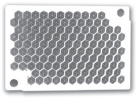
Upgraded Cylindrical (Ø18mm) Type

▣ 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)

(MST-□)

Connector Type

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

▣ Specifications

Model	NPN open collector output	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 output	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
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)								Fixed	
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 X, Y, Z direction for 2 hours									
Shock		500m/s² (approx. 50G) in each X, Y, Z direction for 3 times									
Environment	Ambient illumination	Sunlight: Max. 11,000lx, Incandescent lamp: Max. 3,000lx (Receiver illumination)									
	Ambient temperature	-10 to 60℃, storage: -25 to 75℃									
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH									
Protection structure		IP66 (IEC standard) (BR20M Series: IP67)									
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 the setting range of the reflector.
The sensor can detect under 0.1m.
When using reflective tapes, the reflectivity will vary by the size of the tape. Please refer to the "▣ Reflectivity 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.

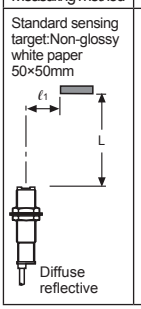
▣ Feature Data

◎ Diffuse reflective type / Narrow beam reflective type

●BR100-DDT-□(-P)/BRP100-DDT-□(-P)

Sensing area characteristic

Measuring method



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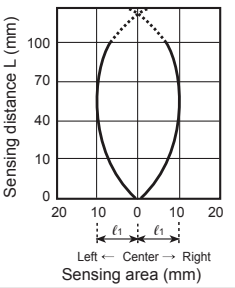
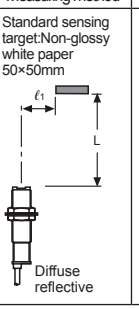


●BR400-DDT-□(-P)/BRP400-DDT-□(-P)

Sensing area characteristic

Measuring method



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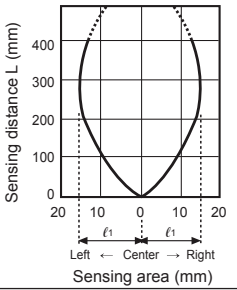
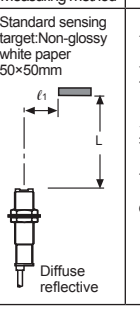


●BR200-DDTN-□(-P)/BRP200-DDTN-□(-P)

Sensing area characteristic

Measuring method



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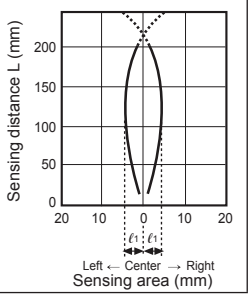
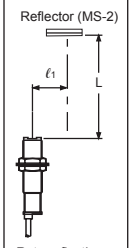


◎ Retroreflective type

● BR3M-MDT-□(-P) / BRP3M-MDT-□(-P)

Parallel shifting characteristic

Measuring method



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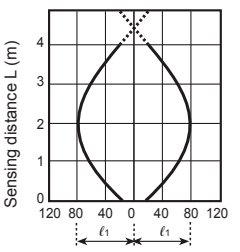
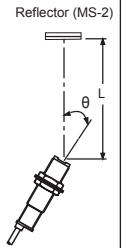


Parallel shifting characteristic

Measuring method



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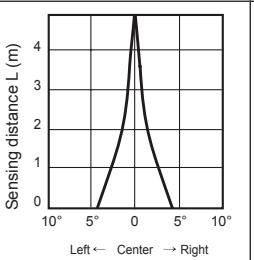
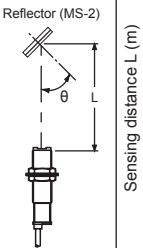


Parallel shifting characteristic

Measuring method



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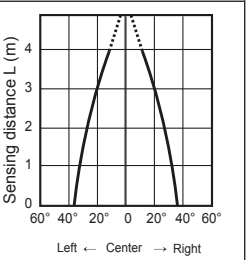
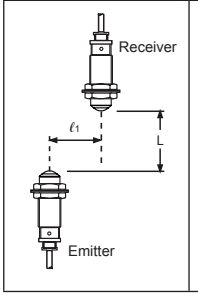


◎ Through-beam type

● BR4M-TDT□-□ / BR4M-TDT□-□-P

Parallel shifting characteristic

Measuring method



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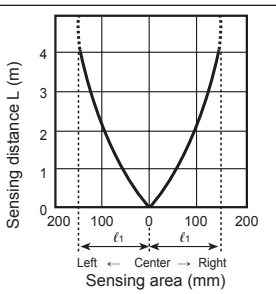
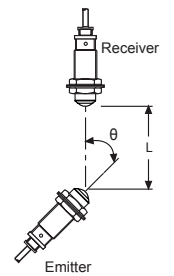


Angle characteristic

Measuring method



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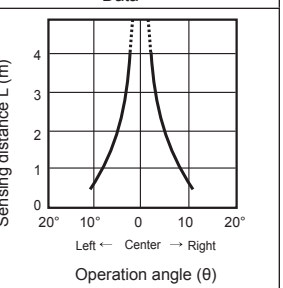
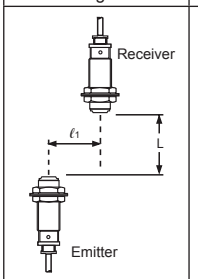


● BR20M-TDT□-□ / BR20M-TDT□-□-P

Parallel shifting characteristic

Measuring method



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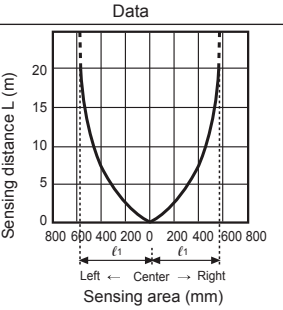
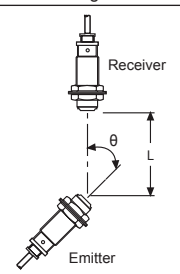


Angle characteristic

Measuring method



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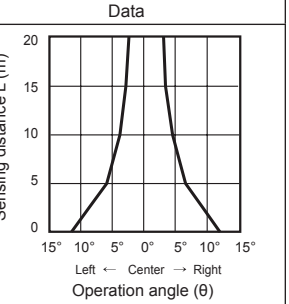
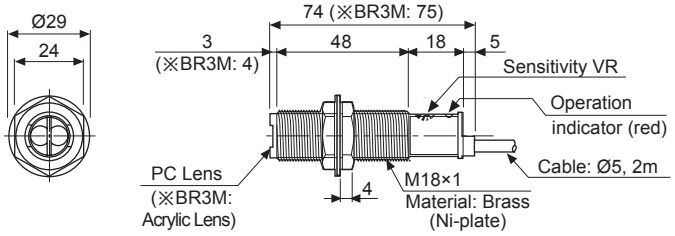


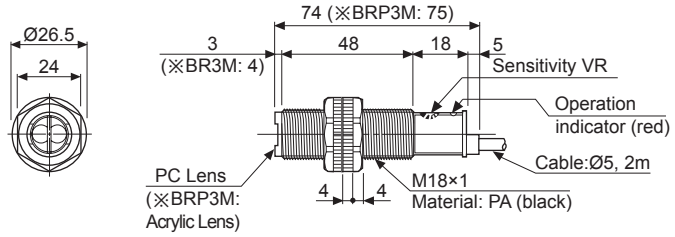
▣ Dimensions

(unit: mm)

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

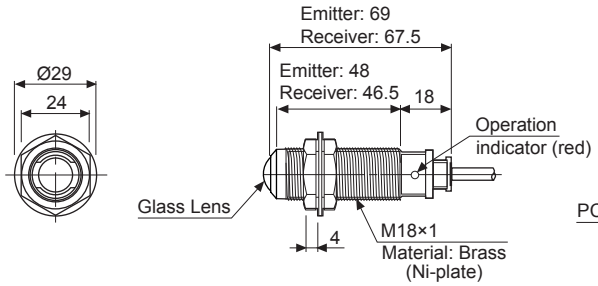


- **BRP100-DDT / BRP100-DDT-P**
- **BRP200-DDTN / BRP200-DDTN-P**
- **BRP400-DDT / BRP400-DDT-P**
- **BRP3M-MDT / BRP3M-MDT-P (※)**



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

< BR4M >



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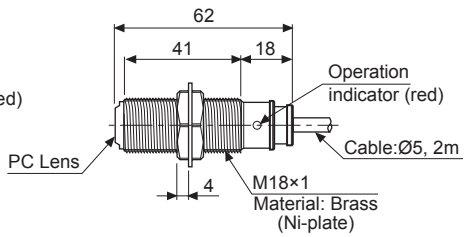
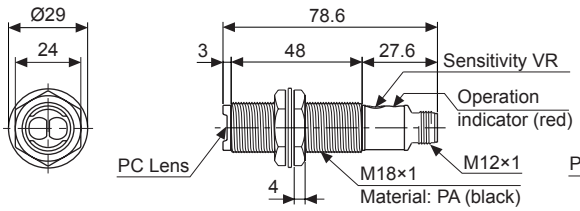
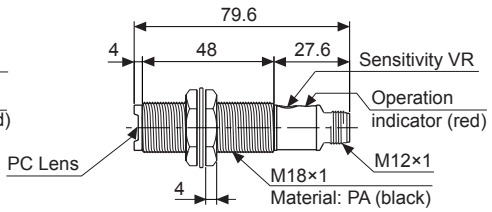


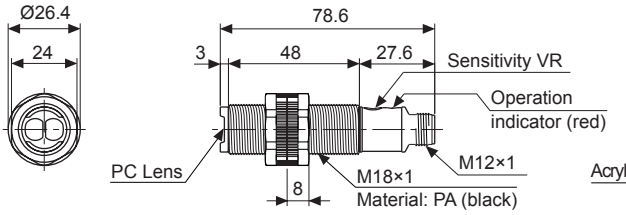
- **BR100/200/400-DDT(N)-C(-P)**



- **BRP3M-MDT-C(-P)**

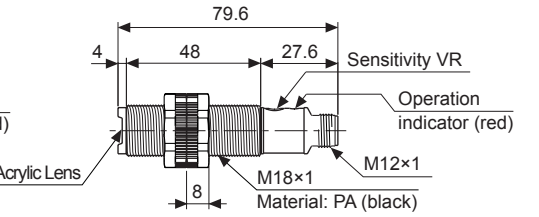


• **BRP100/200/400-DDT(N)-C(-P)**

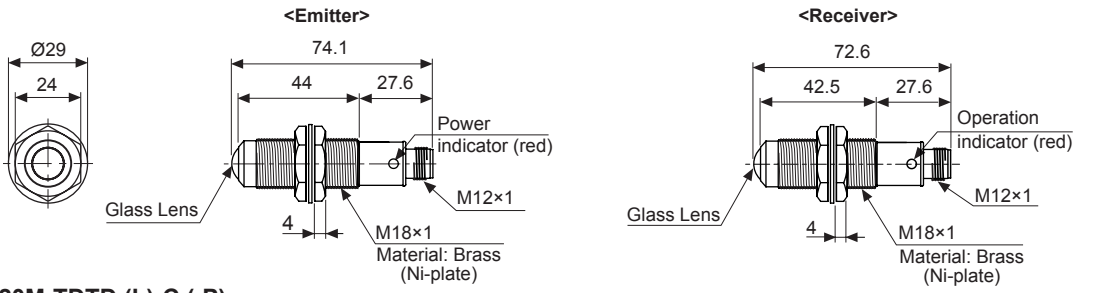


• **BR3M-MDT-C(-P)**

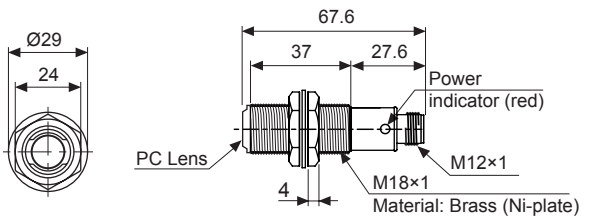
(unit: mm)



• **BR4M-TDTD(L)-C(-P)**

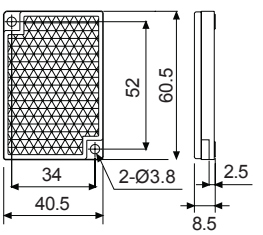


• **BR20M-TDTD (L)-C (-P)**

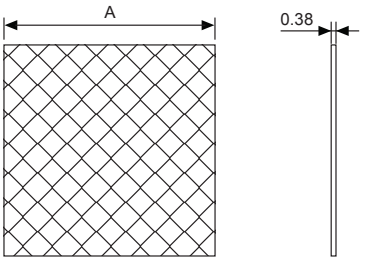


• **Reflector**

<MS-2>



• **Reflective tape (sold separately)**



(unit: mm)

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

▣ Operation Mode

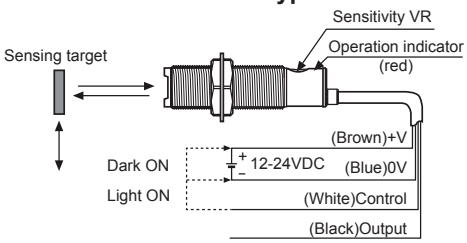
Operation mode	Light ON	Dark ON
Receiver operation	Received light Interrupted light	Received light Interrupted light
Operation indicator (Red LED)	ON OFF	ON OFF
Transistor output	ON OFF	ON OFF

※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).

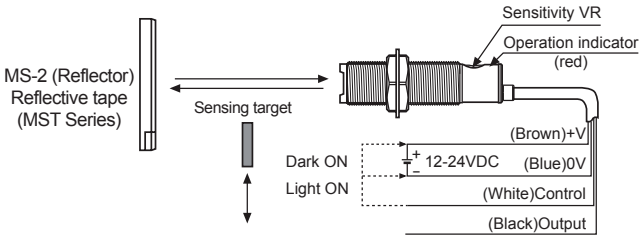
※If the control output terminal is short-circuited or flown over rated current, the control signal is not output normally due to protection circuit.

■ Connections

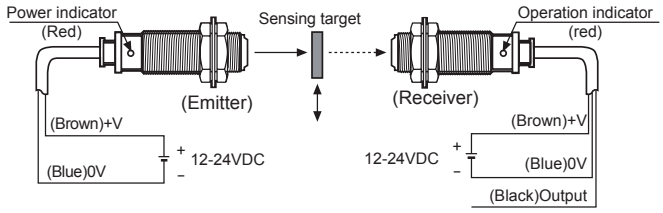
● Diffuse reflective type / Narrow beam reflective type



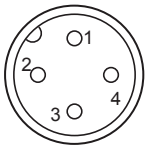
● Retroreflective type



● Through-beam type



■ Connections For Connector Part



M12 Connector pin

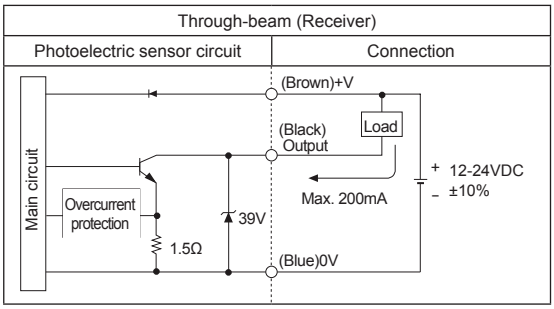
Connector pin No.	Cable colors	Application		
		Diffuse/ Narrow beam reflective/ Retroreflective type	Through-beam type	
			Emitter	Receiver
1	Brown	24VDC	24VDC	24VDC
2	White	CONTROL	N.C	GND
3	Blue	GND	GND	GND
4	Black	OUTPUT	N.C	OUTPUT

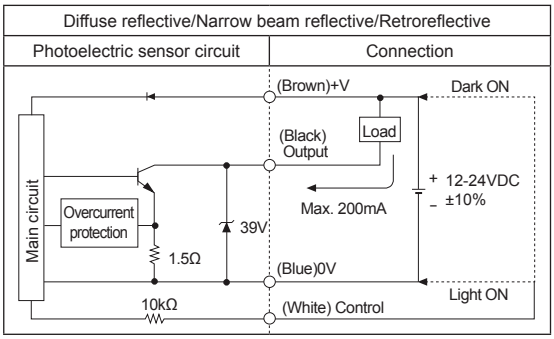
● Connector cable (sold separately)

※Please refer to the G-6 for connector cable.

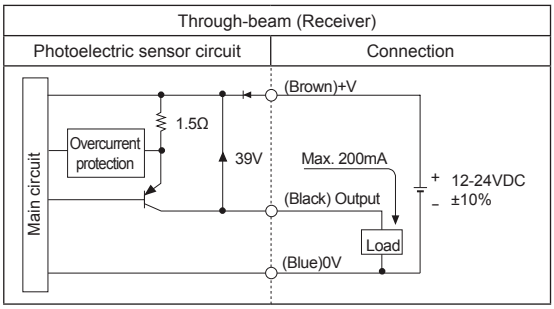
■ Control Output Diagram

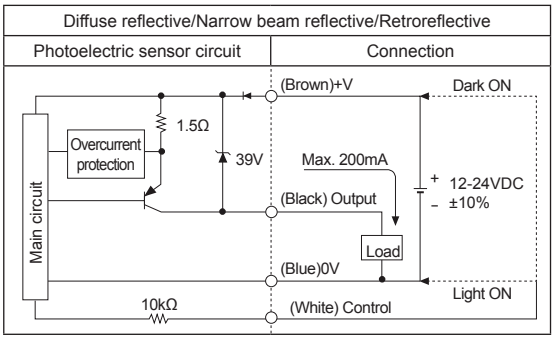
● NPN open collector output





● PNP open collector output





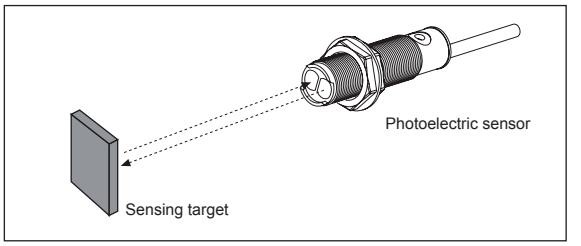
※Before using this unit, select Light ON/Dark ON with control cable. (Light ON: Connect control cable with 0V / Dark ON: Connect control cable with +V)
※Control cable is only for Diffuse reflective/Narrow beam reflective/Retroreflective type.

▣ 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 ;

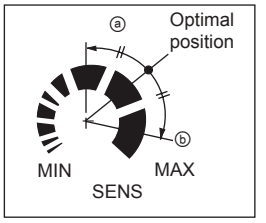
◎ Diffuse reflective/Narrow beam reflective type

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 ⓐ 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 ⓑ where the operation indicator turns ON. If the indicator dose not turn ON, max. position is ⓑ.
4. Set the Sensitivity VR at the center of two switching position ⓐ, ⓑ.

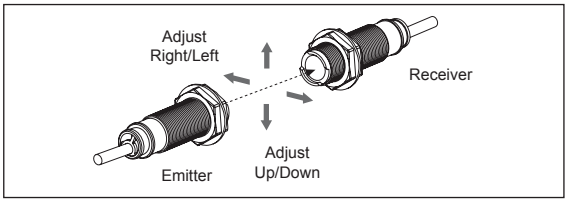
※The sensing distance indicated on specification chart is for 100×100mm or 50×50mm of non-glossy white paper. Be sure that it can be different by size, surface and gloss of target.



◎ 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 by adjusting the receiver or the emitter right and left, up and down.
3. After the adjustment, check the stability of operation by putting the object at the optical axis.

※If the sensing target is translucent body or smaller than Ø15mm, it can be missed by sensor because light penetrate it.



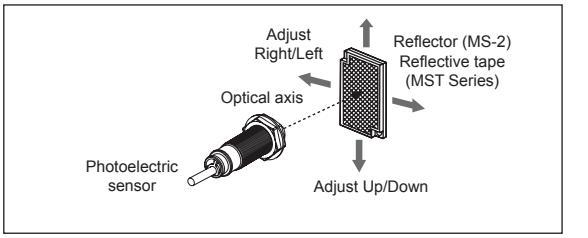
◎ Retroreflective type

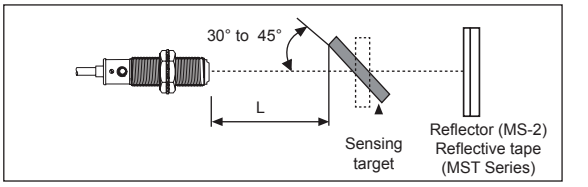
1. Supply the power to the photoelectric sensor, after setting the photoelectric sensor and the reflector (MS-2) or reflective tape face to face.
2. Set the photoelectric sensor in the position which indicator turns on, by adjusting the reflector or the sensor right and left, up and down.
3. Fix both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

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

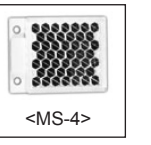
※If reflectance of target is higher than non-glossy white paper, it might cause malfunction by reflection from the target when the target is near to photoelectric sensor. Therefore put enough space between the target and the photoelectric sensor or the surface of the target should be installed at angle 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.

▣ Reflectivity By Reflective Tape Model

MST-50-10 (50×50mm)	80%
MST-100-5 (100×100mm)	120%
MST-200-2 (200×200mm)	140%

※This reflectivity is based on the reflector (MS-2).

※Reflectivity 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 reflectivity before using reflective tapes.

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