Upgraded cylindrical(Ø18mm) type

■ Features

- Realizes long installation 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-2A)

Connector Type

■ Specifications

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

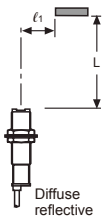
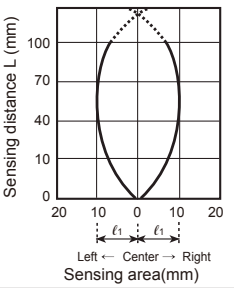
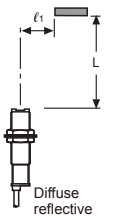
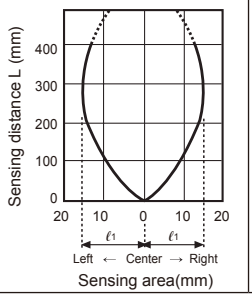
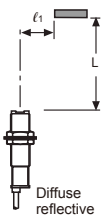
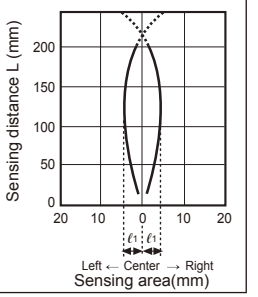
Model	NPN open collector output	BRP100-DDT	BR100-DDT	BRP400-DDT	BR400-DDT	BRP200-DDTN	BR200-DDTN	BRP3M-MDT	BR3M-MDT	BR4M-TDTD BR20M-TDTD	BR4M-TDTL BR20M-TDTL
		BRP100-DDT-C	BR100-DDT-C	BRP400-DDT-C	BR400-DDT-C	BRP200-DDTN-C	BR200-DDTN-C	BRP3M-MDT-C	BR3M-MDT-C	BR4M-TDTD-C BR20M-TDTD-C	BR4M-TDTL-C BR20M-TDTL-C
	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
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 ofmin. 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 or 300m/s² at frequency of 10 to 55Hz(for 1 min.) in each of X, Y, Z directions for 2 hours									
Shock		500m/s²(approx. 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	-10 to 60℃, storage : -25 to 75℃									
	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						●Case - BRP3M: PA(Black) BR3M: Brass, Ni-plate ●Sensing part - Acrylic		●Case - Brass, Ni-plate ●Sensing part - BR4M : Glass BR20M : PC	
Cable		●BR(P): ø5, 4-wire, Length:2m(Emitter of through-beam type: ø5, 2-wire, Length: 2m / Receiver: ø5, 3-wire, Length: 2m) (AWG 22, Core diameter: 0.08mm, Number of cores : 60, Insulator out diameter: ø1.25) ●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									
Unit weight		●BRP Series : Approx. 100g, BR Series : Approx. 120g ●BRP-C Series : Approx. 30g, BR-C Series : Approx. 50g								●BR Series:Approx. 300g ●BR-C Series: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.
※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

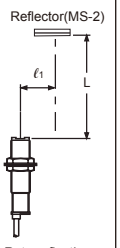
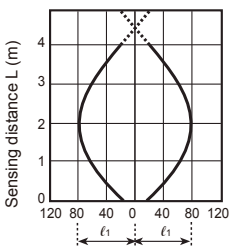
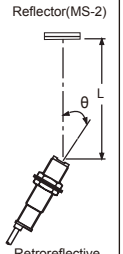
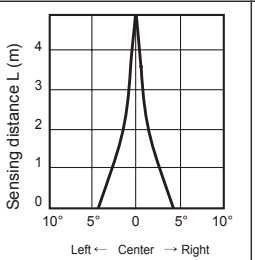
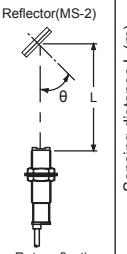
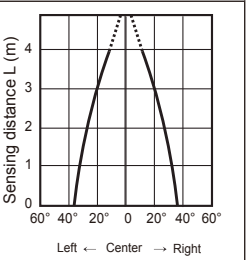
◎ Diffuse reflective type / Narrow beam reflective type

●BR100-DDT-☐(-P)/BRP100-DDT-☐(-P) ●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
Standard sensing target:Non-glossy white paper 50×50mm 		Standard sensing target:Non-glossy white paper 50×50mm 		Standard sensing target:Non-glossy white paper 50×50mm 	

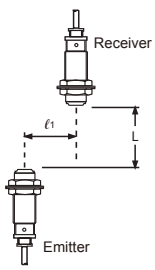
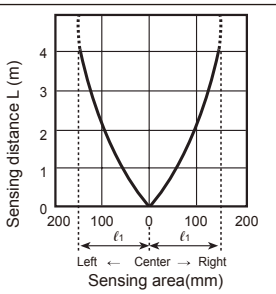
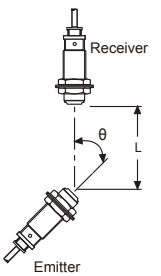
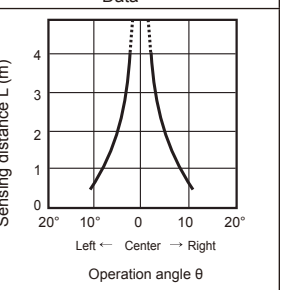
◎ Retroreflective type

● BR3M-MDT-☐(-P) / BRP3M-MDT-☐(-P)

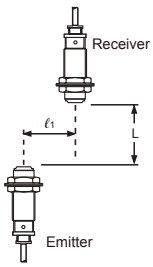
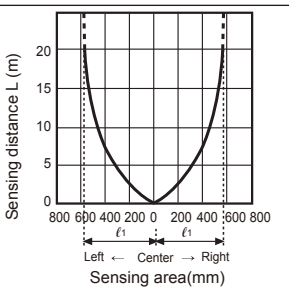
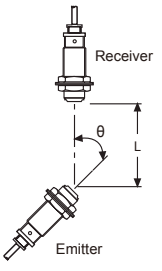
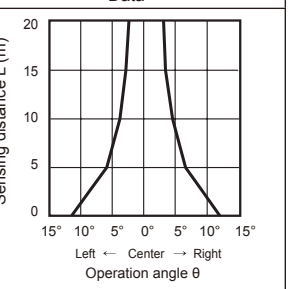
Parallel shifting characteristic		Parallel shifting characteristic		Parallel shifting characteristic	
Measuring method	Data	Measuring method	Data	Measuring method	Data
					

◎ Through-beam type

● BR4M-TDT☐-☐ / BR4M-TDT☐-☐-P

Parallel shifting characteristic		Angle characteristic	
Measuring method	Data	Measuring method	Data
			

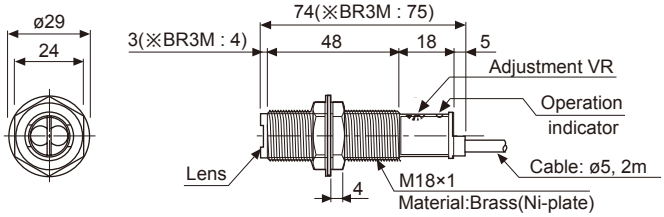
● BR20M-TDT☐-☐ / BR20M-TDT☐-☐-P

Parallel shifting characteristic		Angle characteristic	
Measuring method	Data	Measuring method	Data
			

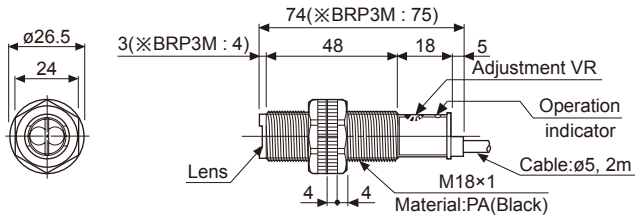
▣ Dimensions

(unit: mm)

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

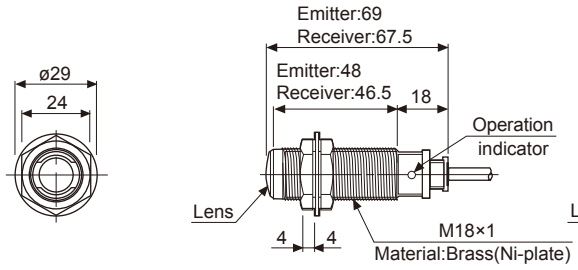


- **BRP100-DDT / BRP100-DDT-P**
- **BRP200-DDTN / BRP200-DDTN-P**
- **BRP400-DDT / BRP400-DDT-P**
- **BRP3M-MDT / BRP3M-MDT-P (※)**



- **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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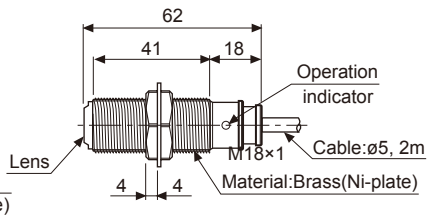
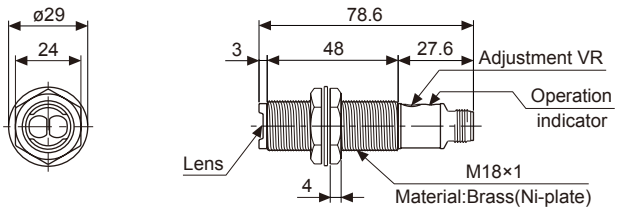
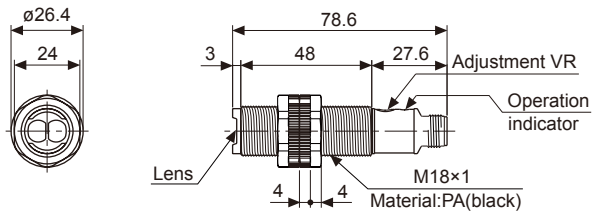


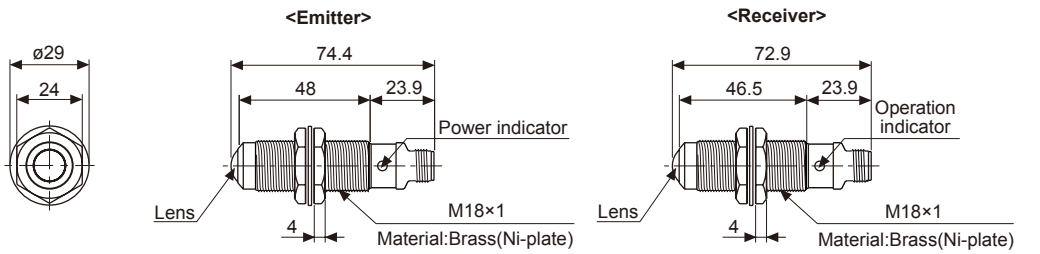
- **BR100/200/400/3M-DDT(N)-C(-P)**



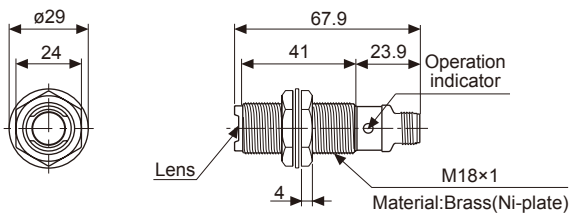
● **BRP100/200/400/3M-DDT(N)-C(-P)** (unit: mm)



● **BR4M-TDTD(L)-C(-P)**



● **BR20M-TDTD(L)-C(-P)**



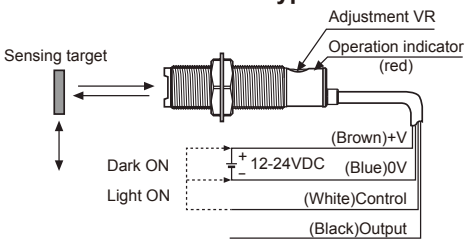
▣ Operation mode

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

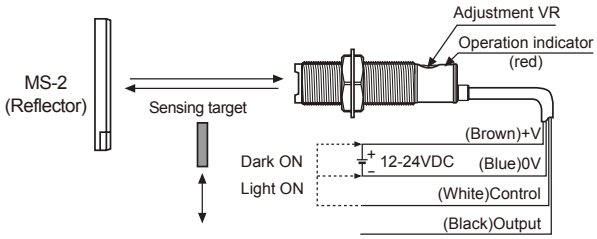
※The transistor output is held OFF for 0.5 sec. after supplied power in order to prevent malfunction of this photoelectricsensor (except through-beam type).
※If the control output terminal is short-circuited or flow beyond rated current, the control signal is not output normally due to protection circuit.

▣ Connections

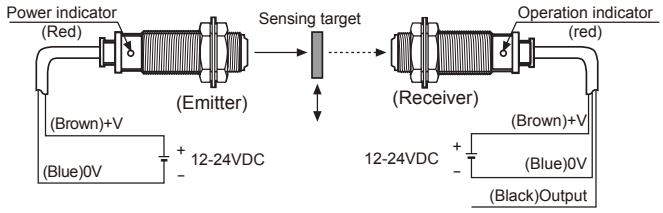
● **Diffuse reflective type / Narrow beam reflective type**



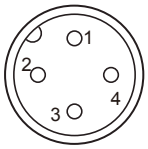
● **Retroreflective type**



● **Through-beam type**



▣ Connections for connector part



M12 Connector pin

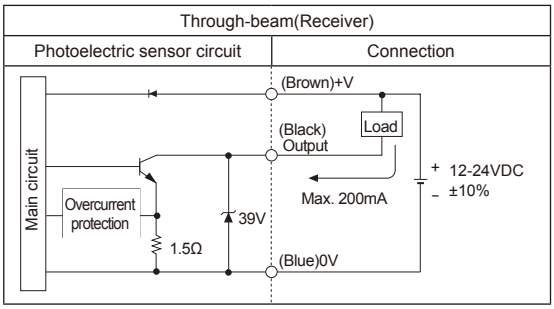
Connector pin No.	Cable colors	Application		
		Diffuse/Narrow beam reflective type	Retroreflective type	Through-beam type
1	Brown	24VDC	24VDC	24VDC
2	White	CONTROL	N.C	GND
3	Blue	GND	GND	GND
4	Black	OUTPUT	N.C	OUTPUT

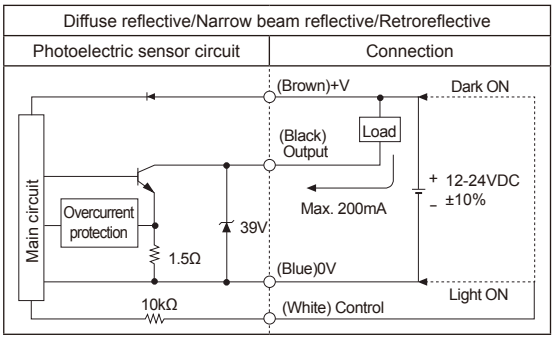
● Connector cable(sold separately)

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

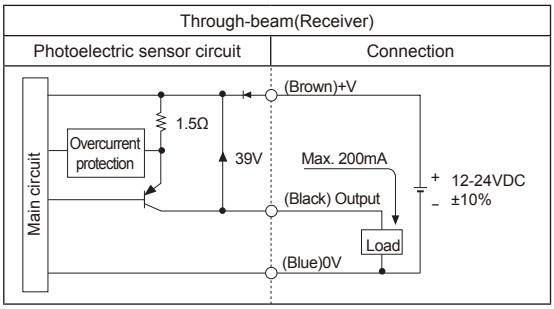
▣ Control output diagram

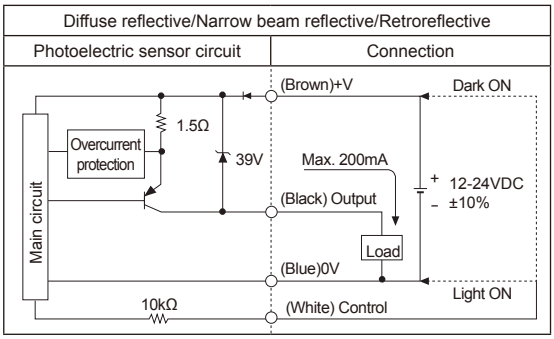
● **NPN open collector output**





● **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)

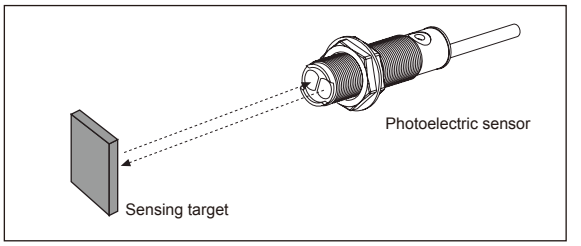
※Control cable is only for Diffuse reflective/Narrow beam reflective/Retroreflective type.

▣ 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 ;

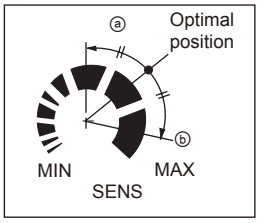
◎ Diffuse reflective/Narrow beam reflective type

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

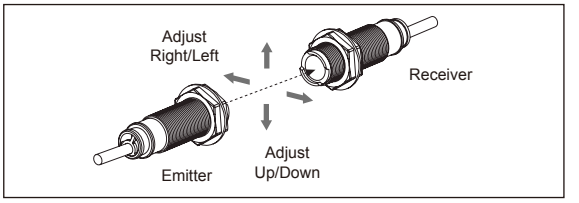
※The sensing distance indicated on specification chart is for 100×100mm or 50×50mm of non-glossy white paper. Be sure that it can be different by size, surface and gloss of target.



◎ 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 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 ø15mm, it can be missed by sensor cause light penetrate it.



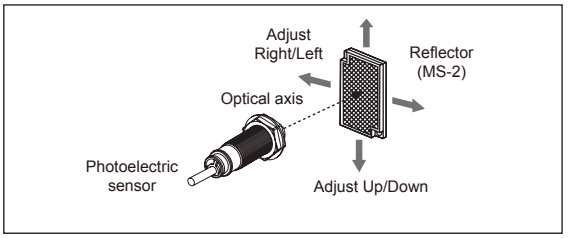
◎ Retroreflective type

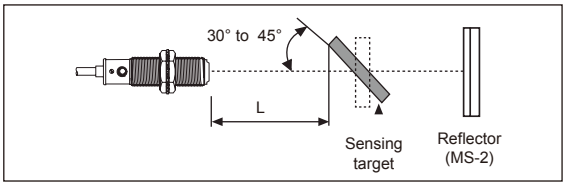
1. Supply the power to the photoelectric sensor, after setting the photoelectric sensor and the reflector(MS-2) in face to face.
2. Set the photoelectric sensor in the position which indicator turns on, as adjusting the reflector or the sensor right and left, up and down.
3. Fix both units tightly after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