



Autonics

Uultra-thin Photoelectric Sensor

BTF 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.

※Safety considerations are categorized as follows.

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.

※The symbols used on the product and instruction manual represent the following

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

Warning

1. **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, fire, or economic loss.

2. **Do not disassemble or modify the unit. Please contact us if necessary.**

Failure to follow this instruction may result in product damage or fire.

Caution

1. **Do not use the unit outdoors.**

Failure to follow this instruction may result in shortening the life cycle of the unit or malfunction. Use the unit indoors only. Do not use the unit outdoors, where it may be affected out external environmental factors.

(e.g. rain, dust, frost, sunlight, condensation, etc.)

2. **Do not use the unit where flammable or explosive gas may be present.**

Failure to follow this instruction may result in fire or explosion.

3. **Use the unit within the rated specifications.**

Failure to follow this instruction may result in shortening the life cycle of the unit.

4. **Do not use loads beyond the rated voltage range. Do not supply AC power.**

Failure to follow these instructions may result in product damage.

5. **Check the polarity of the power before wiring the unit.**

Failure to follow this instruction may result in product damage.

6. **Do not use the unit where heavy vibration or impact may be present.**

Failure to follow this instruction may result in product damage.

7. **Do not use water or oil-based detergent when cleaning the unit.**

Failure to follow this instruction may result in fire.

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

Power supply

T Through-beam

D Diffuse reflective

B BGS reflective

Sensing type

No mark mm

M m

Sensing distance unit

Number Sensing distance

Sensing distance

F Flat type

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
Type	PNP open collector output	BTF1M-TDTL-P	BTF1M-TDTD-P	BTF30-DDTL-P	BTF30-DDTD-P	BTF15-BDTL-P	BTF15-BDTD-P
Sensing distance	1m	5 to 30mm※1		1 to 15mm※1			
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±: ±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±: • 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 LED, stability indicator: green LED						
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 minute						
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each X, Y, Z direction for 2 hours						
Shock	500m/s ² (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: 2						
Approval	CE						
Weight※2	Approx. 98g (approx. 40g)		Approx. 70g (approx. 25g)		Approx. 70g (approx. 25g)		

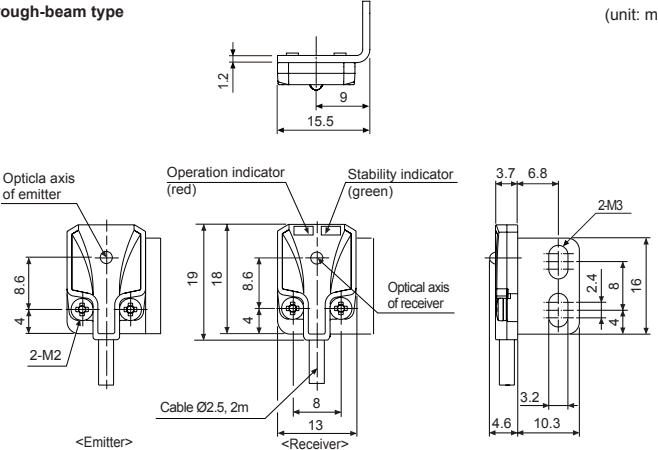
※1: Non-glossy white paper 50×50mm.

※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.

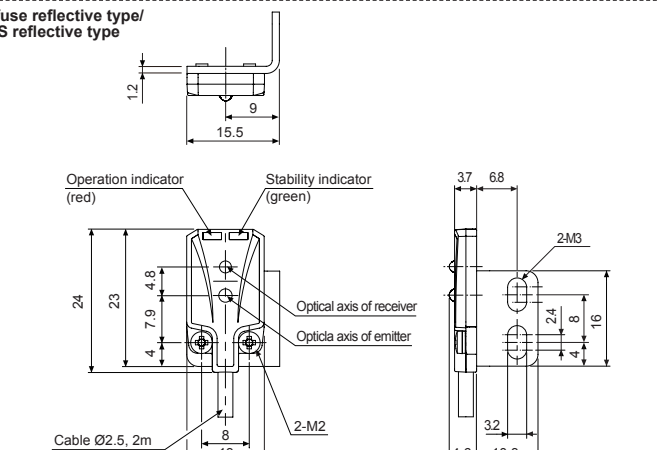
Dimensions

Through-beam type



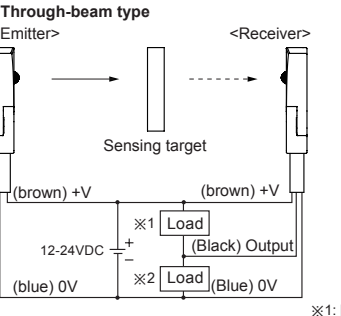
(unit: mm)

Diffuse reflective type/BGS reflective type

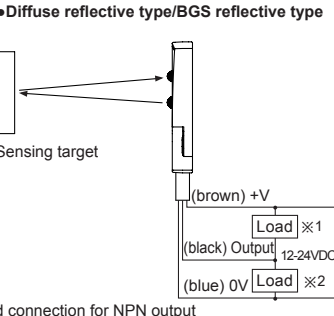


Connections

Through-beam type

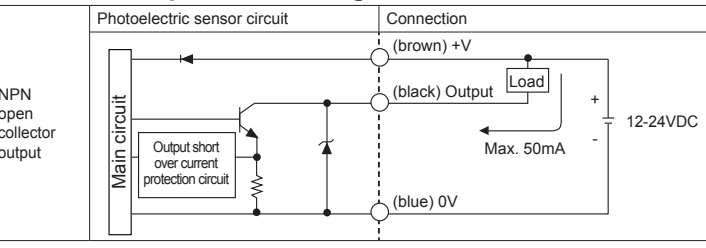


Diffuse reflective type/BGS reflective type

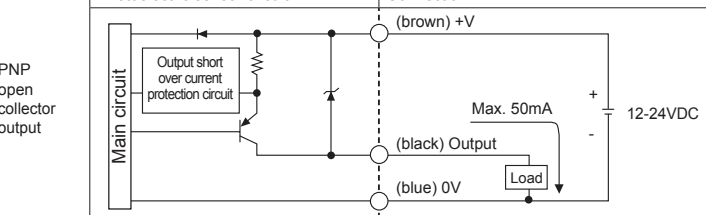


Control Output Circuit Diagram

NPN open collector output



PNP open collector output



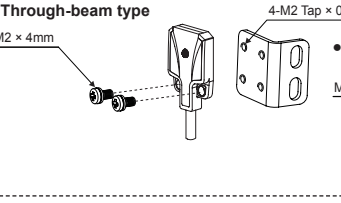
Installation and Adjustment

Installation

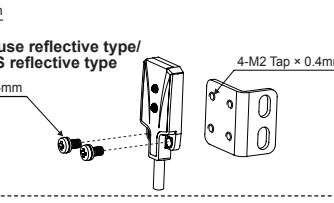
Please use bolt M2 for mounting of sensor, set the tightening torque under 0.3N·m.

※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.

Through-beam type



Diffuse reflective type/BGS reflective type

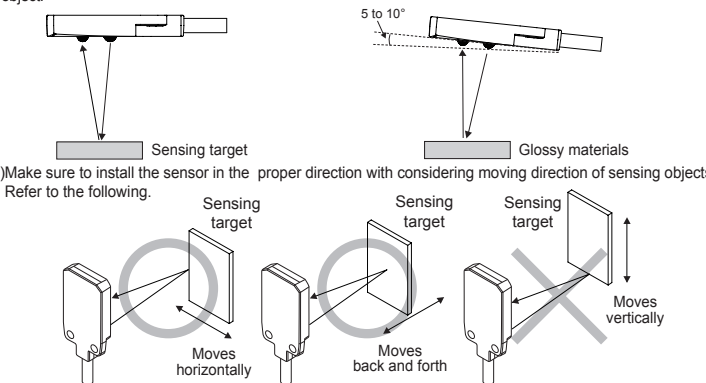


Notice for BGS reflective type

1) Make sure that the sensing side of sensor is parallel with the surface of each sensing object.

2) If the sensing object has glossary 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.

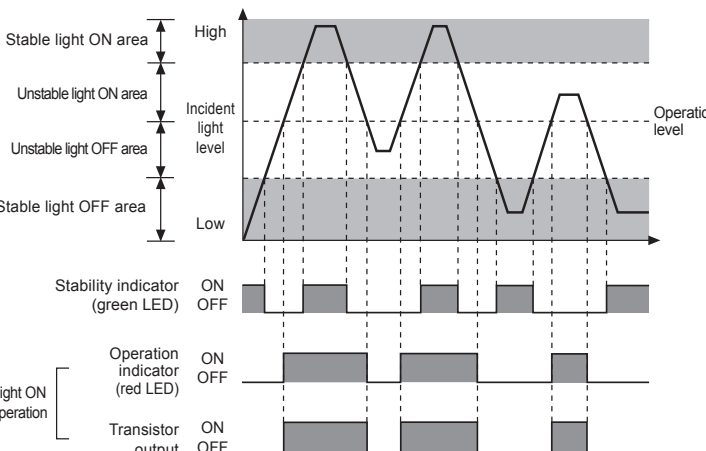
3) Make sure to install the sensor in the proper direction with considering moving direction of sensing objects. Refer to the following.



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

Operating Timing Diagram



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

Cautions during Use

1. 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.

2. Shade a strong source of light as like sunlight, spotlight not to be let in the inclination angle range of photoelectric sensor directly.

3. The photoelectric sensor may cause malfunction under the fluorescent lamp light, be sure to use the cover or the shutter to shade the light.

4. 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.

5. Power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.

6. 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.

7. Avoid installing the unit in place with corrosive gas, oil or dust, strong flux, noise, sunlight, strong alkali and acid.

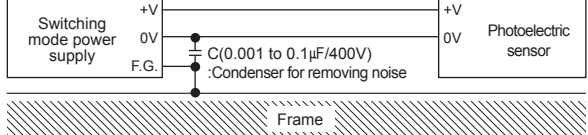
8. In case of connecting relay as inductive load to output, please remove surge by using diode or varistor.

9. Photoelectric sensor cable shall be used as short as possible, because it may cause malfunction by noise through the cable.

10. 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.

11. When use switching mode 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.

Diagram



12. This unit may be used in the following environments.

- ①Indoors
- ②Altitude max. 2,000m
- ③Pollution degree 3
- ④Installation category II

※Failure to follow these instructions may result in product damage.

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

http://www.autonics.com

HEADQUARTERS:

18, Bansong-ro 513 beon-gil, Haeundae-gu, Busan, South Korea, 48002

TEL: 82-51-519-3232

E-mail: sales@autonics.com

DRW170725AA