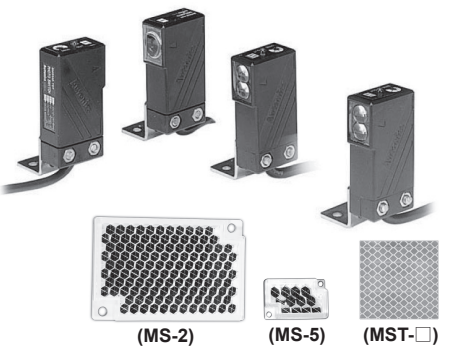
High Speed Response Type with Built-in Output Protection Circuit

▣ Features

- Reverse power polarity and overcurrent
- Response time: Max. 1ms
- Light ON/Dark ON mode selectable by control wire
- Sensitivity adjuster (except for through-beam type)

Please read "Safety Considerations" in the instruction manual before using.



(MS-2) (MS-5) (MST-□)

※MS-5, MST-□ is sold separately.

▣ Specifications

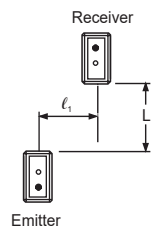
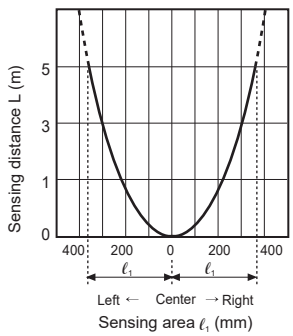
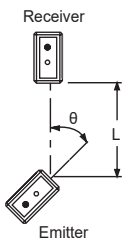
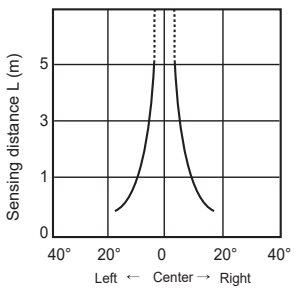
Model	NPN open collector output	**BMS5M-TDT**	**BMS2M-MDT**	**BMS300-DDT**
	PNP open collector output	**BMS5M-TDT-P**	**BMS2M-MDT-P**	**BMS300-DDT-P**
Sensing type		Through-beam	Retroreflective	Diffuse reflective
Sensing distance		5m	2m※1	300mm※2
Sensing target		Opaque materials of Min. Ø10mm	Opaque materials of Min. Ø60mm	Translucent, Opaque materials
Hysteresis		—		Max. 20% at rated setting distance
Response time		Max. 1ms		
Power supply		12-24VDC⎓ ±10% (ripple P-P: max. 10%)		
Current consumption		Max. 50mA	Max. 45mA	
Light source		Infrared LED (940nm)		
Sensitivity adjustment		—		Sensitivity adjuster
Operation mode		Selectable Light ON or Dark ON by control wire		
Control output		NPN or PNP open collector output ●Load voltage: max. 30VDC⎓ ●Load current: max. 200mA ●Residual voltage - NPN: max. 1VDC⎓, PNP: max. 2.5VDC		
Protection circuit		Reverse polarity protection circuit, output short overcurrent protection circuit		
Indicator		Operation indicator: red LED, power indicator: red LED (BMS5M-TDT1)		
Insulation resistance		Over 20MΩ (at 500VDC megger)		
Noise immunity		±240V the square wave noise (pulse width: 1μs) by the noise simulator		
Dielectric strength		1000VAC 50/60Hz for 1minute		
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 70℃		
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH		
Material		Case: acrylonitrile butadiene styrene, sensing part: polycarbonate, bracket: steel plate cold commercial, bolt: steel chromium molybdenum, nut: steel chromium molybdenum	Case: acrylonitrile butadiene styrene, sensing part: acryl, bracket: steel plate cold commercial, bolt: steel chromium molybdenum, nut: steel chromium molybdenum	
Cable		Ø5mm, 4-wire, 2m (emitter of through-beam type: Ø5mm, 2-wire, 2m) (AWG22, core diameter: 0.08mm, number of cores: 60, insulator out diameter: Ø1.25mm)		
Accessories	Individual	—	Reflector (MS-2)	—
	Common	Fixing bracket, M4 bolt: 4, M4 nut: 4	Fixing bracket, M4 bolt: 4, M4 nut: 4, adjustment screwdriver	
Approval		CE		
Unit weight		Approx. 180g	Approx. 110g	Approx. 100g

※1: It is sensing distance between sensor and reflector MS-2 and it is the same when MS-5 is used. It is detectable 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.
※2: Non-glossy white paper 100×100mm.
※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

▣ Feature Data

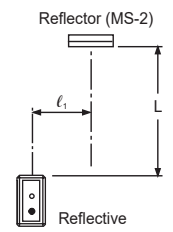
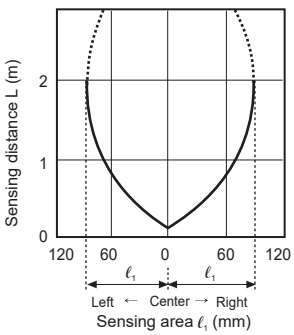
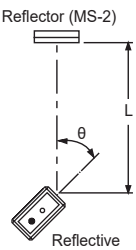
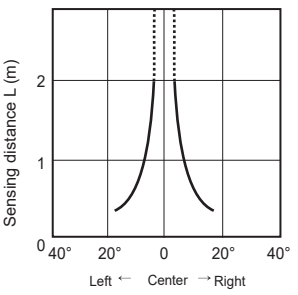
◎ Through-beam type

● BMS5M-TDT ● BMS5M-TDT-P

Parallel shifting characteristic		Angle characteristic	
Measuring method	Data	Measuring method	Data
			

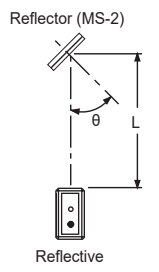
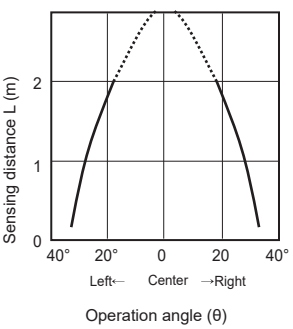
◎ Retroreflective type

● BMS2M-MDT ● BMS2M-MDT-P

Parallel shifting characteristic		Sensor angle characteristic	
Measuring method	Data	Measuring method	Data
			

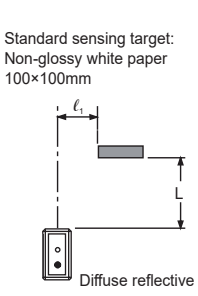
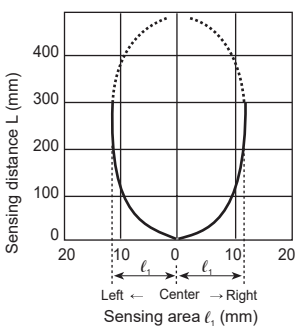
◎ Retroreflective type

● BMS2M-MDT ● BMS2M-MDT-P

Reflector angle characteristic	
Measuring method	Data
	

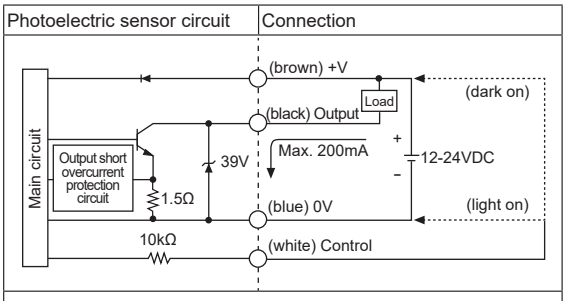
◎ Diffuse reflective type

● BMS300-DDT ● BMS300-DDT-P

Sensing area characteristic	
Measuring method	Data
	

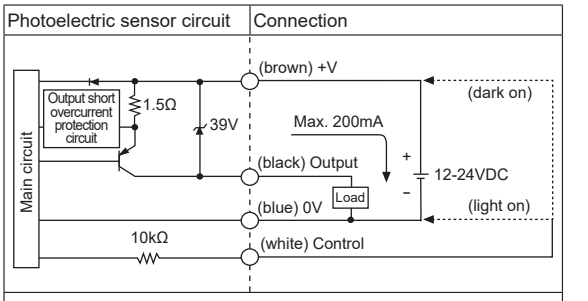
▣ Control Output Diagram

● NPN open collector output



Through-beam: **BMS5M-TDT2**, Retroreflective: **BMS2M-MDT**
Diffuse reflective: **BMS300-DDT**

● PNP open collector output



Through-beam: **BMS5M-TDT2-P**, Retroreflective: **BMS2M-MDT-P**
Diffuse reflective: **BMS300-DDT-P**

※Select Light ON / Dark ON by control wire. - Light ON: Connect control wire to 0V / Dark ON: Connect control wire to +V
※If short-circuit the control output terminal or supply current over the rated specification, normal control signal is not output due to the output short over current protection circuit.

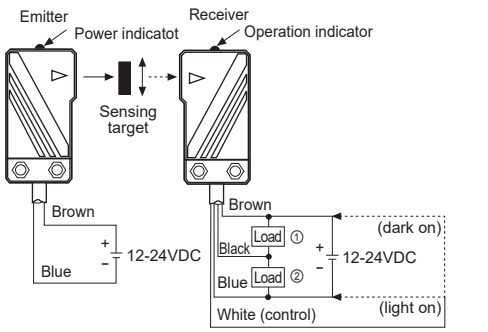
▣ Operation Mode

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

※To prevent malfunction, this sensor maintains control output OFF for 0.5 sec after supplying the power.

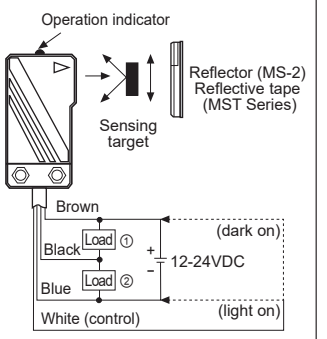
▣ Connections

BMS5M-TDT, BMS5M-TDT-P



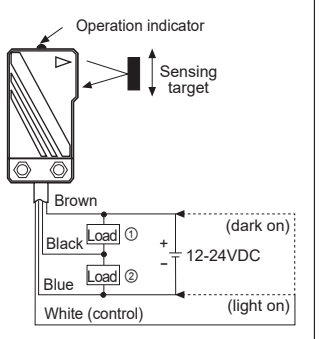
①Load connection for NPN output
②Load connection for PNP output

BMS2M-MDT, BMS2M-MDT-P



①Load connection for NPN output
②Load connection for PNP output

BMS300-DDT, BMS300-DDT-P



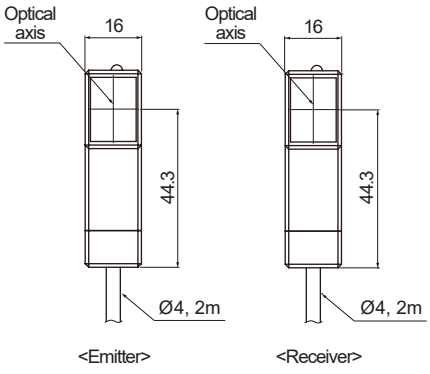
①Load connection for NPN output
②Load connection for PNP output

※Dark ON mode is on when control line is opened.

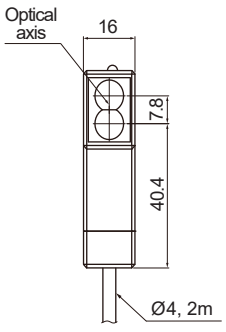
▣ Dimensions

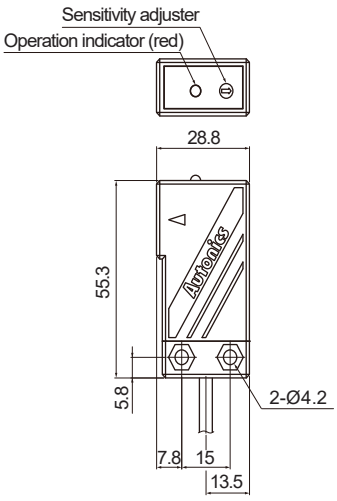
(unit: mm)

• Through-beam type



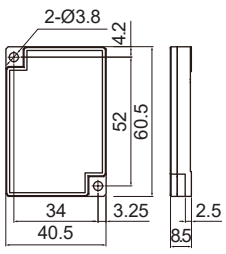
• Retroreflective/Diffuse reflective type



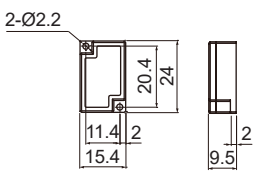


• Reflector

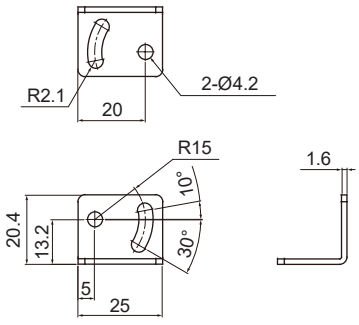
· MS-2



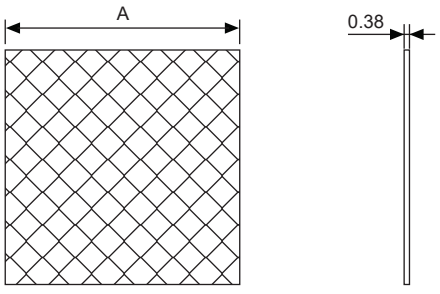
· MS-5(sold separately)



• Bracket



• Reflective tape (MST Series, sold separately)



(unit: mm)

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

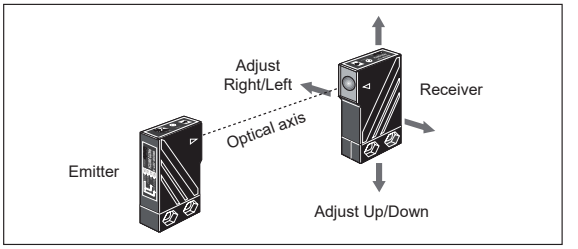
▣ Mounting and Sensitivity Adjustment

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:
When using photoelectric sensors closely over two units, it may result in malfunction due to mutual interference.
When installing the product, tighten the screw with a tightening torque of 0.8N·m.

◎ Optical axis adjustment

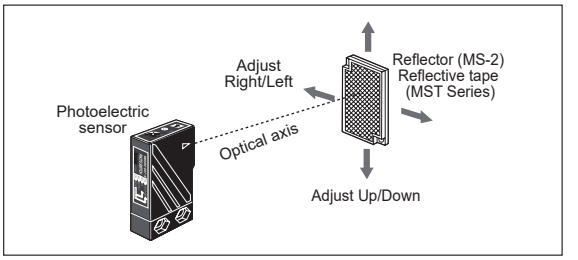
● Through-beam type

Set the photoelectric sensor in the middle of the operation range of the operation indicator by adjusting the receiver or emitter right and left, up and down.



● Retroreflective type

Mount the photoelectric sensor and the reflector or reflective tape facing each other then fix them in the middle of operation range of the operation indicator by adjusting the reflector (or reflective tape) right and left, up and down.



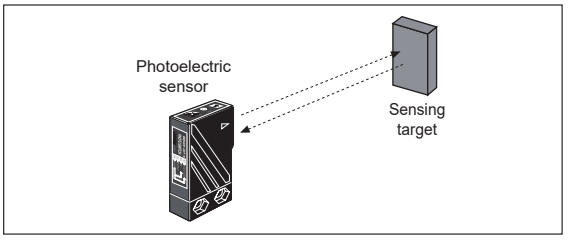
※If the mounting place is too narrow, please use MS-5 instead of MS-2.

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


<MS-5>

● Diffuse reflective type

Mount the photoelectric sensor and the target then fix them in the middle of operation range of the operation indicator by adjusting the photoelectric sensor right and left, up and down.

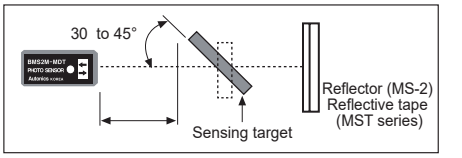


◎ Sensitivity adjustment

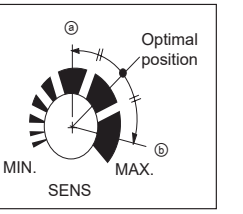
● Retroreflective type

Fix the sensitivity adjuster at max. position and then check if the sensor operates normally to pass the target within sensing area of the sensor.
If the sensor does not work normally by noise or external light, turn the sensitivity adjuster slowly up to the position.

※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 the photoelectric sensor. Therefore enough space between the target should be used and the photoelectric sensor or the surface of the target should be mounted at angle of 30° to 45° against optical axis.



● Diffuse reflective type



Set the target at a position to be detected by the beam, then turn the sensitivity adjuster until position ⓐ where the operation indicator turns ON from min. position of the sensitivity adjuster up to position ⓐ which the operation indicator turn ON from min.
Take the target out of the sensing area, then turn the sensitivity adjuster until position where the indicator turns ON. If position ⓑ is not checked, the max. position is ⓑ. Set the sensitivity adjuster in the middle of two switching position ⓐ, ⓑ.

※Please be aware not to make the unstable operation of sensor by background and mounting side.

▣ Reflectivity by Reflective Tape Model

MST-50-10 (50×50mm)	90%
MST-100-5 (100×100mm)	120%
MST-200-2 (200×200mm)	190%

※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.