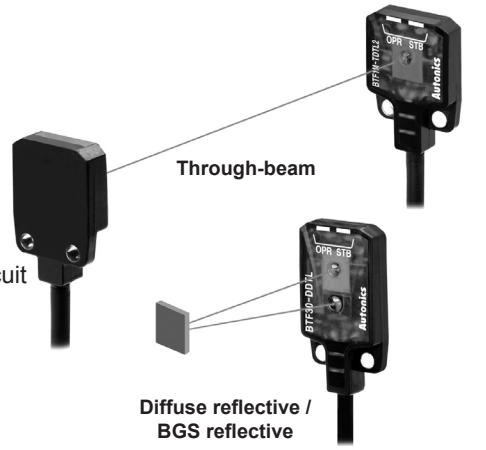
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Ultra-slim and amplifier built-in type

NEW

▣ Features

- Realization of ultra-slim size by adopting one-chip photo IC
- Size: Through-beam(W13×H19×L3.7mm),
  Diffuse reflective, BGS reflective(W13×H24×L3.7mm)
- Adopts BGS method superior than convergent reflective to minimize error by background color, or material of sensing object for stable sensing
- Visible light source to check the position of sensing spot and superior to small sensing target with narrow sensing width
- Built-in reverse polarity, output short, overcurrent protection circuit
- Protection structure IP67(IEC standard)



⚠ **Please read "Caution for your safety" in operation manual before using.**

CE

▣ 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**
Sensing type		Through-beam		Diffuse reflective		BGS reflective	
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		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. 1V, PNP:Max. 2V					
Protection circuit		Reverse polarity protection, output short-circuit protection					
Indicator		Operation indicator: Red, Stability indicator: Green					
Insulation resistance		Min. 20MΩ(at 500VDC megger)					
Noise resistance		±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 or 300m/s^2 at frequency of 10 to 55Hz(for 1 min.) in each of X, Y, Z directions for 2 hours					
Shock		500m/s^2(approx. 50G) in each of 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℃, storage: -40 to 70℃					
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH					
Protection		IP67(IEC standards)					
Material		Case: PBT, Sensing part : PMMA					
Cable		ø2.5, 3-wire, Length: 2m (Emitter of through-beam type: ø2.5, 2-wire, Length: 2m) (AWG28, Core diameter: 0.08mm, Number of cores: 19, Insulator out diameter: ø0.9)					
Accessory		Fixing bracket(SUS304), Bolt(SWCH10A)					
Approval		CE					
Unit weight		Approx. 40g		Approx. 25g			

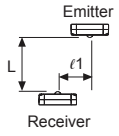
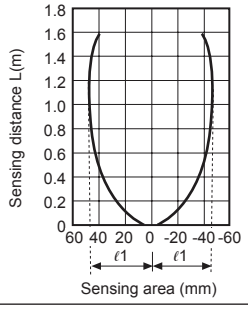
※The temperature or humidity mentioned in Environment indicates a non freezing or condensation environment.

▣ Feature data

◎ Through-beam

● BTF1M-TDTL / BTF1M-TDTL-P

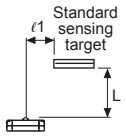
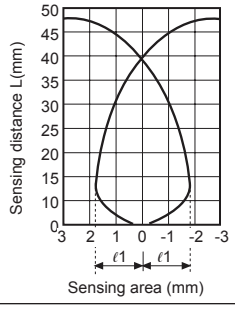
Sensing area characteristic

Measuring method	Data
	

◎ Diffuse reflective

● BTF30-DDTL / BTF30-DDTL-P

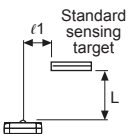
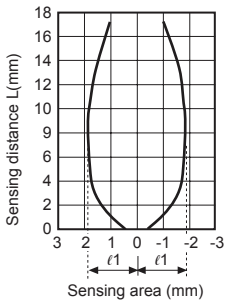
Sensing area characteristic

Measuring method	Data
	

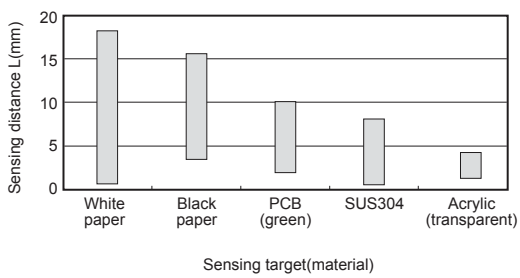
◎ BGS reflective

● BTF15-BDTL / BTF15-BDTL-P

Sensing area characteristic

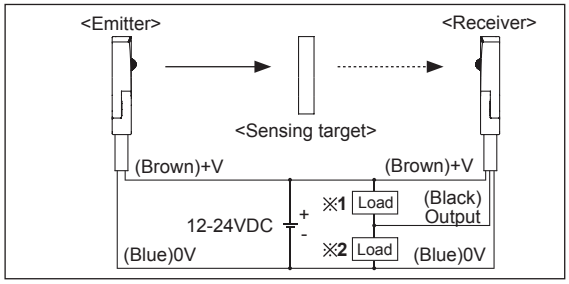
Measuring method	Data
	

Sensing distance by material

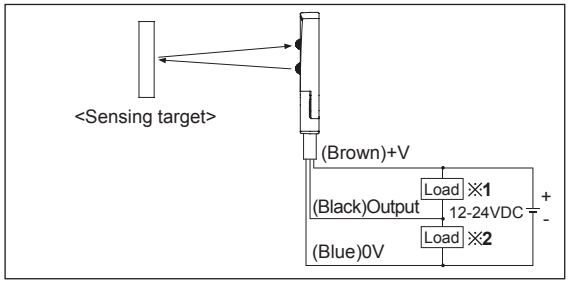


▣ Connections

● Through-beam



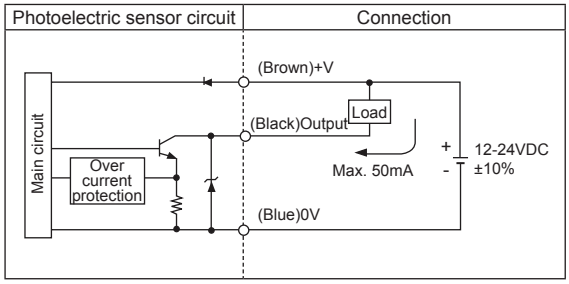
● Diffuse reflective/BGS reflective



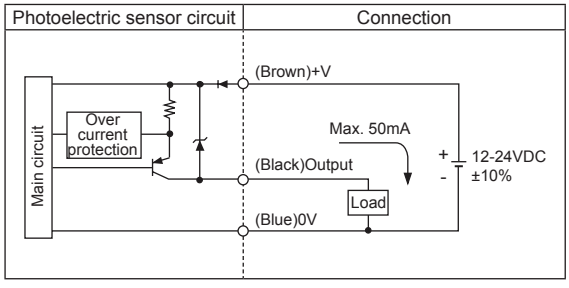
※1: Load connection for NPN output
※2: Load connection for PNP output

▣ Control output diagram

● NPN open collector output



● PNP open collector output



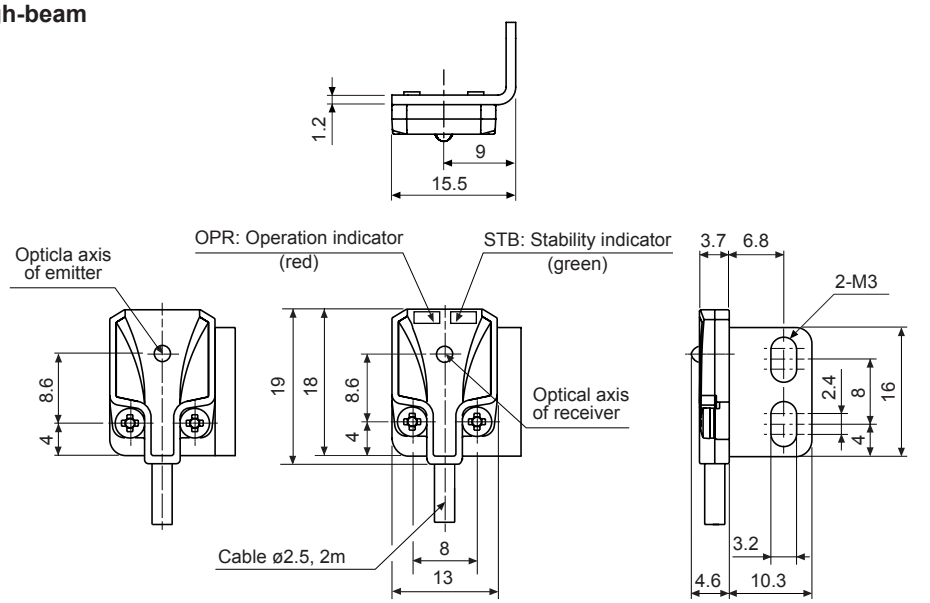
▣ Operation mode

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

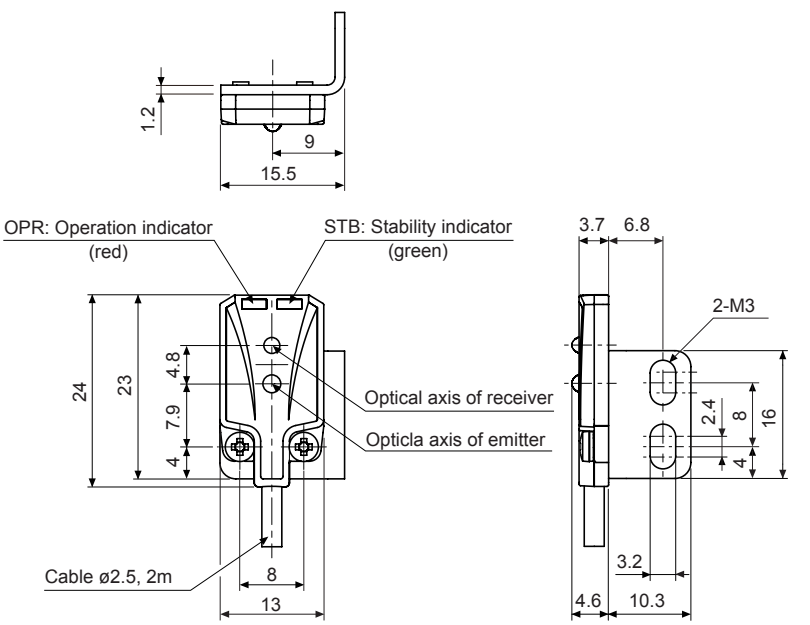
▣ Dimensions

(unit: mm)

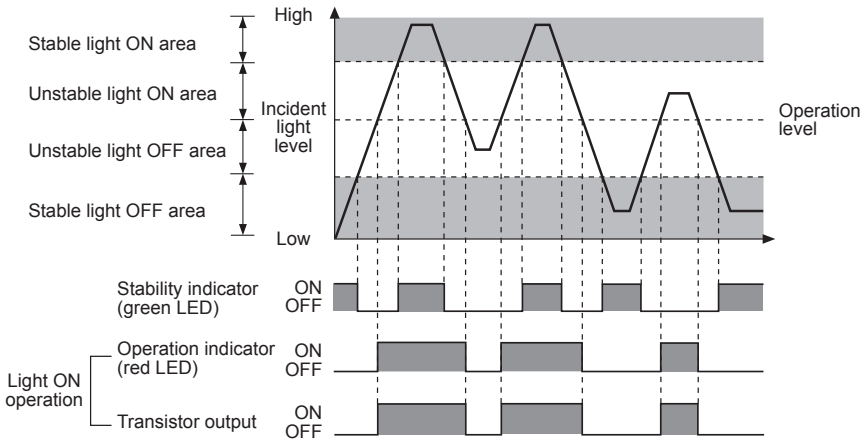
● **Through-beam**



● **Diffuse reflective/BGS reflective**



▣ Operation timing diagram



※The waveforms of “Operation indicator” and “Transistor output” are for Light ON operation. They are opposite operation for Dark ON operation.

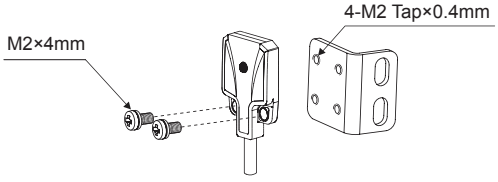
▣ Mounting and sensitivity adjustment

◎ For mounting

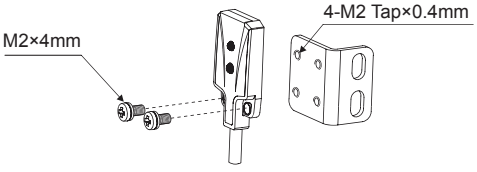
Please use bolts M2 for mounting this sensor and the tightening torque is under 0.3 N·m.

※Do not impact on the unit with hard objects and do not bend the cable part too much. It may cause damage to waterproof function.

● Through-beam

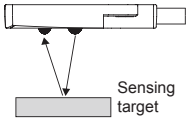


● Diffuse reflective/BGS reflective

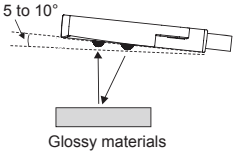


※ Notice for BGS reflective type

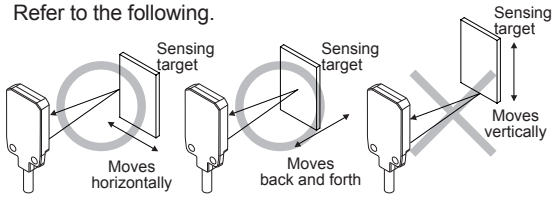
1) Make sure that the sensing side of this sensor is parallel with the surface of each sensing object.



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.



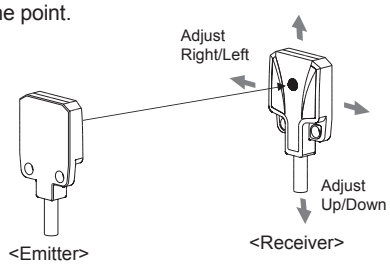
3) Make sure to install the sensor in the proper direction with considering moving direction of sensing objects.
Refer to the following.



◎ Optical axis adjustment

● Through-beam

Set the emitter and the receiver facing each other and adjust these up·down, right·left after to check the point operating the stability indicator. Fix the emitter and the receiver at the center of the point.



● Diffuse reflective/BGS reflective

After place a sensing target, fix it in the middle of position where the stability indicator operates adjusting the sensor to up·down, right·left. Make sure that the sensing side of the sensor is parallel with the surface of each sensing target.

