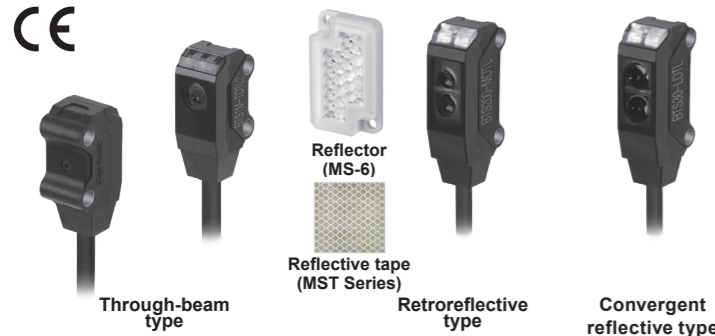


# Autonics Ultra-compact Photoelectric Sensor BTS SERIES

## INSTRUCTION MANUAL



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.
- ⚠ 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.

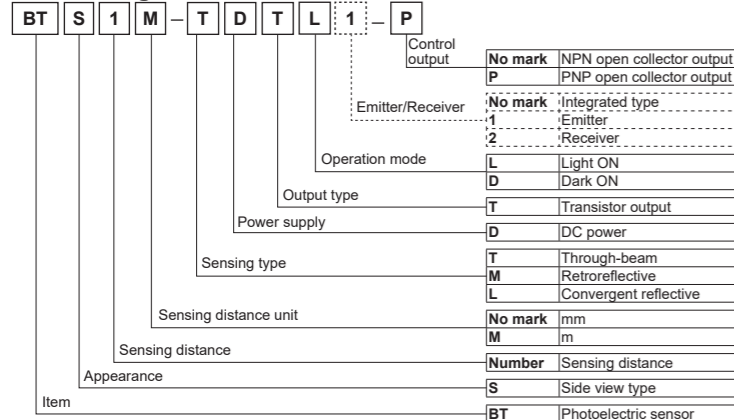
### Warning

- 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.)
- 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.
- Do not disassemble or modify the unit.
- Do not connect, repair, or inspect the unit while connected to a power source.
- Check 'Connections' before wiring.

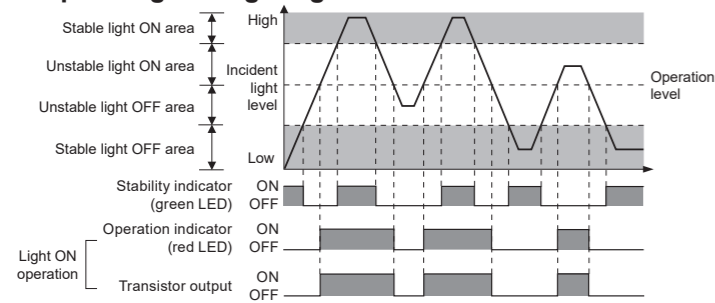
### Caution

- Use the unit within the rated specifications.
- Use a dry cloth to clean the unit, and do not use water or organic solvent.

### Ordering Information



### Operating Timing Diagram



The waveforms of "Operation indicator" and "Transistor output" are for Light ON operation. They are reversed for Dark ON operation.  
 The above specifications are subject to change and some models may be discontinued without notice.  
 Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

### Specifications

Sensing type	Through-beam		Retroreflective type		Convergent reflective type	
	BTS1M-TD-TL	BTS1M-TD-TD-P	BTS200-MD-TL	BTS200-MD-TD	BTS30-LD-TL	BTS30-LD-TD
Model	BTS1M-TD-TL	BTS1M-TD-TD-P	BTS200-MD-TL	BTS200-MD-TD	BTS30-LD-TL	BTS30-LD-TD
Sensing distance	1m	10 to 200mm <sup>※1</sup>	5 to 30mm <sup>※2</sup>	5 to 15mm <sup>※2</sup>		
Sensing target	Opaque materials of min. Ø2mm	Opaque materials of min. Ø27mm	Opaque materials of min. Ø0.15mm (sensing distance 100mm)	Opaque materials, translucent materials		
Min. sensing target	Opaque materials of Ø2mm	Opaque materials of Ø2mm <sup>※3</sup> (sensing distance 100mm)	Ø0.15mm (sensing distance 10mm)			
Hysteresis distance	—	—	Max. 15% of maximum sensing distance			
Response time	Max. 1ms					
Power supply	12-24VDC= ±10% (ripple P-P: max. 10%)					
Current consumption	Max. 20mA (in case of through-beam type, this value is for each emitter and receiver.)					
Light source	Red LED (650nm)					
Operation mode	Light ON	Dark ON	Light ON	Dark ON	Light ON	Dark ON
Control output	NPN or PNP open collector output - Load current: max. 50mA - Residual voltage -NPN: max. 1VDC=, PNP: max. 2VDC					
Protection circuit	Power reverse polarity protection circuit, output short over current protection circuit					
Indicator	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					
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					
Shock	500m/s <sup>2</sup> (approx. 50G) in each X, Y, Z direction for 3 times					
Environment	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					
Protection structure	IP67 (IEC standard)					
Material	Case: polybutylene terephthalate, sensing part: polymethyl methacrylate, bracket: stainless steel 304, bolt: carbon steel wire for cold heading (SWCH10A)					
Cable	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)					
Accessory	Bracket A: 2, sub-bracket for through-beam type: 2, M2 Bolt: 4 Reflector (MS-6), bracket A, sub-bracket for reflective type, M2 Bolt: 2 Bracket A, sub-bracket for reflective type, M2 Bolt: 2					
Approval	CE					
Weight <sup>※4</sup>	Approx. 65g (approx. 40g) / Approx. 45g (approx. 25g)					

- ※1: 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.
- ※2: It will vary by the installation environment and sensing conditions. Please refer to the catalog or website.
- ※3: non-glossy white paper 50×50mm
- ※4: The weight includes packaging. The weight in parenthesis is for unit only.
- ※The temperature or humidity mentioned in Environment indicates a non freezing or condensation.

### Accessory (sold separately)

Slit

• **BTS1M-ST**

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

Slit Ø	Min. sensing target	Max. sensing distance
Ø1	Opaque materials of min. Ø1.6	500mm
Ø0.5	Opaque materials of min. Ø1.2	300mm
Ø0.5	Opaque materials of min. Ø1.2	300mm
Applied	Applied	Opaque materials of min. Ø0.8

※This slit is for BTS1M-TD-TL 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.

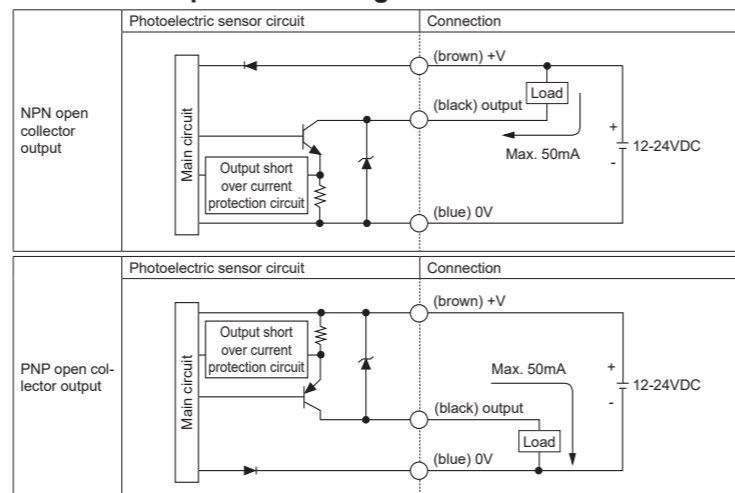
• **BTS1M-ST**

Min. sensing target and max. sensing distance by Ø of the slit

Slit Ø	Applied condition	Min. sensing target	Max. sensing distance
Ø1	Emitter	—	—
	Receiver	—	—
Ø0.5	Applied	Applied	Opaque materials of min. Ø1.2
	Applied	Applied	Opaque materials of min. Ø1.2
Applied	Applied	Applied	Opaque materials of min. Ø0.8
	Applied	Applied	Opaque materials of min. Ø0.8

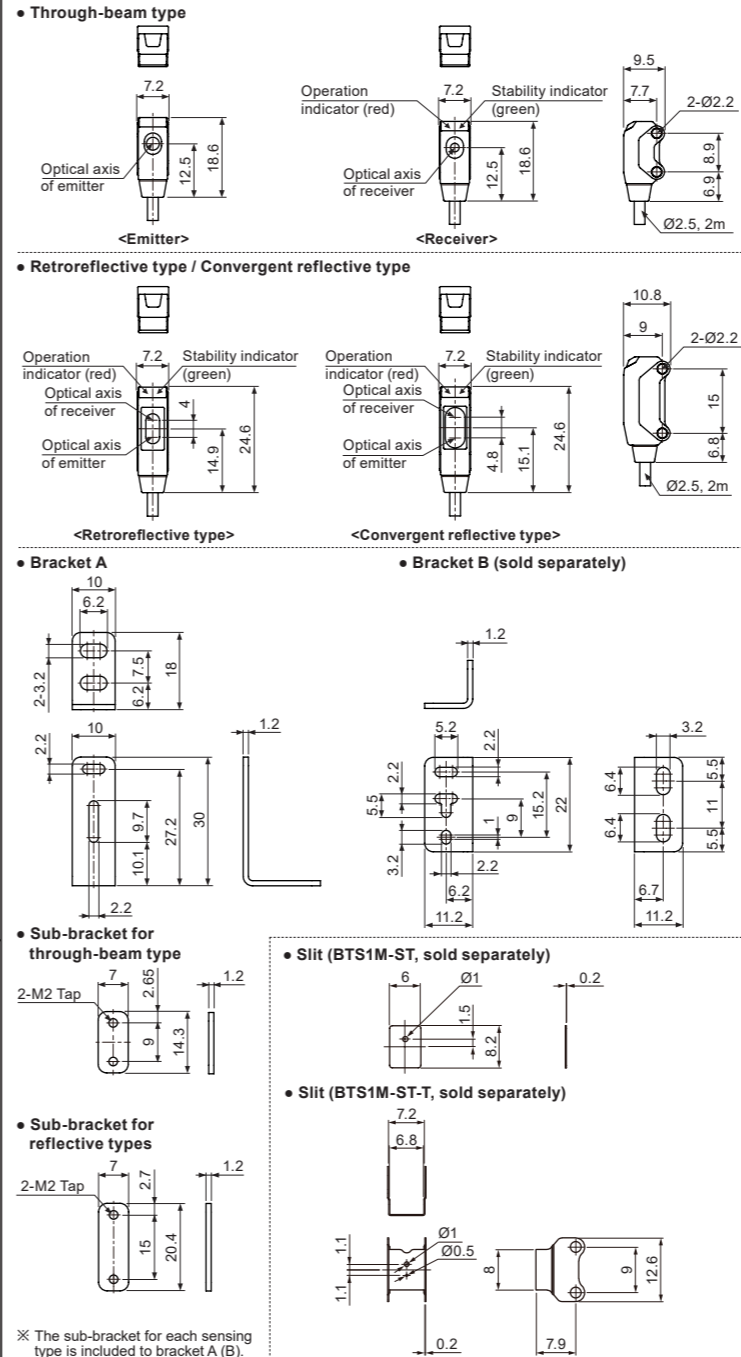
※This slit is for BTS1M-TD-TL only.  
 ※This slit can be used in Ø1 or Ø0.5 by its installation direction.  
 ※2 pieces are packed and sold separately.  
 ※This slit is made of SUS. After covering the product with the slit, fix them with the bolts and sub-bracket.

### Control Output Circuit Diagram

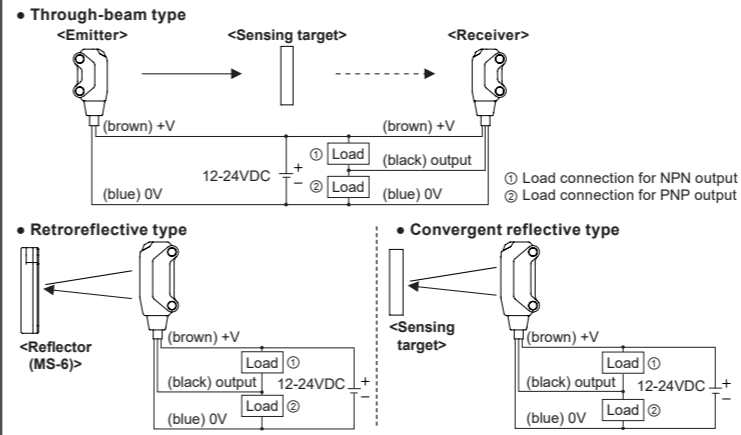


※If short-circuit the control output terminal or supply current over the rated specification, normal control signal is not output due to the output short over current protection circuit

### Dimensions



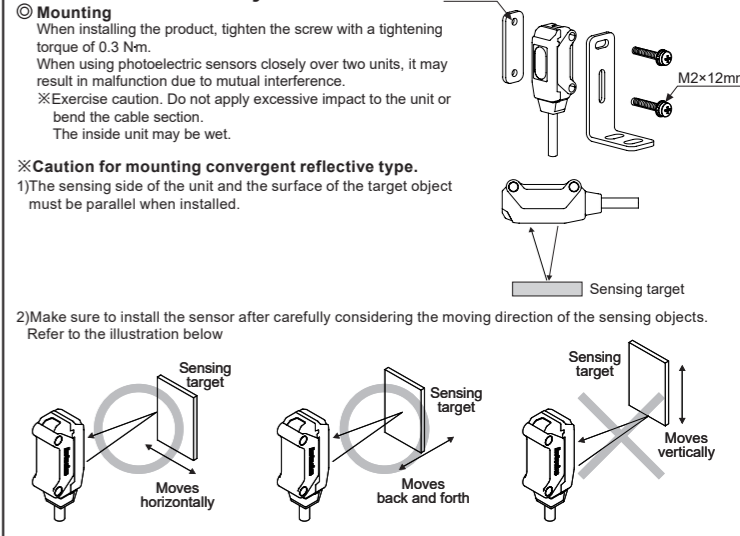
### Connection



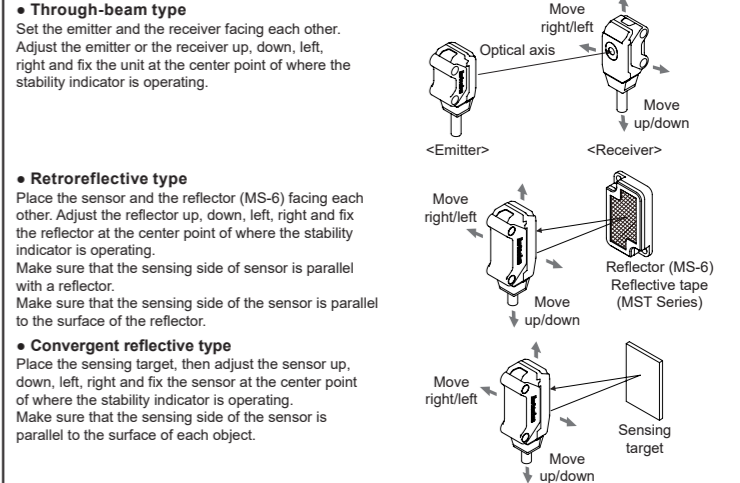
### Operation Mode

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

### Installation & Adjustment



### Optical axis adjustment



### Cautions during Use

- 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 or varistors.
- Use the product, 0.1 sec after supplying power.  
 When using separate power supply for the sensor and load, supply power to sensor first.
- 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- 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.
  - Indoors (in the environment condition rated in 'Specifications')
  - Altitude max. 2,000m
  - Pollution degree 3
  - Installation category II

### Major Products

- Photoelectric Sensors
- Fiber Optic Sensors
- Door Sensors
- Door Side Sensors
- Area Sensors
- Proximity Sensors
- Pressure Sensors
- Rotary Encoders
- Connectors/Sockets
- Switching Mode Power Supplies
- Control Switches/Lamps/Buzzers
- I/O Terminal Blocks & Cables
- Stepper Motors/Drivers/Motion Controllers
- Graphic/Logic Panels
- Field Network Devices
- Laser Marking System (Fiber, Co2, Nd:YAG)
- Laser Welding/Cutting System
- Temperature Controllers
- Temperature/Humidity Transducers
- SSRs/Power Controllers
- Counters
- Timers
- Panel Meters
- Tachometer/Pulse (Rate) Meters
- Display Units
- Sensor Controllers

**Autonics Corporation**  
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