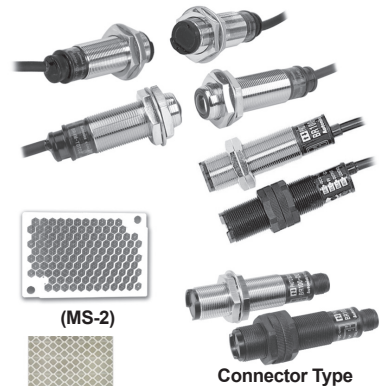


Upgraded cylindrical(Ø18mm) type

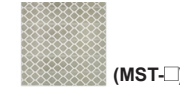
■ Features

- Realizes long sensing distance(20m)(Through-beam type)
- Superior noise resistance with digital signal processing
- High-speed response time under 1ms
- Built-in reverse power polarity and short-circuit(overcurrent) protection circuit
- Suitable for sensing in narrow space(Narrow beam type)
- External sensitivity adjustment(Except Through-beam type)
- Light ON, Dark ON switchable by control wire (Except Through-beam type)
- Excellent environment-resistance performance with glass lens(BR4M)
- Protection structure IP66(IEC standard)

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



(MS-2)



Connector Type

※The model name with '-C' is connector type.
※MST-□ is sold separately.

■ Specifications

Model	NPN open collector output				PNP open collector output				Case		
	BRP100-DDT	BR100-DDT	BRP400-DDT	BR400-DDT	BRP200-DDTN	BR200-DDTN	BRP3M-MDT	BR3M-MDT	BR4M-TDTD	BR4M-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	BR4M-TDTL-C	
	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	BR4M-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	BR4M-TDTL-C-P	
Case	Plastic	Metal	Plastic	Metal	Plastic	Metal	Plastic	Metal	Metal	Metal	
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. Ø60mm		Opaque materials of min. Ø15mm		
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	Adjustable(built-in the adjustment VR)										
Operation mode	Selectable Light ON or Dark ON by control cable(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: Max. 2.5V										
Protection circuit	Reverse polarity protection circuit, Output short-circuit protection circuit										
Indicator	Operation indicator: red LED, Power indicator: red LED(only for emitter of through-beam type)										
Insulation resistance	Min. 20MΩ(at 500VDC megger)										
Noise resistance	±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(for 1 min.) in each of X, Y, Z directions for 2 hours										
Shock	500m/s ² (approx. 50G) in each of X, Y, Z directions for 3 times										
Environment	Sunlight: Max. 11,000lx, Incandescent lamp: Max. 3,000lx (Receiver illumination)										
	Ambient temperature -10 to 60°C, storage: -25 to 75°C										
	Ambient humidity 35 to 85%RH, storage: 35 to 85%RH										
Protection	IP66(IEC standard)										
Material	●Case - BRP: PA(Black) BR: Brass, Ni-plate ●Sensing part - PC Lens						●Case - BRP3M: PA(Black) BR3M: Brass, Ni-plate ●Sensing part - Acrylic Lens		●Case - Brass, Ni-plate ●Sensing part - BR4M: Glass Lens BR20M: PC Lens		
Cable	●BR(P): Ø5mm, 4-wire, Length:2m(Emitter of through-beam type: Ø5mm, 2-wire, Length: 2m / Receiver: Ø5mm, 3-wire, Length: 2m)(AWG 22, Core diameter: 0.08mm, Number of cores: 60, Insulator out diameter: Ø1.25mm) ●BR(P)-C: M12 connector										
Accessory	Individual	VR adjustment driver					VR adjustment driver, Reflector(MS-2)		—		
	Common	BR: Fixing nuts, Washer / BRP: Fixing nuts									
Approval	CE										
Weight ^{※4}	●BRP Series: Approx. 100g ●BR Series: Approx. 120g ●BRP-C Series: Approx. 70g(approx. 30g) ●BR-C Series: Approx. 90g(approx. 50g)						—		●BR Series: Approx. 300g ●BR-C Series: Approx. 150g (approx.110g)		

※1: Non-glossy white paper 50×50mm

※2: Non-glossy white paper 100×100mm

※3: The sensing distance is specified with using the MS-2 reflector. Sensing distance is setting range of the reflector.

The sensor can detect under 0.1m.

When using reflective tapes, the reflection efficiency will vary by the size of the tape. Please refer to the "Reflection efficiency by reflective tape model" table before using the tapes.

※4: The weight of standard type is only unit weight. The weight of connector type is with packaging and the weight in parentheses is only unit weight.

※Tightening torque for connector is 0.39 to 0.49N.m.

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

(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 mode power supply

(Q) Stepper motor& Driver&Controller

(R) Graphic/ Logic panel

(S) Field network device

(T) Software

(U) Other

BR Series

Feature data

Diffuse reflective type / Narrow beam reflective type

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

Sensing area characteristic		Sensing area characteristic		Sensing area characteristic	
Measuring method	Data	Measuring method	Data	Measuring method	Data
<p>Standard sensing target: Non-glossy white paper 50×50mm</p> <p>Diffuse reflective</p>	<p>Sensing distance L (mm)</p> <p>Sensing area (mm)</p>	<p>Standard sensing target: Non-glossy white paper 50×50mm</p> <p>Diffuse reflective</p>	<p>Sensing distance L (mm)</p> <p>Sensing area (mm)</p>	<p>Standard sensing target: Non-glossy white paper 50×50mm</p> <p>Diffuse reflective</p>	<p>Sensing distance L (mm)</p> <p>Sensing area (mm)</p>

Retroreflective type

●BR3M-MDT-□(-P) / BRP3M-MDT-□(-P)

Parallel shifting characteristic		Parallel shifting characteristic		Parallel shifting characteristic	
Measuring method	Data	Measuring method	Data	Measuring method	Data
<p>Reflector (MS-2)</p> <p>Retroreflective</p>	<p>Sensing distance L (m)</p> <p>Sensing area (mm)</p>	<p>Reflector (MS-2)</p> <p>Retroreflective</p>	<p>Sensing distance L (m)</p> <p>Operation angle (θ)</p>	<p>Reflector (MS-2)</p> <p>Retroreflective</p>	<p>Sensing distance L (m)</p> <p>Operation angle (θ)</p>

Through-beam type

●BR4M-TDT□-□ / BR4M-TDT□-□-□-□-□-□

Parallel shifting characteristic		Angle characteristic	
Measuring method	Data	Measuring method	Data
<p>Receiver</p> <p>Emitter</p>	<p>Sensing distance L (m)</p> <p>Sensing area (mm)</p>	<p>Receiver</p> <p>Emitter</p>	<p>Sensing distance L (m)</p> <p>Operation angle (θ)</p>

●BR20M-TDT□-□ / BR20M-TDT□-□-□-□-□-□

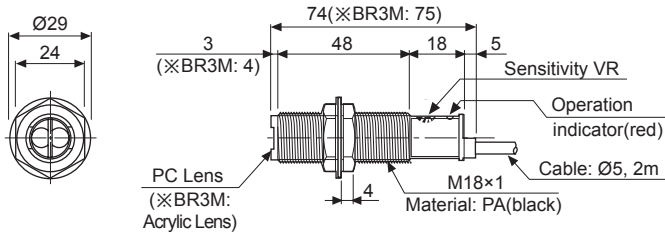
Parallel shifting characteristic		Angle characteristic	
Measuring method	Data	Measuring method	Data
<p>Receiver</p> <p>Emitter</p>	<p>Sensing distance L (m)</p> <p>Sensing area (mm)</p>	<p>Receiver</p> <p>Emitter</p>	<p>Sensing distance L (m)</p> <p>Operation angle (θ)</p>

Cylindrical type

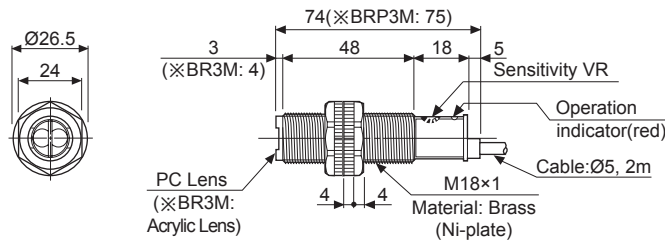
■ Dimensions

(unit: mm)

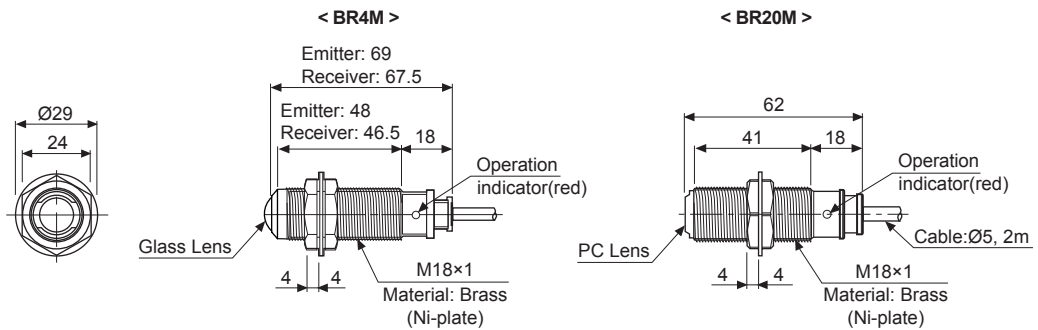
- BR100-DDT / BR100-DDT-P ● BR200-DDTN / BR200-DDTN-P
- BR400-DDT / BR400-DDT-P ● BR3M-MDT / BR3M-MDT-P (※)



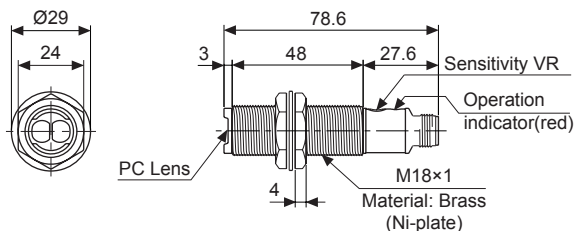
- BRP100-DDT / BRP100-DDT-P ● BRP200-DDTN / BRP200-DDTN-P
- BRP400-DDT / BRP400-DDT-P ● BRP3M-MDT / BRP3M-MDT-P (※)



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



- BR100/200/400-DDT(N)-C(-P)

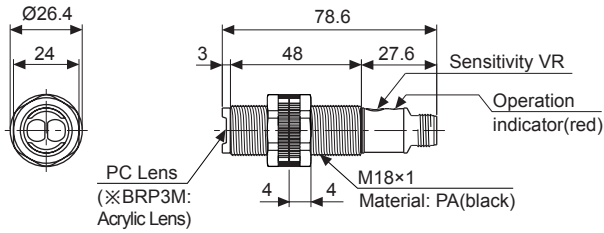


(A)	Photo electric sensor
(B)	Fiber optic sensor
(C)	Door/Area sensor
(D)	Proximity sensor
(E)	Pressure sensor
(F)	Rotary encoder
(G)	Connector/Socket
(H)	Temp. controller
(I)	SSR/Power controller
(J)	Counter
(K)	Timer
(L)	Panel meter
(M)	Tacho/Speed/Pulse meter
(N)	Display unit
(O)	Sensor controller
(P)	Switching mode power supply
(Q)	Stepper motor& Driver&Controller
(R)	Graphic/Logic panel
(S)	Field network device
(T)	Software
(U)	Other

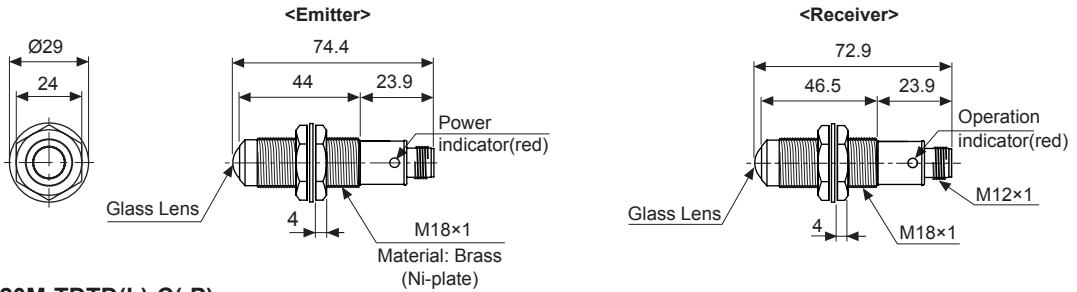
BR Series

• BRP100/200/400/3M-DDT(N)-C(-P)

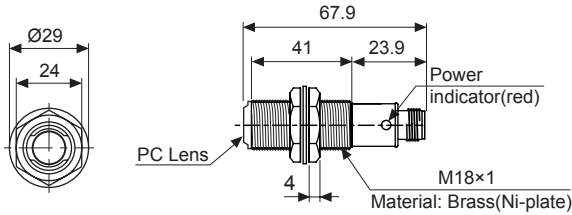
(unit: mm)



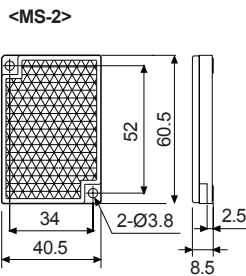
• BR4M-TDTD(L)-C(-P)



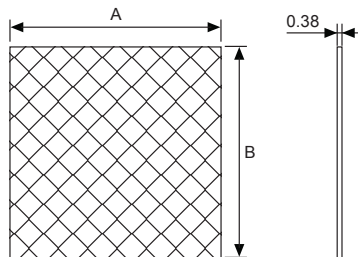
• BR20M-TDTD(L)-C(-P)



• Reflector



• Reflective tape(sold separately)



	A	B
MST-50-10	50	50
MST-100-5	100	100
MST-200-2	200	200

■ Operation mode

Operation mode	Light ON	Dark ON
Receiver operation	Received light Interrupted light	Received light Interrupted light
Operation indicator (Red LED)	ON OFF	ON OFF
Transistor output	ON OFF	ON OFF

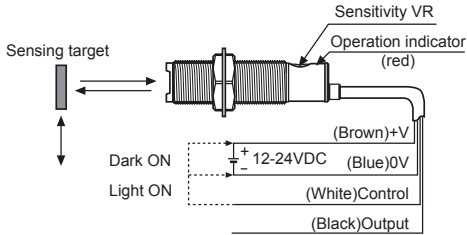
※The transistor output is held OFF for 0.5 sec. after supplied power in order to prevent malfunction of this photoelectric sensor(except through-beam type).

※If the control output terminal is short-circuited or flow beyond rated current, the control signal is not output normally due to protection circuit.

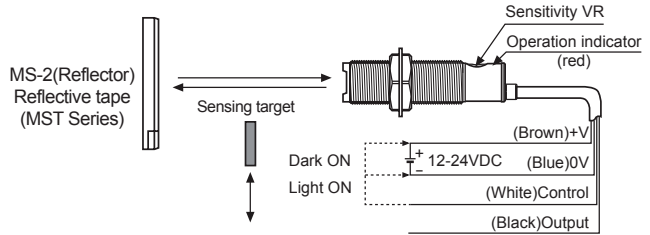
Cylindrical type

■ Connections

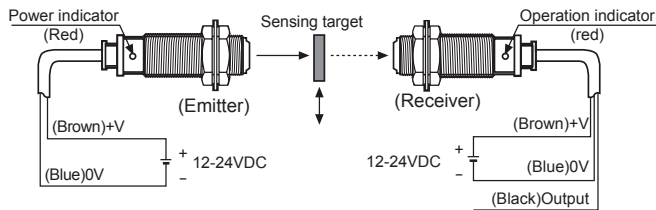
- Diffuse reflective type / Narrow beam reflective type



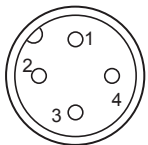
- Retroreflective type



- Through-beam type



■ Connections for connector part



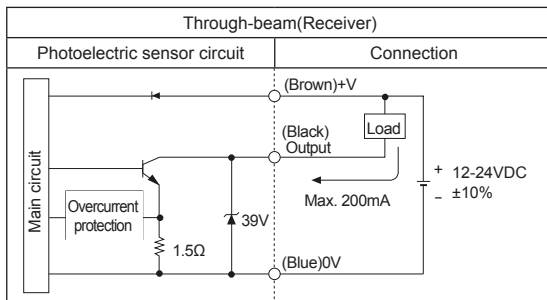
M12 Connector pin

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

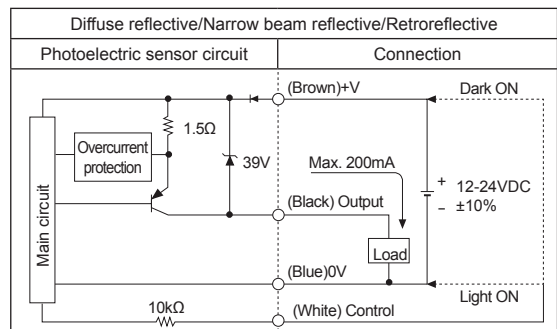
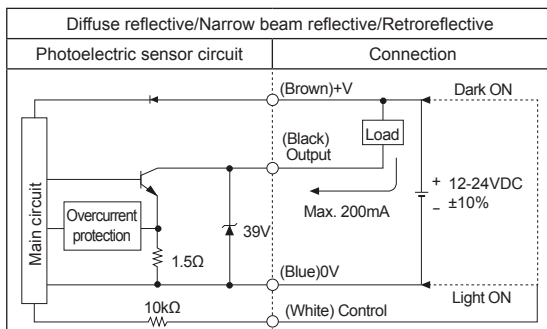
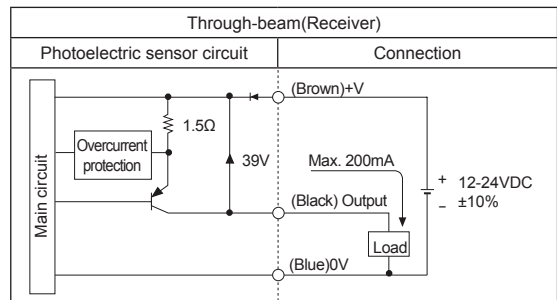
- Connector cable(sold separately)
※Please refer to the G-6 for connector cable.

■ Control output diagram

- NPN open collector output



- PNP open collector output



※Before using this unit, select Light ON/Dark ON with control cable.(Light ON: Connect control cable with 0V / Dark ON: Connect control cable with +V)
※Control cable is only for Diffuse reflective/Narrow beam reflective/Retroreflective type.

(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

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(O) Sensor controller

(P) Switching mode power supply

(Q) Stepper motor& Driver&Controller

(R) Graphic/ Logic panel

(S) Field network device

(T) Software

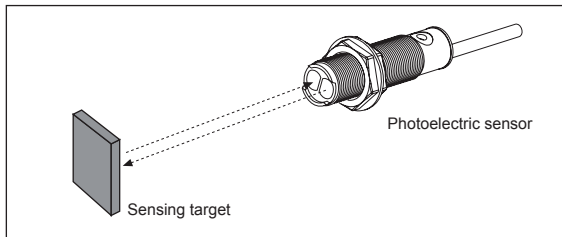
(U) Other

■ Mounting and sensitivity adjustment

Install the sensor to the desired place and check the connections. Supply the power to the sensor and adjust the optical axis and the sensitivity as follow ;

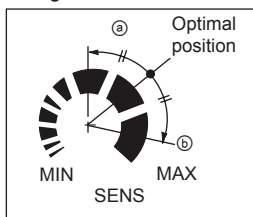
◎ Diffuse reflective/Narrow beam reflective type

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 Sensitivity VR until position ③ where the operation indicator turns ON from min. position of the Sensitivity VR.
3. Take the target out of the sensing area, then turn the Sensitivity VR until position ④ where the operation indicator turns ON. If the indicator dose not turn ON, max. position is ⑤.
4. Set the Sensitivity VR at the center of two switching position ③, ④.

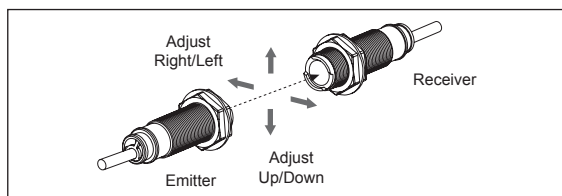
※The sensing distance indicated on specification chart is for 100×100mm or 50×50mm of non-glossy white paper. Be sure that it can be different by size, surface and gloss of target.



◎ 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 center of position in the middle of the operation range of indicator adjusting the receiver or 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 $\varnothing 15\text{mm}$, it can be missed by sensor cause light penetrate it.

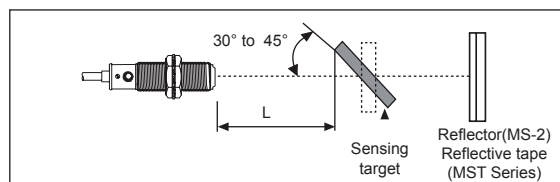
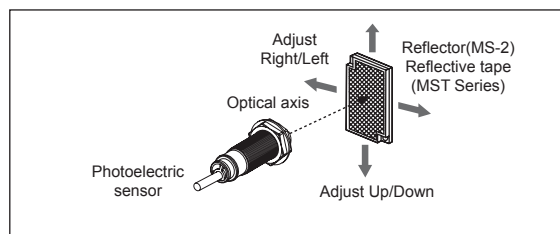


◎ Retroreflective type

1. Supply the power to the photoelectric sensor, after setting the photoelectric sensor and the reflector(MS-2) or reflective tape in face to face.
2. Set the photoelectric sensor in the position which indicator turns on, as adjusting the reflector or the sensor right and left, up and down.
3. Fix both units tightly after checking that the unit detects the target.

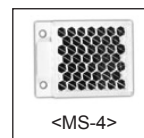
※If using more than 2 photoelectric sensors in parallel, the space between them should be more than 30cm.
 ※If reflectance of target is higher than non-glossy white paper, it might cause malfunction by reflection from the target when the target is near to photoelectric sensor. Therefore put enough space between the target and the photoelectric sensor or the surface of the target should be installed at angle of 30° to 45° against optical axis. (When a sensing target with high reflectance near by, photoelectric sensing with the polarizing filter should be used.)

※Sensitivity adjustment: Refer to the diffuse reflective type's.



※If the mounting place is too narrow, please use MS-4 instead of MS-2.

※Please use reflective tape(MST Series) for where a reflector is not installed.



■ Reflective efficiency by reflective tape model

MST-50-10 (50×50mm)	100%
MST-100-5 (100×100mm)	140%
MST-200-2 (200×200mm)	180%

※ Reflective efficiency may vary depending on usage environment and installation conditions.

The sensing distance and minimum sensing target size increase as the size of the tape increases.

Please check the reflection efficiency before using reflective tapes.

※For using reflective tape, installation distance should be min. 20mm.