Push Button Type Photomicro Sensors

▣ Features

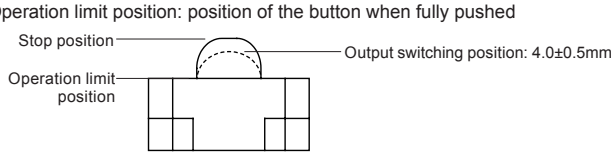
- Button operation enables accurate detection regardless of material, color, or reflectance of target object
- Optimized for transport detection of semiconductor wafer enclosures (FOUP, FOSB, etc.)
- Optical detection of button operation guarantees mechanical life cycle of 5 million operations
- Total of 4 red LED indicators (side:2, top:2) for higher visibility of operation status
- Increased product durability with steel mounting brackets
- Emitter OFF function and check stable operation functions
- Power supply reverse polarity protection circuit, output short-circuit protection circuit

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

▣ Specifications

Model	NPN open collector output	BS5-P1ML	BS5-P1MD
	PNP open collector output	BS5-P1ML-P	BS5-P1MD-P
Operation method※1		Push button type	
Button operation※2	Stop position	5.0±0.4mm	
	Output switching position	4.0±0.5mm	
	Operation limit position	Below 0mm	
Operation load※3		Max. 3N (max. 0.3kgf)	
Power supply		12-24VDC ±10% (ripple P-P: max. 10%)	
Current consumption		Max. 35mA	
Light source		Infrared LED (940nm)	
Operation mode		Light ON (Output OFF when button is pushed)	Dark ON (Output ON when button is pushed)
Control output		NPN or PNP open collector output ·Load voltage: Max. 26.4VDC ·Load current: Max. 50mA ·Residual voltage: Max. 1V	
External input※4	NPN output	Emitter OFF: short at 0V or max. 0.25V (outflow current max. 30mA) Emitter ON: open (leakage current max. 0.4mA)	
	PNP output	Emitter OFF: short at +V or min. -0.25V of +V (absorption current max. 30mA) Emitter ON: open (leakage current max. 0.4mA)	
	Response	Under 1ms	
Protection circuit		Reverse polarity protection, output short-circuit protection	
Indicator		Operation indicator: red LED	
Insulation resistance		Min. 20MΩ (at 250VDC megger)	
Noise strength		±240V of square wave noise (pulse width:1 μs) from the noise simulator	
Dielectric strength		1,000VAC at 50/60Hz for 1min.	
Vibration		1.5mm amplitude at 10 to 55Hz frequency in each X, Y, Z direction for 2 hours	
Shock		500m/s² (approx. 50G) in each X, Y, Z direction for 3 times	
Mechanical life cycle		Min. 5,000,000 operations (1 operation = stop position - operation limit position - stop position)	
Environment	Ambient illuminance	Fluorescent lamp: max. 1,000lx (receiver illuminance)	
	Ambient temperature	-20 to 55℃, storage: -25 to 70℃	
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH	
Protection structure		IP40 (IEC standard)	
Material		Case: Polycarbonate + Glass fiber, Button: Polyoxymethylene, Sleeve: SUS304 (steel use Stainless 304)	
Cable		Ø3mm, 4-wire, length: 1m (AWG 28, core diameter: 0.08mm, no. of core wires: 19, insulator diameter: Ø0.88mm)	
Weight※5		Approx. 50g (approx. 30g)	

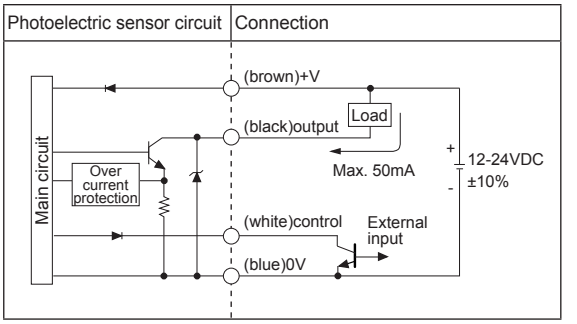
※1: Detection occurs when the button is pushed and the light source is blocked.
※2: Stop position: position of the button without any applied pressure
Output switching position: position where the output switches ON/OFF
Operation limit position: position of the button when fully pushed



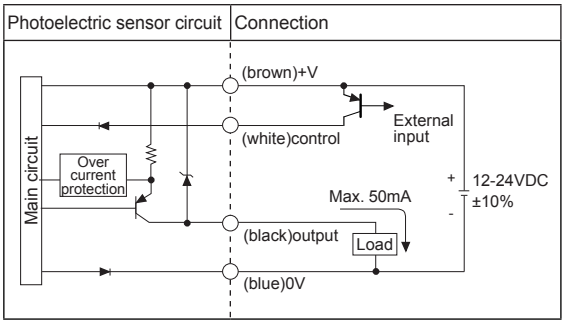
※3: Pressure required to push the button from stop position to output switching position
※4: External input when using emitter OFF function or check stable operation functions.
※5: The weight includes packaging. The weight in parentheses is for unit only.
※The temperature and humidity of environment resistance are rated at non-freezing or condensation.

▣ Control Output Diagram

• NPN open collector output



• PNP open collector output

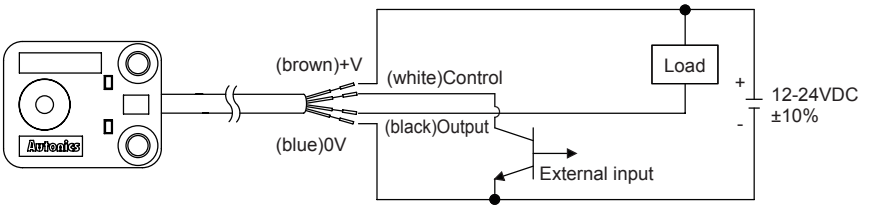


▣ Operation Mode

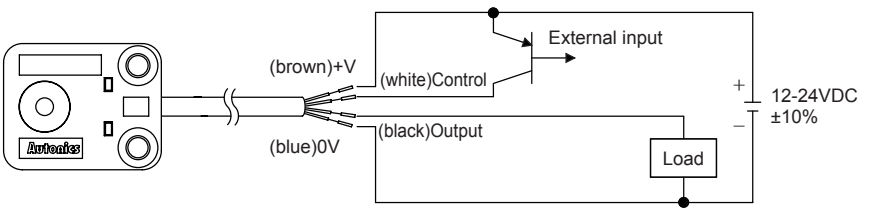
Operation mode	Light ON(Output OFF when button is pushed)	Dark ON(Output ON when button is pushed)
Button position	Pushed / Raised	Pushed / Raised
Receiver operaion	Received light / Interrupted light	Received light / Interrupted light
Operation indicator (redLED)	ON / OFF	ON / OFF
Transistor output	ON / OFF	ON / OFF

▣ Connections

• NPN open collector output

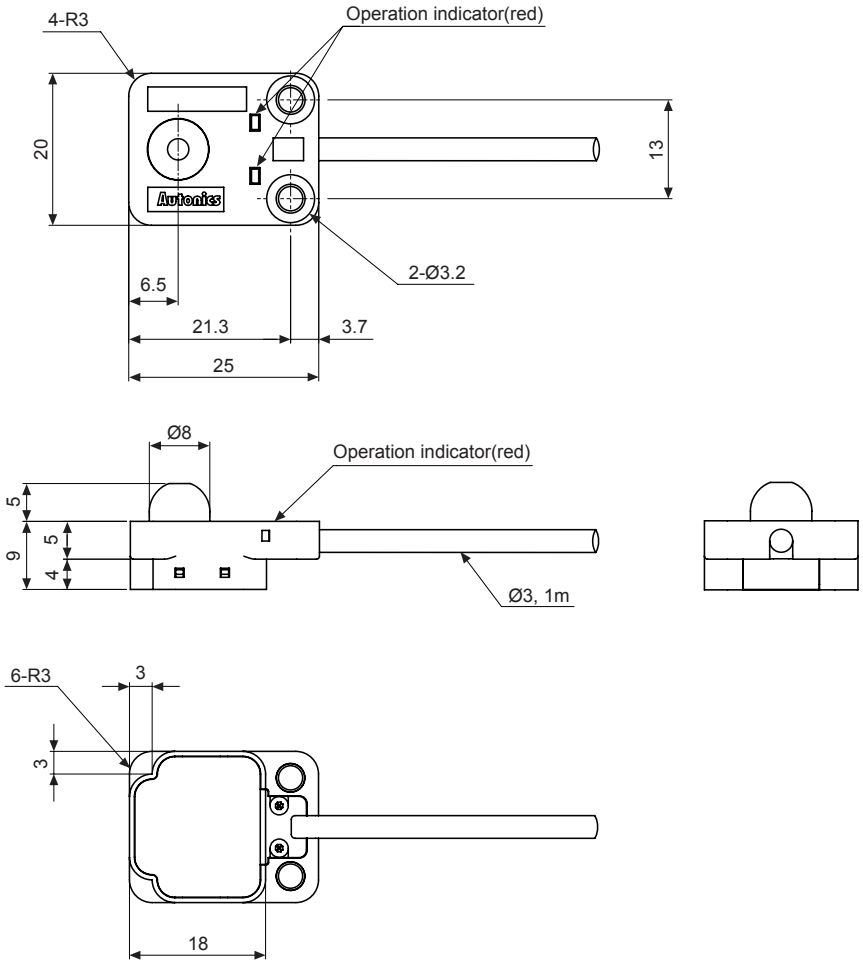


• PNP open collector output



▣ Dimensions

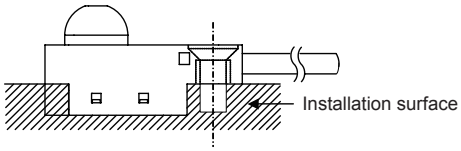
(unit: mm)



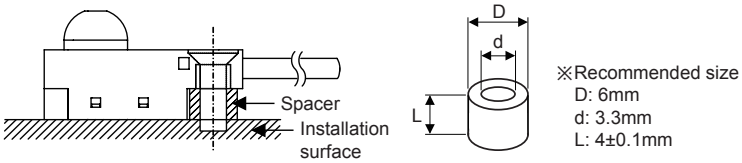
▣ Installation

Use M3 countersunk screws to install the unit. The tightening torque should be less than 0.59N·m (6.0kgf·cm).
Installation methods differ depending on the installation surface.

1) Installation on non-flush surface
Install the sensor after fitting the sensor in the opening as shown in the figure below.



2) Installation on flush surface
Insert a spacer between the installation surface and the mounting surface of the sensor as shown in the figure below.

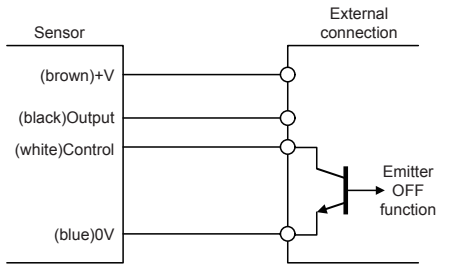
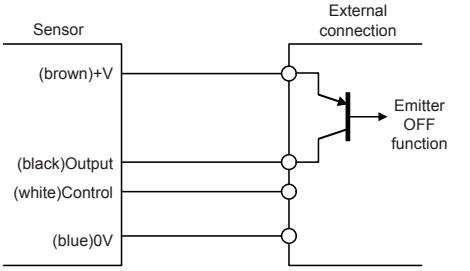


※Recommended size
D: 6mm
d: 3.3mm
L: 4±0.1mm

▣ Functions

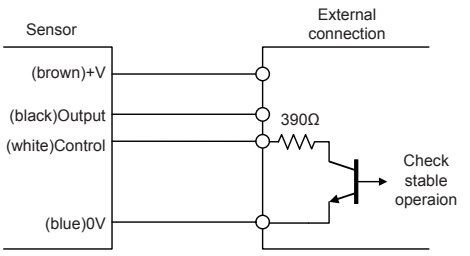
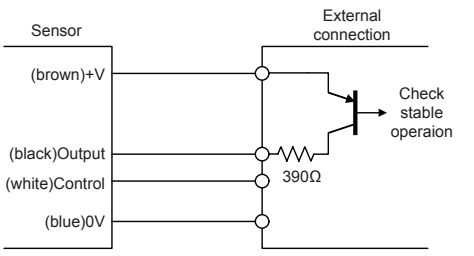
- **Emitter OFF function**

The emitter LED can be turned ON/OFF without pushing the button, to test for stable operation of the receiver.

NPN open collector output	PNP open collector output
	

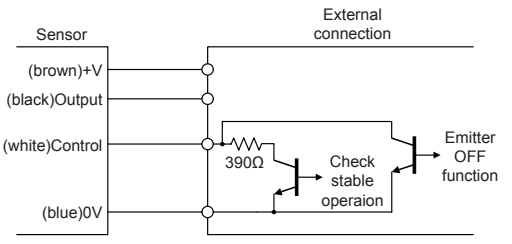
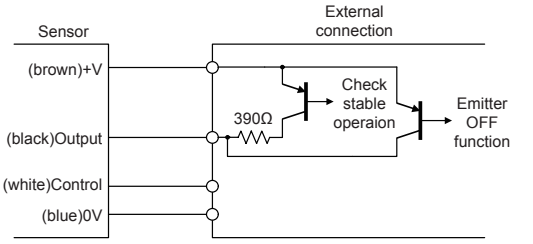
- **Check stable operation function**

Reduces the LED intensity by approximately 20% while button is not pushed, and check that the receiver is still receiving light (same transistor ON status as at 100%) This ensures that sensor will not malfunction due to changing light intensity.

NPN open collector output	PNP open collector output
	

- **Simultaneous use of emitter OFF and check stable operation function**

Follow the circuit diagram below:

NPN open collector output	PNP open collector output
	

※When using the emitter OFF function and check stable operation function simultaneously, the transistor used should be able to open and close 50mA/10V and resistance should be over 1/8W. Failure may cause product damage.