

# Autonics

## ULTRA-THIN PHOTOELECTRIC SENSOR BTF SERIES

### M A N U A L



Through-beam type



Diffuse reflective type/  
BGS reflective type

Thank you very much for selecting Autonics products.  
For your safety, please read the following before using.

### Caution for your safety

- ※Please keep these instructions and review them before using this unit.
- ※Please observe the cautions that follow;
  - Warning** Serious injury may result if instructions are not followed.
  - Caution** Product may be damaged, or injury may result if instructions are not followed.
- ※The following is an explanation of the symbols used in the operation manual.
  - Caution:** Injury or danger may occur under special conditions.

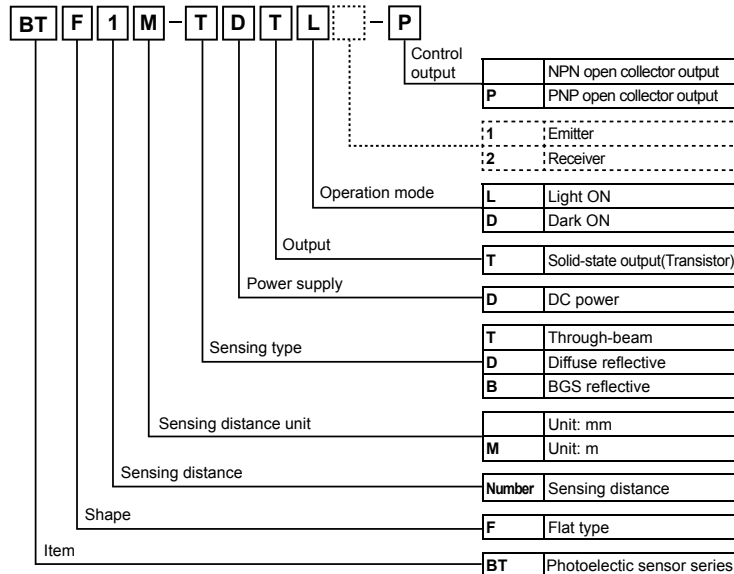
### Warning

- In case of using this unit with machinery(Ex: nuclear power control, medical equipment, ship, vehicle, train, airplane, combustion apparatus, safety device, crane/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install safe device.  
It may cause a fire, human injury or damage to property.
- Do not disassemble or modify this unit. Please contact us if it is required.  
It may give an electric shock and cause a fire.

### Caution

- This unit shall not be used outdoors.  
It might shorten the life cycle of the product or give an electric shock.  
Use this product inside only. Do not use the product outdoors or location subject to temperatures or humidity outside.(Ex: rain, dirty, frost, sunlight, condensation, etc.)
- Do not use this unit where there is flammable or explosive gas.  
It may cause a fire or explosion.
- Please observe the rated specifications.  
It may shorten the life cycle or damage to the product.
- Do not use this unit over rated voltage and do not supply AC power to DC power type.  
It may cause a damage to product.
- Please check the polarity of power and wrong wiring.  
It may cause a damage to product.
- Do not use this unit where there is vibration or impact.  
It may cause a damage to product.
- In cleaning the unit, do not use water or an oil-based detergent.  
It may cause a fire, give an electric shock or damage to product.

### Ordering information



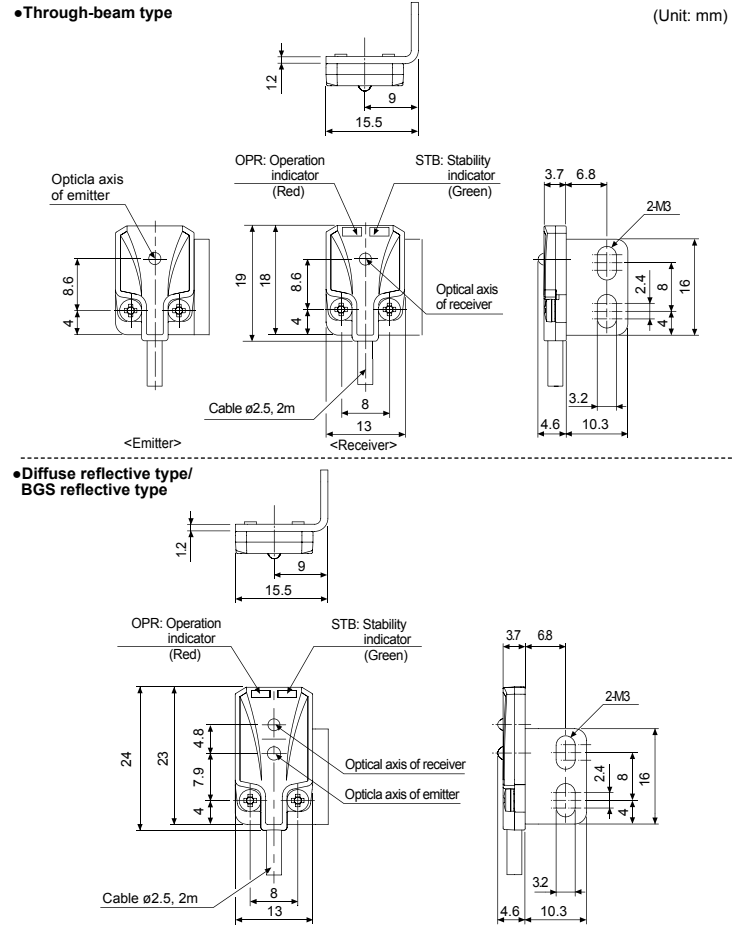
※: This information is intended for product management of through-beam type.  
(No need to refer when selecting model)  
※The above specifications are subject to change without notice.

### Specifications

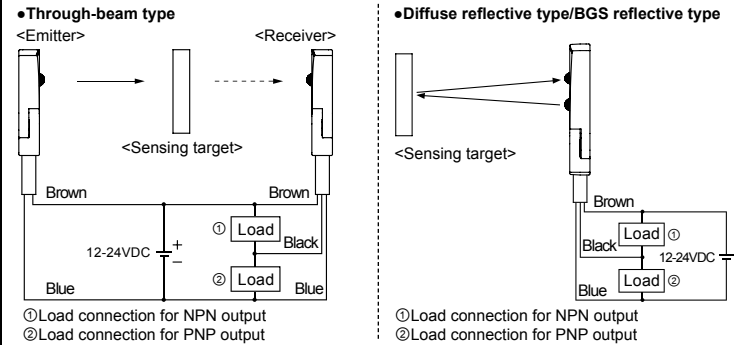
Type	Through-beam	Diffuse reflective	BGS reflective
Model	BTF1M-TDTL BTF1M-TDTL-P	BTF1M-TDTD BTF1M-TDTD-P	BTF15-BDTL BTF15-BDTL-P
Sensing distance	1m	5 to 30mm(Non-glossy white paper 50×50mm)	1 to 15mm(Non-glossy white paper 50×50mm)
Sensing target	Opaque materials of max. ø2mm	Opaque materials, Translucent materials	
Min. Sensing target	Opaque materials of ø2mm	ø0.2mm (Sensing distance 10mm)	ø0.2mm non-illuminated objects (Sensing distance 10mm)
Hysteresis	-	Max. 20% at rated sensing distance	Max. 5% at rated sensing distance
Reflectivity Characteristics (black/white error)	-	-	Max 15% of maximum sensing distance
Response time	Max. 1ms		
Power supply	12-24VDC ±10%(Ripple P-P: Max. 10%)		
Current consumption	Max. 20mA(This is for each emitter and receiver of through-beam type)		
Light source/Wavelength	Red LED(650nm)		
Operation mode	Light ON	Dark ON	Light ON
Control output	< NPN or PNP open collector output > -Load voltage: Max. 26.4VDC -Load current: Max. 50mA -Residual voltage: Max. 1V(NPN), Max. 2V(PNP)		
Protection circuit	Reverse polarity protection, output short-circuit protection		
Indicator	Operation indicator: Red, Stability indicator: Green		
Connection	Outgoing cable		
Insulation resistance	Min. 20MΩ(at 500VDC megger)		
Noise strength	±240V the square wave noise(pulse width:1μs) by the noise simulator		
Dielectric strength	1,000VAC 50/60Hz for 1 minute		
Vibration resistance	1.5mm or 300ms <sup>2</sup> amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours		
Shock resistance	500m/s <sup>2</sup> (50G) in X, Y, Z directions for 3 times		
Environment	Ambient illumination: Sunlight: Max.10,000lx, Incandescent lamp: Max.3,000lx(Receiver illumination)		
	Ambient temperature: -25 to 55°C, Storage: -40 to 70°C		
	Ambient humidity: 35 to 85%RH, Storage: 35 to 85%RH		
Protection	IP67(IEC standards)		
Material	Case: PBT, Sensing part : PMMA, Indicator : PMMA		
Cable	ø2.5mm, 3P, Length: 2m(Emitter of through-beam type: ø2.5mm, 2P, Length: 2m) (AWG 28, Core wire diameter: 0.08mm, No. of core wire: 19, Insulator out diameter: 0.9mm)		
Accessory	Fixing bracket(SUS304), Bolt(SWCH10A)		
Approval	CE		
Unit weight	Approx. 40g	Approx. 25g	Approx. 25g

※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

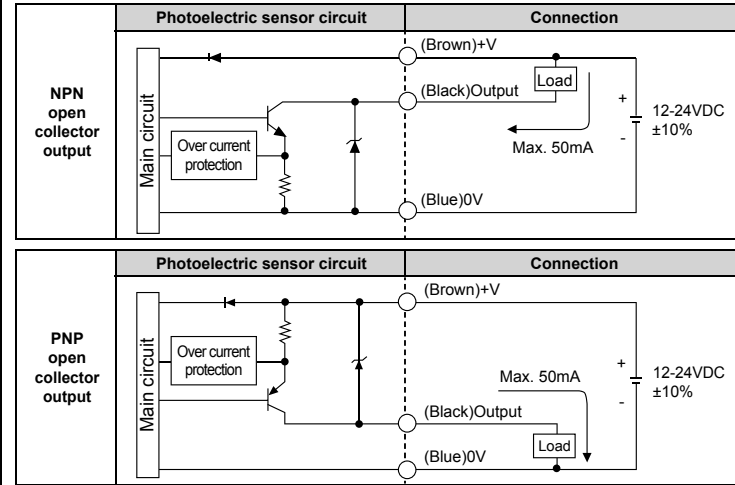
### Dimensions



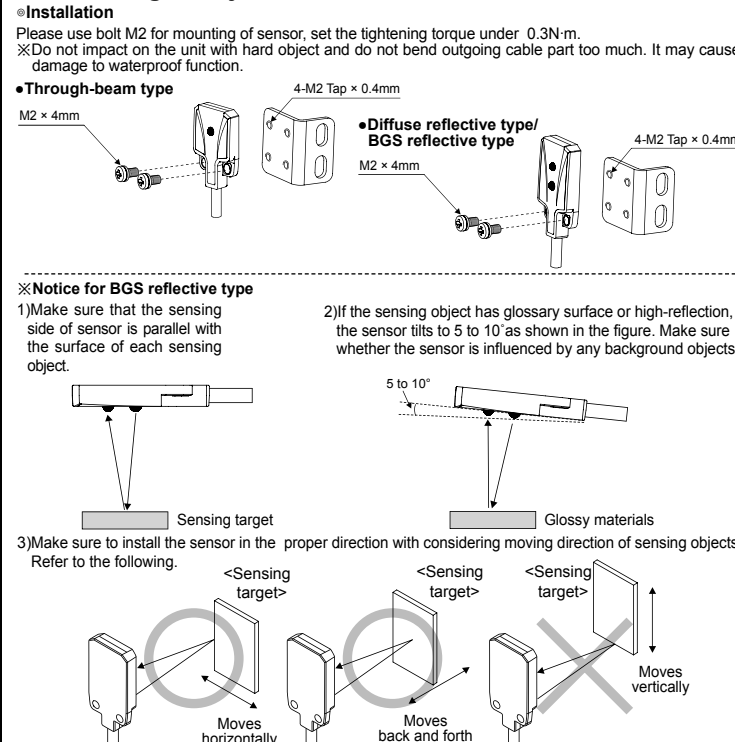
### Connections



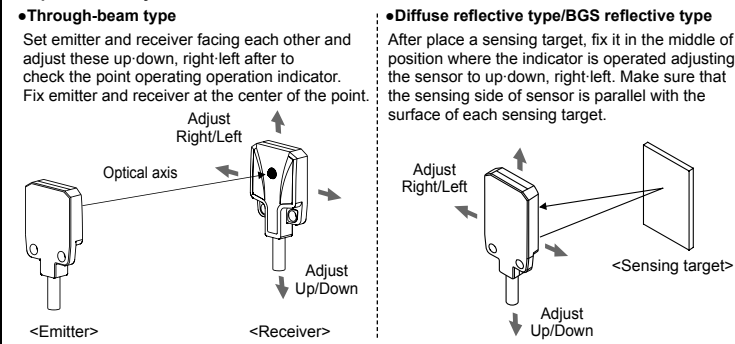
### Control output circuit diagram



### Mounting & Adjustment



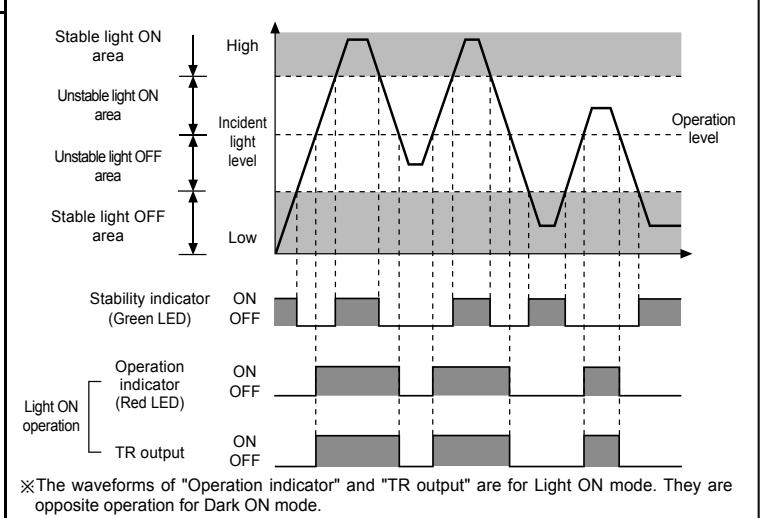
### Optical axis adjustment



### Operation mode

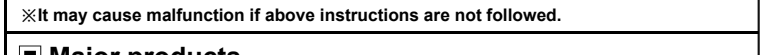
Operation mode	Light ON mode	Dark ON mode
Receiver operation	Received light Interrupted light	Received light Interrupted light
Operation indicator (Red LED)	ON OFF	ON OFF
TR output	ON OFF	ON OFF

### Operating timing diagram



### Caution for using

- The sensor will be in a detectable status within 100ms after supply the power. If the power line of the load and the sensor is different, supply power voltage to the sensor first.
- Shade a strong source of light as like sunlight, spotlight not to be let in the inclination angle range of photoelectric sensor directly.
- The photoelectric sensor may cause malfunction under the fluorescent lamp light, be sure to use the cover or the shutter to shade the light.
- If photoelectric sensor is installed at flat part, it may cause malfunction by reflection light from flat part. Be sure to put space between photoelectric sensor and ground.
- When wiring the photoelectric sensor with high voltage line, power line in a same conduit, it may cause malfunction or mechanical problem, please do wire separately or use different conduit.
- Avoid installing the unit in place with corrosive gas, oil or dust, strong flux, noise, sunlight, strong alkali and acid.
- In case of connecting relay as inductive load to output, please remove surge by using diode or varistor.
- Photoelectric sensor cable shall be used as short as possible, because it may cause malfunction by noise through the cable.
- When it is stained by dirt at lens, please clean the lens with dry cloth, do not use an organic materials such as alkali, acid and chromic acid.
- When use switching power supply as the source of supplying power, F.G. terminal shall be grounded and a condenser for removing noise shall be installed between 0V and F.G. terminal.



- Installation environment
  - ① It shall be used indoor
  - ② Altitude Max. 2,000m
  - ③ Pollution Degree 3
  - ④ Installation Category II

※It may cause malfunction if above instructions are not followed.

### Major products

- Proximity sensors
- Area sensors
- Display units
- Rotary encoders
- Power controllers
- Photoelectric sensors
- Door/Door side sensors
- Graphic/Logic panels
- Temperature controllers
- Tachometer/Pulse(Rate) meters
- Temperature/Humidity transducers
- Switching power supplies
- Stepping motors/drivers/motion controllers
- Field network devices
- Laser marking system(CO<sub>2</sub>, Nd:YAG)
- Laser welding/soldering system
- Counters
- Timers
- Panel meters
- Pressure sensors
- Fiber optic sensors
- Sensor controllers

**Autonics Corporation**  
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**Satisfiable Partner For Factory Automation**

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