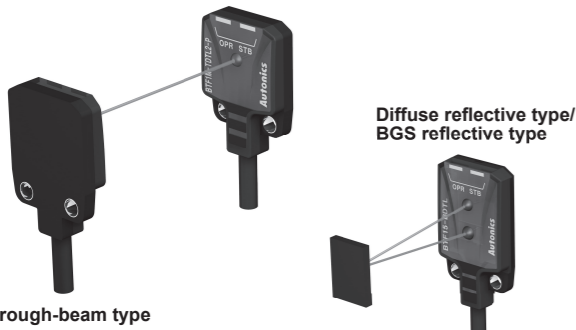


# Autonics

## Ultra-thin Photoelectric Sensor BTF SERIES

### INSTRUCTION MANUAL



Through-beam type

Diffuse reflective type/  
BGS reflective type

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.)  
Failure to follow this instruction may result in fire, personal injury, or economic loss.
  - 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.
  - Check 'Connections' before wiring.**  
Failure to follow this instruction may result in fire.

#### ⚠ Caution

- Use the unit within the rated specifications.  
Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent.  
Failure to follow this instruction may result in fire.
- Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.  
Failure to follow this instruction may result in fire or explosion.

#### ■ Ordering Information

BT	F	1	M	-	T	D	T	L	-	P
Control output										
No mark NPN open collector output										
P PNP open collector output										
Appearance										
No mark Integrated type										
1 Emitter										
2 Receiver										
Operation mode										
L Light ON										
D Dark ON										
Output										
T Transistor output										
D DC power										
Sensing type										
T Through-beam										
D Diffuse reflective										
B BGS reflective										
Sensing distance unit										
No mark mm										
M m										
Sensing distance										
Number Sensing distance										
Shape										
F Flat type										
Item										
BT Photoelectric sensor series										

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

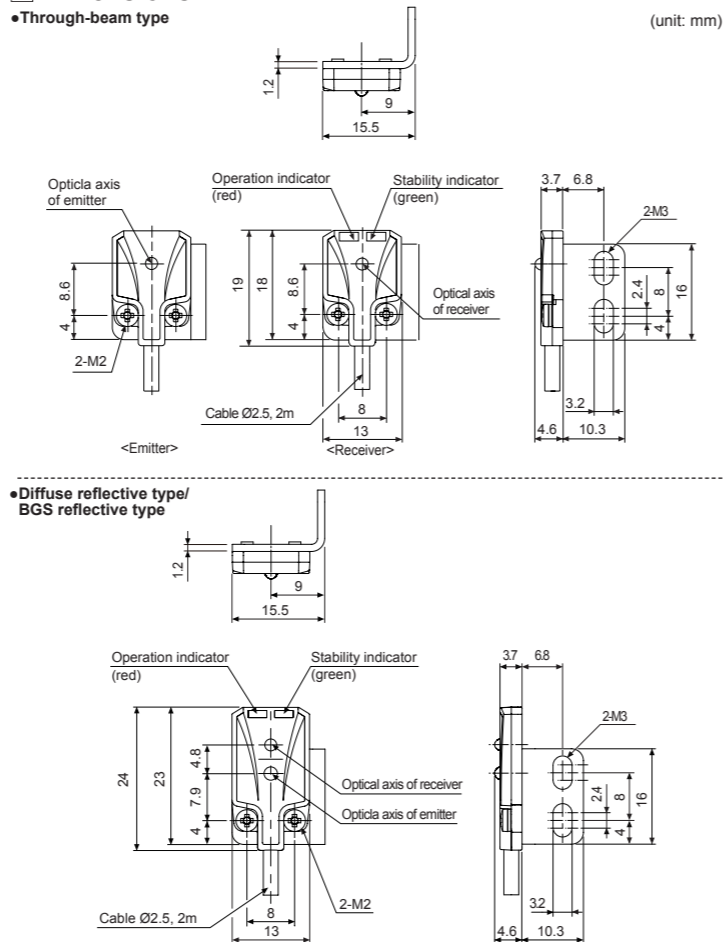
※ The above specifications are subject to change and some models may be discontinued without notice.  
※ Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

#### ■ Specifications

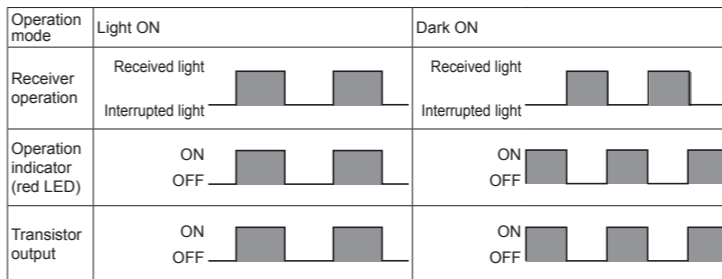
Model	NPN open collector output	BTF1M-TDTL	BTF1M-TDTD	BTF30-DDTL	BTF30-DDTD	BTF15-BDTL	BTF15-BDTD
	PNP open collector output	BTF1M-TDTL-P	BTF1M-TDTD-P	BTF30-DDTL-P	BTF30-DDTD-P	BTF15-BDTL-P	BTF15-BDTD-P
Type	Through-beam		Diffuse reflective		BGS reflective		
Sensing distance	1m		5 to 30mm <sup>※1</sup>		1 to 15mm <sup>※1</sup>		
Sensing target	Opaque material over Ø2mm		Translucent, opaque materials				
Min. sensing target	Opaque material of Ø2mm		Ø0.2mm (sensing distance 10mm)		Ø0.2mm non-illuminated objects (sensing distance 10mm)		
Hysteresis	-		Max. 20% at sensing distance		Max. 5% at sensing distance		
Reflectivity characteristics (black/white error)	-		-		Max. 15% of maximum sensing distance		
Response time	Max. 1ms						
Power supply	12-24VDC $\pm$ 10% (ripple P-P: max. 10%)						
Current consumption	Max. 20mA (this is for each emitter and receiver of through-beam type.)						
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 voltage: max. 26.4VDC $\pm$ • Load current: max. 50mA • Residual voltage - NPN: max. 1VDC $\pm$ , PNP: max. 2VDC						
Protection circuit	Power reverse polarity protection circuit, output short over current protection circuit						
Indicator	Operation indicator: red LED, stability indicator: green LED						
Connection	Cable type						
Insulation resistance	Over 20M $\Omega$ (at 500VDC megger)						
Noise immunity	$\pm$ 240V the square wave noise (pulse width: 1 $\mu$ s) by the noise simulator						
Dielectric strength	1,000VAC 50/60Hz for 1 minute						
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	Ambient illu. Sunlight: max. 10,000lx, incandescent lamp: max. 3,000lx (receiver illumination) Ambient temp. -25 to 55°C, storage: -40 to 70°C Ambient humi. 35 to 85%RH, storage: 35 to 85%RH						
Protection	IP67 (IEC standards)						
Material	Case: polybutylene terephthalate, sensing part: polymethyl methacrylate, bracket: SUS304 (steel use stainless 304), bolt: carbon steel, sleeve: SUS304 (steel use stainless 304)						
Cable	Ø2.5mm, 3P, 2m (emitter of through-beam type: Ø2.5mm, 2P, 2m) (AWG 28, core diameter: 0.08mm, number of core: 19, insulator out diameter: Ø0.9mm)						
Accessory	Fixing bracket, M2 bolt: 4		Fixing bracket, M2 bolt: 2				
Approval							
Weight <sup>※2</sup>	Approx. 98g (approx. 40g)	Approx. 70g (approx. 25g)	Approx. 70g (approx. 25g)	Approx. 70g (approx. 25g)	Approx. 70g (approx. 25g)	Approx. 70g (approx. 25g)	Approx. 70g (approx. 25g)

※1: Non-glossy white paper 50x50mm.  
※2: 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.

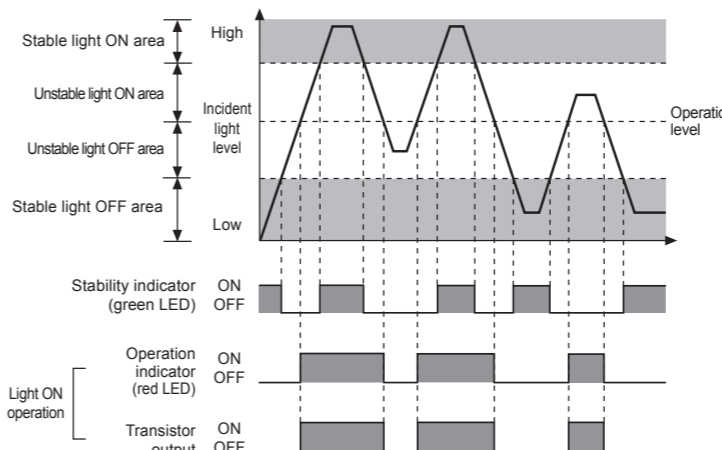
#### ■ Dimensions



#### ■ Operation Mode



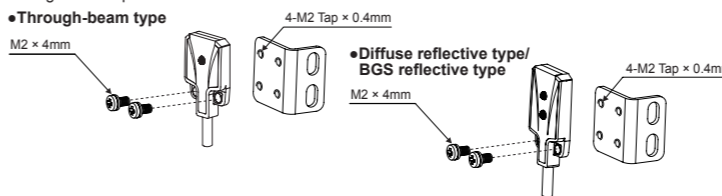
#### ■ Operating Timing Diagram



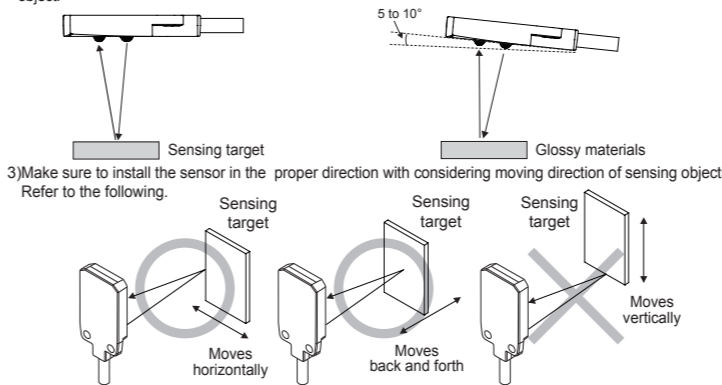
※ The waveform of 'Operation indicator' and 'Transistor output' are for Light ON operation. The waveform are reversed for Dark ON operation.

#### ■ Installation and Adjustment

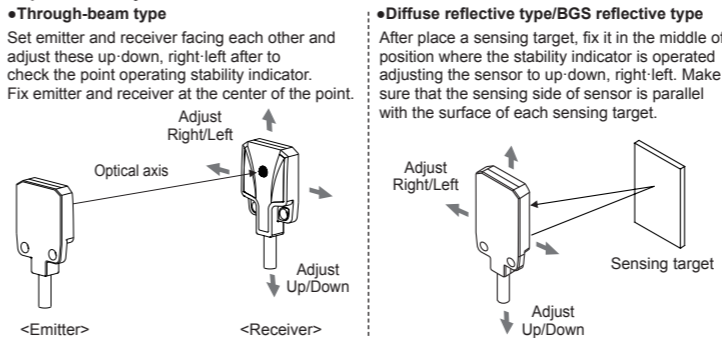
●Installation  
When using photoelectric sensors closely over two units, it may result in malfunction due to mutual interference. When installing the product, tighten the screw with a tightening torque of 0.3N·m.  
※ Do not impact on the unit with hard object and do not bend outgoing cable part too much. It may cause damage to waterproof function.



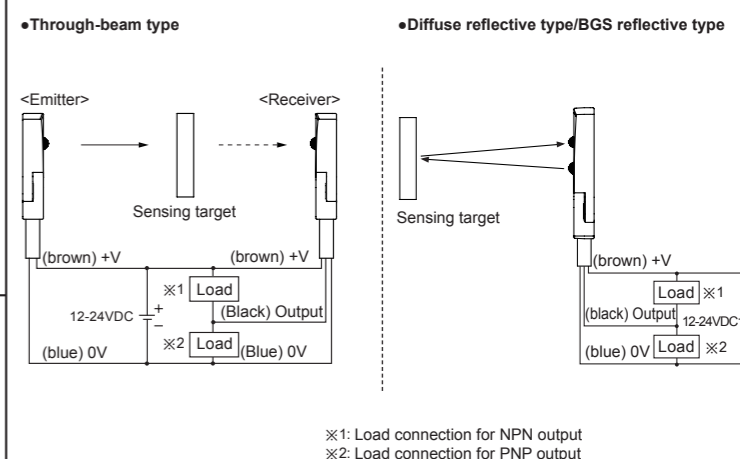
※Notice for BGS reflective type  
1) Make sure that the sensing side of sensor is parallel with the surface of each sensing object.  
2) If the sensing object has glossy surface or high-reflection, the sensor tilts to 5 to 10° as shown in the figure. Make sure whether the sensor is influenced by any background objects.



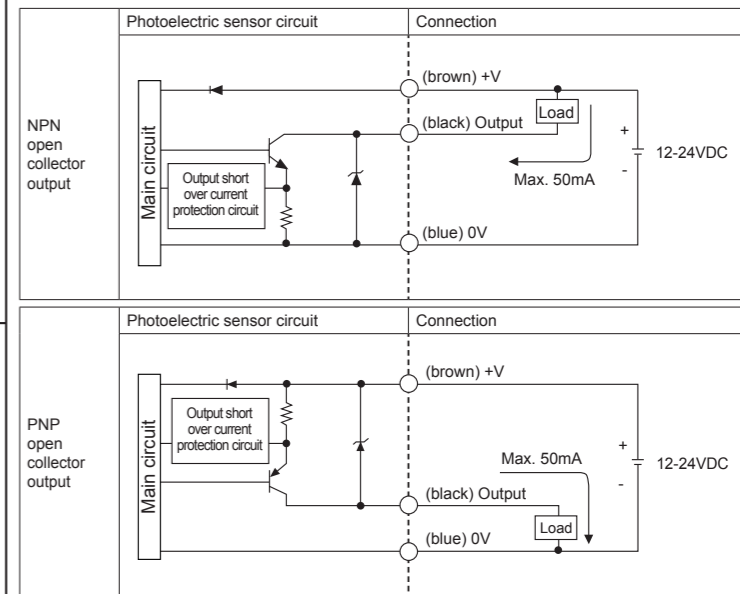
#### ●Optical axis adjustment



#### ■ Connections



#### ■ 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.

#### ■ 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.
  - ① Indoors (in the environment condition rated in 'Specifications')
  - ② Altitude max. 2,000m
  - ③ Pollution degree 3
  - ④ 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, CO<sub>2</sub>, 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

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