreflective

●BR3M-MDT-□(-P) / BRP3M-MDT-□(-P)

Parallel shifting characteristic		Sensor angle characteristic		Reflector angle characteristic	
Measuring method	Data	Measuring method	Data	Measuring method	Data
Reflector(MS-2)	Sensing distance L(m) 4 3 2 1 0 / 120 80 40 0 40 80 120 / Left ← Center → Right / Operation position ℓ1 (m)	Reflector(MS-2)	Sensing distance L(m) 4 3 2 1 0 / 10° 5° 0 5° 10° / Left ← Center → Right / Operation angle θ	Reflector(MS-2)	Sensing distance L(m) 4 3 2 1 0 / 60° 40° 20° 0° 20° 40° 60° / Left ← Center → Right / Operation angle θ
ℓ1, L, Retroreflective		θ, L, Retroreflective		θ, L, Retroreflective	

◎Through-beam

●BR4M-TDT□-□ / BR4M-TDT□-□-P

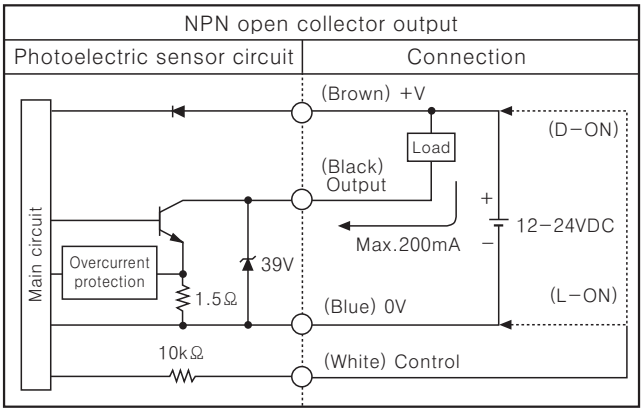
Parallel shifting characteristic		Angle characteristic	
Measuring method	Data	Measuring method	Data
Receiver, ℓ1, L, Emitter	Sensing distance L(m) 4 3 2 1 0 / 200 100 0 100 200 / Left ← Center → Right / Operation position ℓ1 (mm)	Receiver, θ, L, Emitter	Sensing distance L(m) 4 3 2 1 0 / 20° 10° 0 10° 20° / Left ← Center → Right / Operation angle θ

●BR20M-TDT□-□ / BR20M-TDT□-□-P

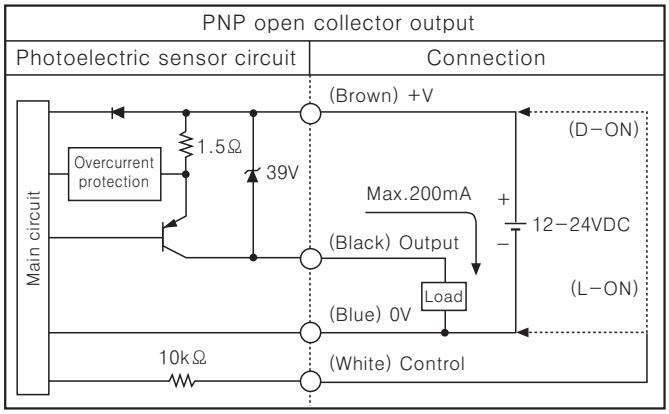
Parallel shifting characteristic		Angle characteristic	
Measuring method	Data	Measuring method	Data
Receiver, ℓ1, L, Emitter	Sensing distance L(m) 20 15 10 5 0 / 800 600 400 200 0 200 400 600 800 / Left ← Center → Right / Operation position ℓ1 (mm)	Receiver, θ, L, Emitter	Sensing distance L(m) 20 15 10 5 0 / 15° 10° 5° 0° 5° 10° 15° / Left ← Center → Right / Operation angle θ

▣Control output diagram

●BR(P)100-DDT-□ / BR(P)200-DDTN-□ / BR(P)400-DDT-□
●BR(P)3M-MDT-□
●BR20M-TDTD2-□ / BR20M-TDTL2-□(Receiver)



●BR(P)100-DDT-□-P / BR(P)200-DDTN-□-P / BR(P)400-DDT-□-P
●BR(P)3M-MDT-□-P
●BR20M-TDTD2-□-P / BR20M-TDTL2-□-P(Receiver)

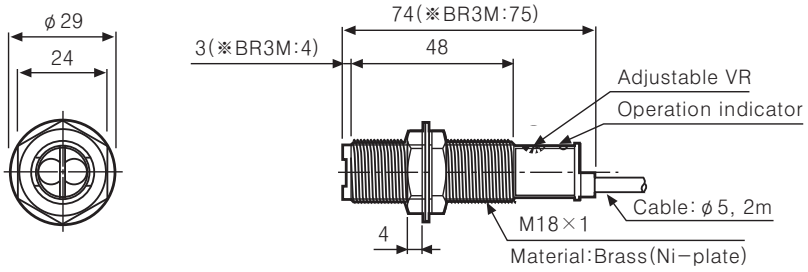


※Select Light ON / Dark ON by control wire. ┌ Light ON : Connect control wire to 0V
└ Dark ON : Connect control wire to +V

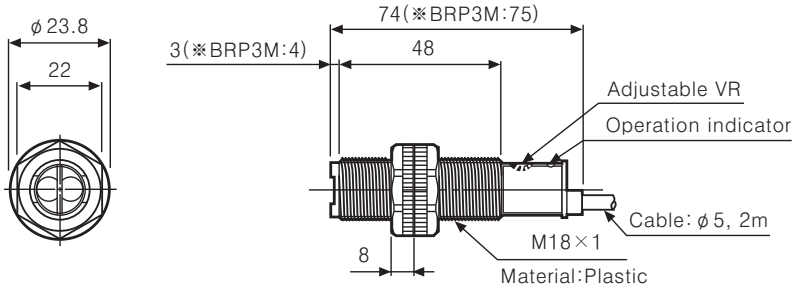
※Control wire is available only for diffuse reflective type and retroreflective type.

▣Dimensions

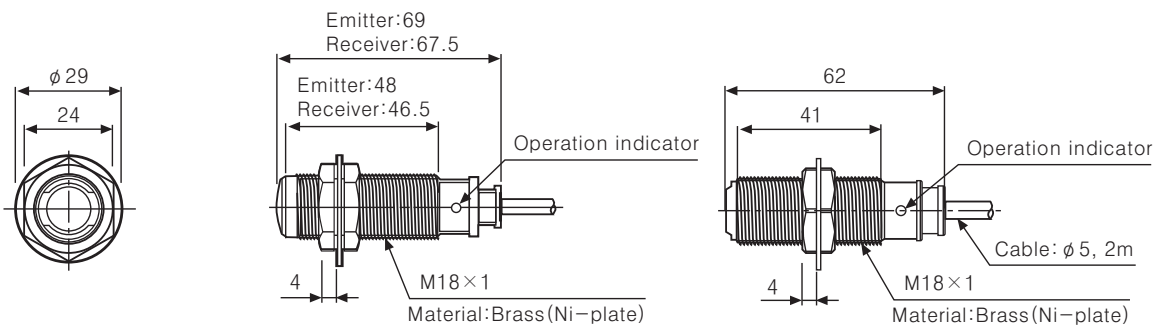
●BR100-DDT / BR100-DDT-P ●BR200-DDTN / BR200-DDTN-P
●BR400-DDT / BR400-DDT-P ●BR3M-MDT / BR3M-MDT-P (※)



●BRP100-DDT / BRP100-DDT-P ●BRP200-DDTN / BRP200-DDTN-P
●BRP400-DDT / BRP400-DDT-P ●BRP3M-MDT / BRP3M-MDT-P (※)



●BR4M-TDTD / BR4M-TDTD-P / BR4M-TDTL / BR4M-TDTL-P
BR20M-TDTD / BR20M-TDTD-P / BR20M-TDTL / BR20M-TDTL-P

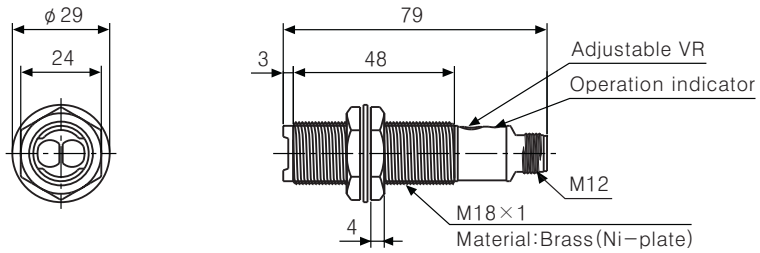


〈 BR4M Series 〉 〈 BR20M Series 〉

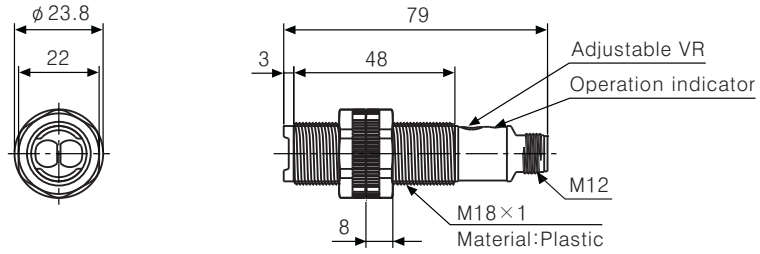
(Unit:mm)

▣Dimensions

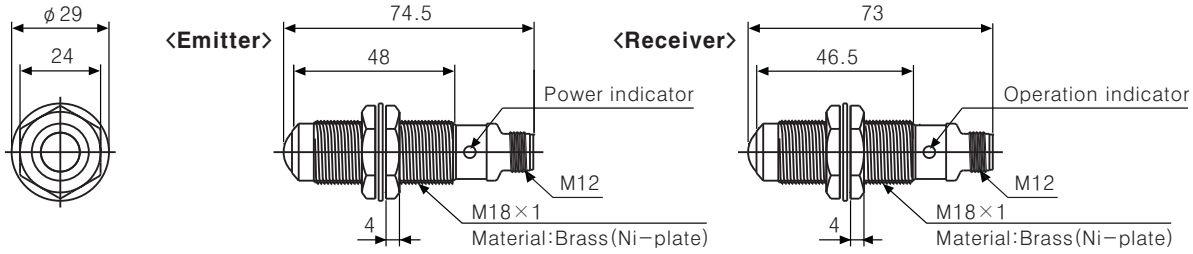
●BR100/200/400/3M-DDT(N)-C(-P)



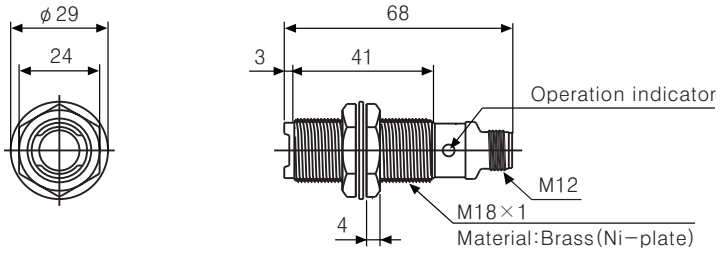
●BRP100/200/400/3M-DDT(N)-C(-P)



●BR4M-TDTD(L)-C(-P)

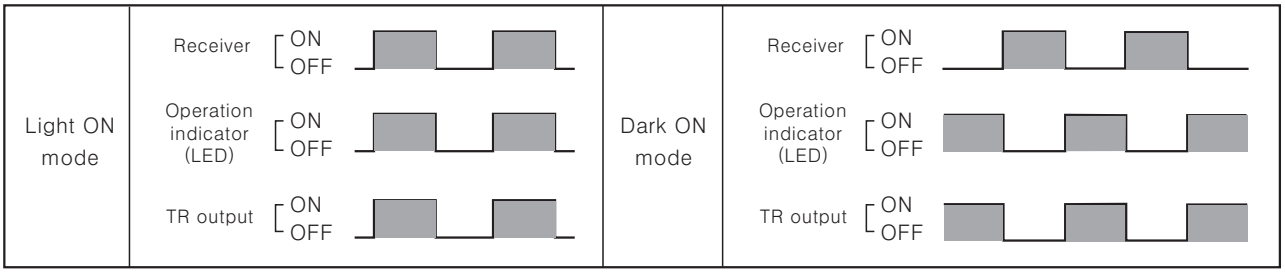


●BR20M-TDTD(L)-C(-P)



(Unit:mm)

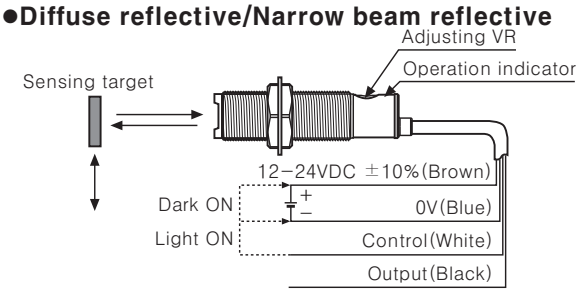
▣Operation mode



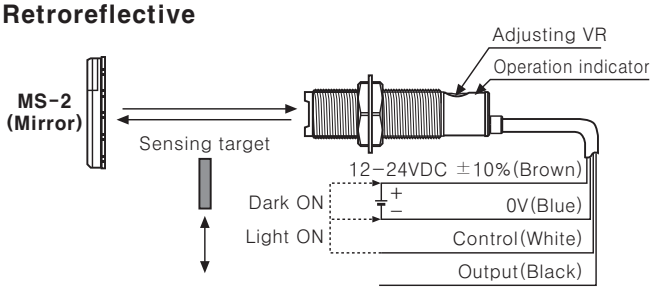
※The control TR output will be held OFF for 0.5 sec. after supplied power in order to prevent malfunction of this photoelectric sensor(Diffuse reflective, retroreflective).
※If the control output terminal is short-circuited or flow beyond rated current, the control signal will not be output normally due to protection circuit.

▣Connections

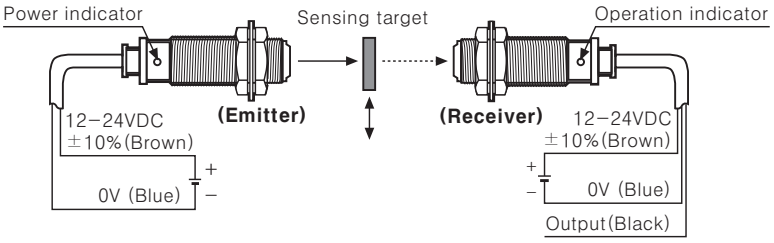
●Diffuse reflective/Narrow beam reflective



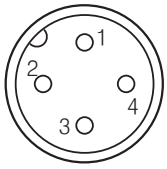
●Retroreflective



●Through-beam



▣Connections



M12 Connector pin

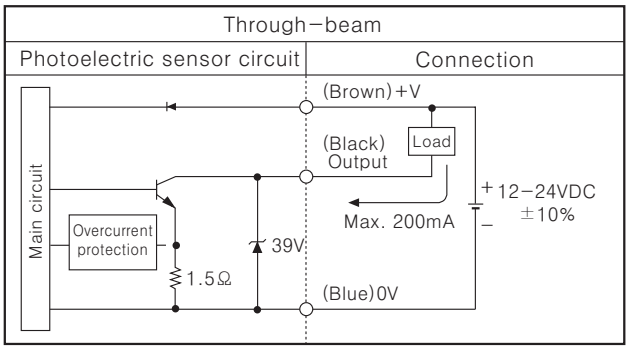
Connector pin No.	Cable colors	Application		
		Diffuse/Narrow beam reflective	Retroreflective	Through-beam
1	Brown	24VDC	24VDC	24VDC
2	White	CONTROL	N.C	GND
3	Blue	GND	GND	GND
4	Black	OUTPUT	N.C	OUTPUT

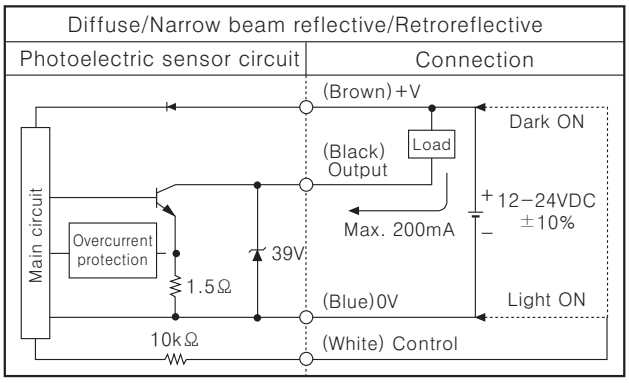
●Connector cable
(Sold separately)

※Please refer to G-5 for connector cable.

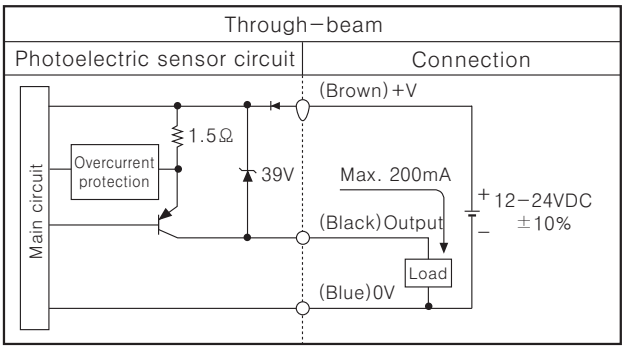
▣Control output diagram

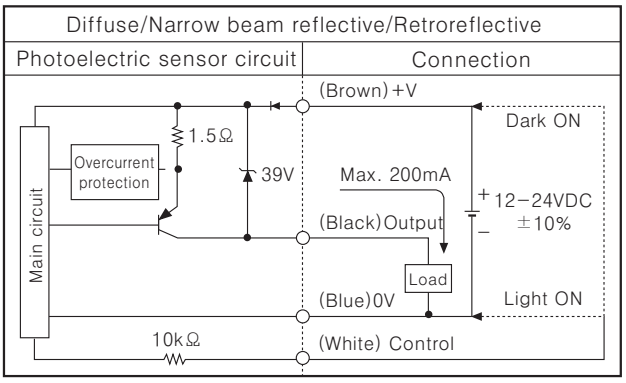
●NPN open collector output





●PNP open collector output



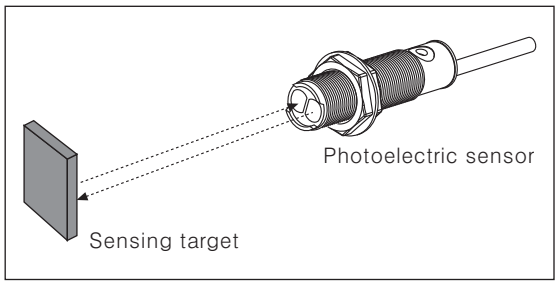


▣Mounting and sensitivity adjustment

Please supply the power to the sensor after mount the emitter and the receiver facing each other, and then adjust an optical axis and the sensitivity as follow;

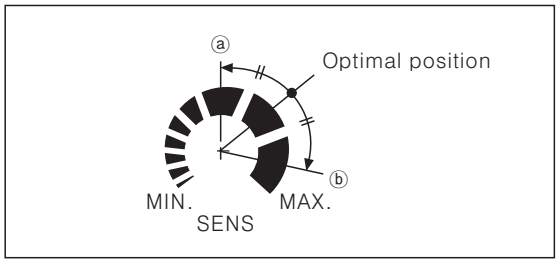
◎Diffuse reflective/Narrow beam reflective type

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 adjuster until position ⓐ in the middle of the operation range of indicator from Min. position of the adjuster.
3. Take the target out of the sensing area, then turn the adjuster until position ⓑ in the middle of the operation range of indicator. If the indicator does not turn on, max. position is position ⓑ.
4. Set the adjuster in the middle of two switching position ⓐ, ⓑ.

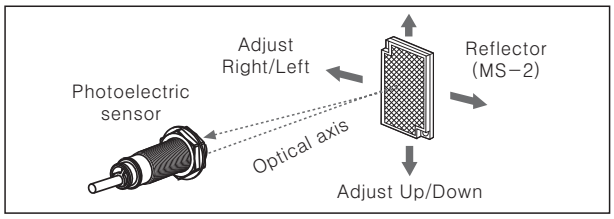
※The sensing distance indicated in the specification chart is that of non-glossy white paper in the target size 100×100mm or 50×50mm. Be sure that it can be different by size, surface and gloss of target.



◎Retroreflective type

1. Supply the power to the photoelectric sensor, after set the photoelectric sensor and the reflector(MS-2) facing each other.
2. Set the photoelectric sensor in the middle of the operation range of indicator adjusting the reflector or the sensor right and left, up and down.
3. Adjust up and down direction as the same.
4. After adjustment, check the stability of operation putting the object at the optical axis.

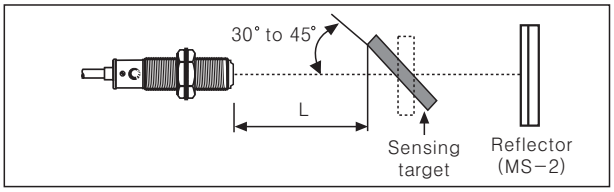
※If use more than 2 photoelectric sensors in parallel, the space between them should be more than 30cm.



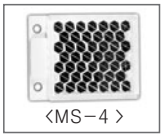
※If use more than 2 photoelectric sensors in parallel, the space between them should be more than 30cm.

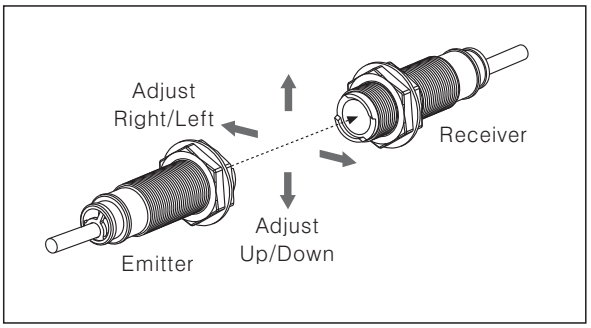
※If reflectance of target is higher than non-glossy white paper, it might cause malfunction by reflection from the target when the target is near to photo sensor. Therefore put enough space between the target and photoelectric sensor or the surface of target should be installed at an angle of 30° to 45° against optical axis. (When detecting target with high reflectance near by, photoelectric sensor with the polarizing filter should be used.)

※Sensitivity adjustment : Please refer to the diffuse reflective type.



※If the mounting place is too small, please use MS-4 instead of MS-2 for same sensing distance.



◎Through-beam type

1. Supply the power to the photoelectric sensor, after mount the emitter and the receiver facing each other.
2. Set the receiver in center of position in the middle of the operation range of indicator adjusting the receiver and the emitter right and left, up and down.
3. Fix both units tightly after checking that the unit detect the target.