Autonics

Ultra-compact Photoelectric Sensor BTS SERIES



Thank you for choosing our Autonics product. Please read the following safety considerations before use.

Safety Considerations

×Please observe all safety considerations for safe and proper product operation to avoid hazards

x symbol represents caution due to special circumstances in which hazards may occur.

Warning Failure to follow these instructions may result in serious injury or death. ▲ Caution Failure to follow these instructions may result in personal injury or product damage.

- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)
 Failure to follow this instruction may result in personal injury, economic loss or fire.

 2. Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct
- sunlight, radiant heat, vibration, impact, or salinity may be present. Failure to follow this instruction may result in explosion or fire.
- 3. Do not disassemble or modify the unit.
- Failure to follow this instruction may result in fire.

 Do not connect, repair, or inspect the unit while connected to a power source. Failure to follow this instruction may result in fire.
- 5. Check 'Connections' before wiring.

⚠ Caution

- 1. Use the unit within the rated specifications.
- Failure to follow this instruction may result in fire or product damage.
- Use a dry cloth to clean the unit, and do not use water or organic solvent. Failure to follow this instruction may result in fire.

Ordering Information BT S 1 M - T D T L 1 - P No mark | NPN open collector output | Integrated type Operation mode Output type Transistor output Power supply DC power Convergent reflective Sensing distance unit Sensing distance Number | Sensing distance Side view type ВТ Photoelectric sensor

Operating Timin	ng Diagram
Stable light ON area	High
Unstable light ON area	cident / Operation
Unstable light OFF area	light level level
Stable light OFF area	Low
Stability indicator (green LED)	ON
Operation indicator Light ON (red LED)	ON OFF
operation Transistor output	ON OFF

**:....This information is intended for product management of through-beam type. (no need to refer when selecting model)

**The waveforms of "Operation indicator" and "Transistor output" are for Light ON operation.

They are reversed for for Dark ON operation.

Specifications

Sensing target Opaque materials of min. Ø2mm Opaque materials of min. Ø27mm Opaque materials of min. Ø27mm Opaque materials of Ø2mm Opaque materials, translucent min Opaque materials of Op	BTS15- LDTD					
Collector output TDTL-P TDTD-P MDTL-P MDTD-P LDTL-P LDTL-P LDTL-P Sensing distance 10 to 200mm 5 to 30mm 2 5 to 15mm 27mm 0 paque materials of min. Ø2mm 0 paque materials of min. Ø2mm 0 paque materials of min. Ø2mm 0 paque materials of @2mm 0 p						
Sensing target Opaque materials of min. Ø2mm Opaque materials of min. Ø2mm Opaque materials of Min. sensing target Opaque materials of Ø2mm Opaque materials, translucent materials of Ø2mm Opaque materials of Opaque materials, translucent materials of Opaque materials of Opaq	BTS15- LDTD-P					
Sensing target min. Ø2mm min. Ø27mm Opaque materials, translucent min. Ø27mm Opaque materials of Ø2mm Opaque materials of Ø2mm Ø2mm Ø2mm Ø2mm Ø2mm Ø2mm Ø2mm (sensing distance Hysteresis distance — Max. 15% of maximum sensing distance	5 to 30mm ^{*2} 5 to 15mm ^{*2}					
Min. sensing target Opaque materials of Ø2mm (sensing distance 10mm) Hysteresis distance — Max. 1ms Max. 15% of maximum sensing distance Max. 15% of maximum sensing di	Opaque materials, translucent materials					
Response time Max. 1ms						
· · · · · · · · · · · · · · · · · · ·	Max. 15% of maximum sensing distance					
Power supply 12-24VDC ±10% (ripple P-P: max. 10%)	Max. 1ms					
	12-24VDC ±10% (ripple P-P: max. 10%)					
Current consumption Max. 20mA (in case of throught-beam type, this value is for each emitter and rec	Max. 20mA (in case of throught-beam type, this value is for each emitter and receiver.)					
Light source Red LED (650nm)	Red LED (650nm)					
Operation mode Light ON Dark ON Light ON Dark ON Light ON Dark ON Light ON	Light ON Dark ON Light ON Dark ON Light ON Dark ON Light ON Dark ON					
NPN or PNP open collector output Load voltage: max. 26.4VDC= Residual voltage -NPN: max. 1VDC=, PNP: max. 2VDC	·Load voltage: max. 26.4VDC ·Load current: max. 50mA					
Protection circuit Power reverse polarity protection circuit, output short over current protection circuit	Power reverse polarity protection circuit, output short over current protection circuit					
Indicator Operation indicator: red, stability indicator: green	Operation indicator: red, stability indicator: green					
Connection Cable type						
Insulation resistance Over 20MΩ (at 500VDC megger)						
Noise immunity ±240V the square wave noise (pulse width: 1µs) by the noise simulator	±240V the square wave noise (pulse width: 1µs) by the noise simulator					
Dielectric strength 1,000VAC 50/60Hz for 1 min.						
Vibration 1.5mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours	1.5mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours					
Shock 500m/s² (approx. 50G) in each X, Y, Z direction for 3 times	500m/s² (approx, 50G) in each X, Y, Z direction for 3 times					
Ambient Sunlight: max. 10,000lx, incandescent lamp: max. 3,000lx (receiver illumination) Ambient temp. 20 to 55°C, storage: -30 to 70°C Ambient humi. 35 to 85%RH, storage: 35 to 85%RH						
. See Ambient temp. 20 to 55°C, storage: -30 to 70°C	-20 to 55°C, storage: -30 to 70°C					
Ambient humi. 35 to 85%RH, storage: 35 to 85%RH						
Protection structure IP67 (IEC standard)						

Case: polybutylene terephthalate, sensing part : polymethyl methacrylate, bracket: stainless steel 304, bolt: carbon steel wire for cold heading (SWCH10A) Ø2.5mm, 3-wire, 2m (emitter of through-beam type: Ø2.5mm, 2-wire, 2m) (AWG 28, Core diameter: 0.08mm, number of cores: 19, insulator out diameter: Ø0.9mm) Cable Reflector (MS-6). bracket for through-beam type: 2 M2 Boit: 4 Page 18 M2 Boit: 4 Page 29 M2 Boit: 2 Page 29

Approx. 65g (approx. 40g) Approx. 45g (approx. 25g)

X1: The sensing distance is specified with the MS-6 reflector.
When using reflective tapes, the reflection efficiency will vary by the size of the tape Please refer to the catalog or website.

- X2: It will vary by the installation environment and sensing conditions. Please refer to the catalog or website non-glossy white paper 50×50mm
- ※3: non-glossy white paper 50×50mm
 ※4: The weight includes packaging. The weight in parenthesis is for unit only.
- tioned in Environment indicates a non freezing or condensation

Accessory (sold separately)

BTS1M-ST

Min. sensing target and max. sensing distance by \emptyset of the slit when attach the slit at an emitter.

when all on the one at an emitter.						
Slit Ø	Min. sensing target	Max. sensing distance				
Ø1	Opaque materials of min. Ø1.6	500mm				

- XThis slit is for BTS1M-TDT□-□ only. Attach only to the emitter to use.
- #4 pieces are packed and sold separately.

 #This slit is sticker for attachment, please remove the dirt on lens of photoelectric sensor before using it.
- After attach the slit, remove the front protection film.

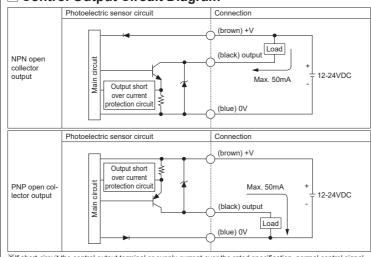
BTS1M-ST

71111 01	Min. se	nsing targe	et and max.	sensing distance by Ø of the sli	t	
Ø1 Ø0.5	Slit Ø	Applied condition		Min. sensing target	May consing distance	
		Emitter	Receiver	Will. serising target	Max. sensing distance	
	Ø1	Applied	_	Onegue meterials of min (61.6	500mm	
		_	Applied	Opaque materials of min. Ø1.6		
		Applied	Applied	Opaque materials of min. Ø1.2	300mm	
	Ø0.5	Applied		Opaque materials of min. Ø1.2	200	
		_	Applied	Opaque materiais of min. Ø1.2	30011111	
		Applied	Applied	Opaque materials of min. Ø0.8	100mm	

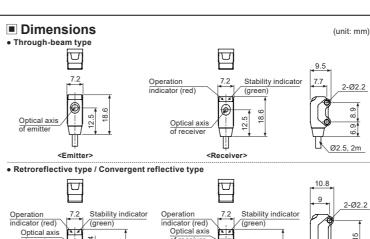
※2 pieces are packed and sold separately.

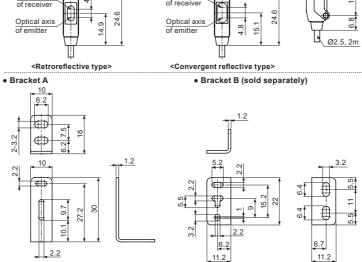
*This slit is made of SUS. After covering the product with the slit, fix them with the bolts and sub-bracket

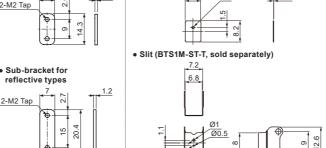
Control Output Circuit Diagram



XIf short-circuit the control output terminal or supply current over the rated specification, normal control signal







• Slit (BTS1M-ST, sold separately)

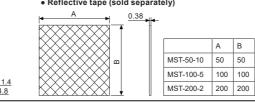
Reflector (MS-6)

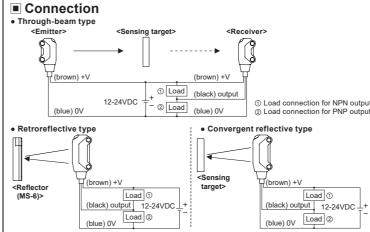
2-02.2

Sub-bracket for

through-beam type

• Reflective tape (sold separately)





■ 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	

M2 Tap

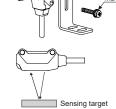
■ Installation & Adjustment

Mounting
 When installing the product, tighten the screw with a tightening

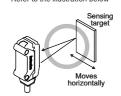
when using photoelectric sensors closely over two units, it may result in malfunction due to mutual interference. XExercise caution. Do not apply excessive impact to the unit or

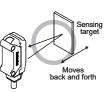
bend the cable section. The inside unit may be wet.

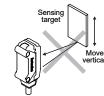
****Caution for mounting convergent reflective type.**1)The sensing side of the unit and the surface of the target object must be parallel when installed.



2)Make sure to install the sensor after carefully considering the moving direction of the sensing objects Refer to the illustration below







right/left

Optical axis adjustment Through-beam type

Set the emitter and the receiver facing each other

Adjust the emitter or the receiver up, down, left, right and fix the unit at the center point of where the tability indicator is operating.



Place the sensor and the reflector (MS-6) facing each other. Adjust the reflector up, down, left, right and fix the reflector at the center point of where the stability ndicator is operating. Make sure that the sensing side of sensor is parallel

with a reflector.

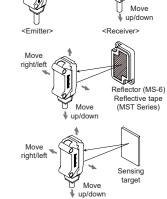
Make sure that the sensing side of the sensor is parallel

to the surface of the reflector.

Convergent reflective type

Place the sensing target, then adjust the sensor up down, left, right and fix the sensor at the center point of where the stability indicator is operating.

Make sure that the sensing side of the sensor is parallel to the surface of each object.



Cautions during Use

1. Follow instructions in 'Cautions during Use'. Otherwise, it may cause unexpected accidents. When connecting a DC relay or other inductive load to the output, remove surge by using diodes

- 3. Use the product, 0.1 sec after supplying power.
- When using separate power supply for the sensor and load, supply power to sensor first. 4. 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- i. Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
- . When using switching mode power supply to supply the power, ground F.G. terminal and connect a condenser between 0V and F.G. terminal to remove noise.

 When using sensor with the equipment which generates noise (switching regulator, inverter, servo
- motor, etc.), ground F.G. terminal of the equipment.
- This unit may be used in the following environments.
- ①Indoors (in the environment condition rated in 'Specifications')
- ②Altitude max. 2.000m
- ③Pollution degree 3
- (4) Installation category II

Major Products

- Photoelectric Sensors
 Temperature Controllers ■ Fiber Optic Sensors ■ Ten erature/Humidity Transducers
- Door Sensors SSRs/Power Controllers
 Door Side Sensors Counters
- Area Sensors
- Proximity Sensors
 Pressure Sensors
- Timers
 Panel Meters
 Tachometer/Pulse (Rate) Meters
 Display Units
- Rotary Encoders
- Connectors/Sockets Sensor Controllers
 Switching Mode Power Supplies
- Control Switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables ■ Stepper Motors/Drivers/Motion Contr
- Graphic/Logic Panels Field Network Devices
- Laser Marking System (Fiber, CO₂, Nd: YAG)
 Laser Welding/Cutting System

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