BS5-P Series

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
- Built-in reverse polarity protection circuit and output short overcurrent protection circuit

⚠ **Please read "Safety Considerations" in the instruction manual before using.**

CE

◼ 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. 1VDC⎓		
External input※4	NPN output	Emitter OFF: short at 0V or max. 0.25VDC⎓ (outflow current max. 30mA) Emitter ON: open (leakage current max. 0.4mA)		
	PNP output	Emitter OFF: short at +V or min. -0.25VDC⎓ of +V (absorption current max. 30mA) Emitter ON: open (leakage current max. 0.4mA)		
	Response	Under 1ms		
Protection circuit		Reverse polarity protection circuit, output short overcurrent protection circuit		
Indicator		Operation indicator: red LED		
Insulation resistance		Over 20MΩ (at 250VDC megger)		
Noise immunity		±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)		
Environ-ment	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, 1m (AWG 28, core diameter: 0.08mm, no. of core wires: 19, insulator diameter: Ø0.88mm)		
Approval		CE		
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

Stop position
Output switching position: 4.0±0.5mm
Operation limit position
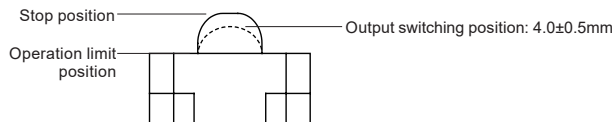
※3: Pressure required to push the button from stop position to output switching position
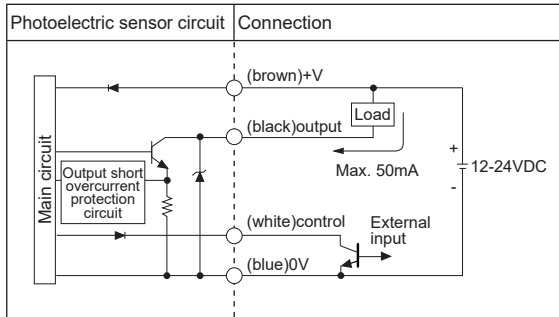※4: External input when using emitter OFF function or check stable operation functions.
※5: The weight includes packaging. The weight in parenthesis is for unit only.
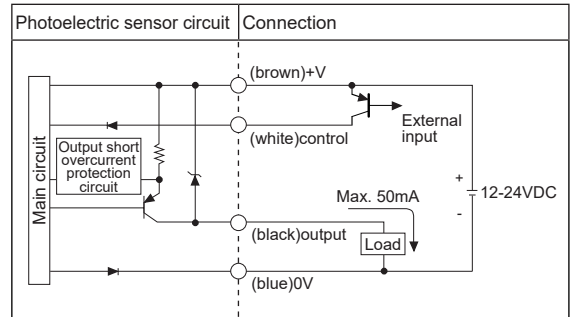※The temperature and humidity of environment resistance are rated at non-freezing or condensation.

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Push Button Type Photomicro Sensors

◼ Control Output Diagram

● NPN open collector output

Photoelectric sensor circuit	Connection

(brown)+V
(black)output — Load
Max. 50mA
12-24VDC +/-
Main circuit
Output short overcurrent protection circuit
(white)control — External input
(blue)0V

● PNP open collector output

Photoelectric sensor circuit	Connection

(brown)+V
External input
(white)control
Main circuit
Output short overcurrent protection circuit
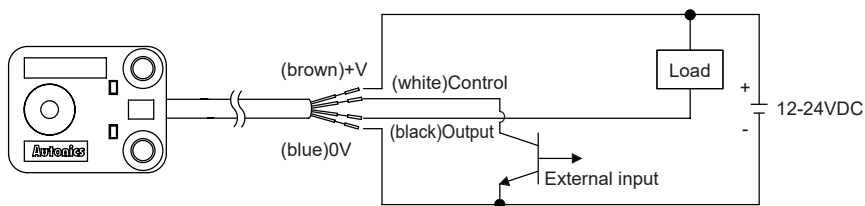Max. 50mA
(black)output — Load
12-24VDC +/-
(blue)0V

※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.
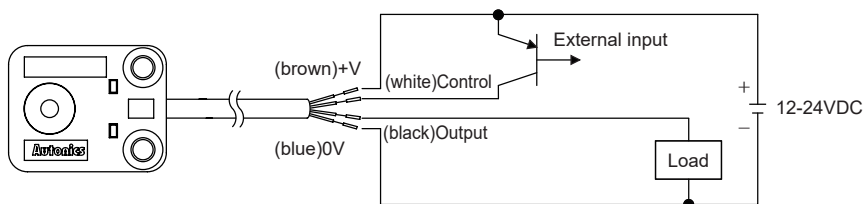
◼ Operation Mode

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

(brown)+V   (white)Control
Load
12-24VDC +/-
(blue)0V   (black)Output
External input
Autonics

● PNP open collector output

(brown)+V   (white)Control
External input
12-24VDC +/-
(blue)0V   (black)Output
Load
Autonics

BS5-P Series

▣ Dimensions

(unit: mm)

4-R3

Operation indicator (red)

20

6.5

21.3   3.7

25

13

2-Ø3.2

Ø8

Operation indicator (red)

5.1

9

4

Ø3, 1m

6-R3   3

3

18

▣ Installation

When installing the product, tighten the screw with a tightening torque of 0.59N·m.
Do not pull the cable with a tensile strength of 30N or over. It may result in fire due to the broken wire.

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

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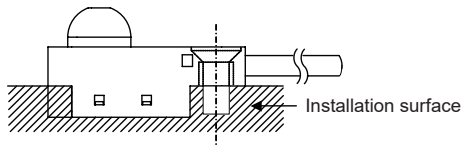
2) Installation on flush surface
   Insert a spacer between the installation surface and the mounting surface of the sensor as shown in the figure below.
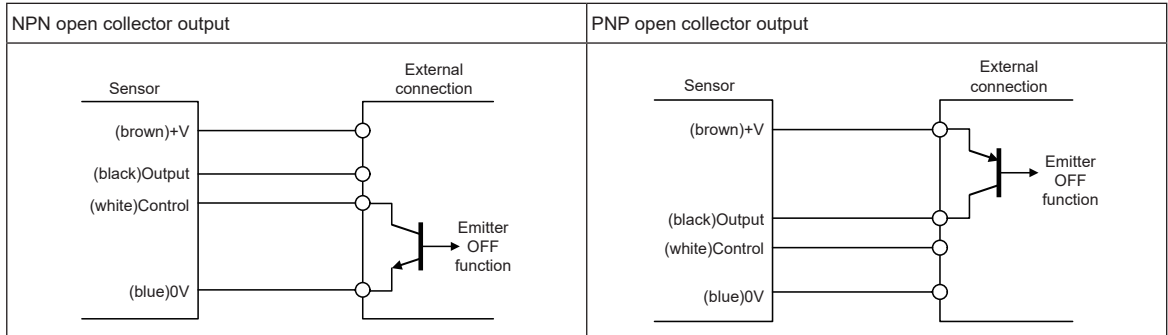
Spacer
Installation surface

D
d
L

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

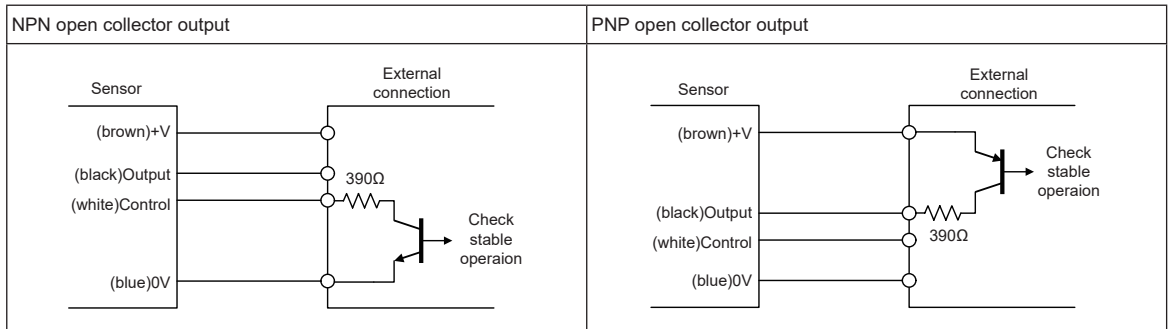Autonics
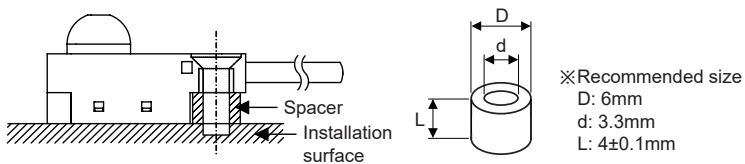
Push Button Type Photomicro Sensors

◼ Functions

● Emitter OFF function

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

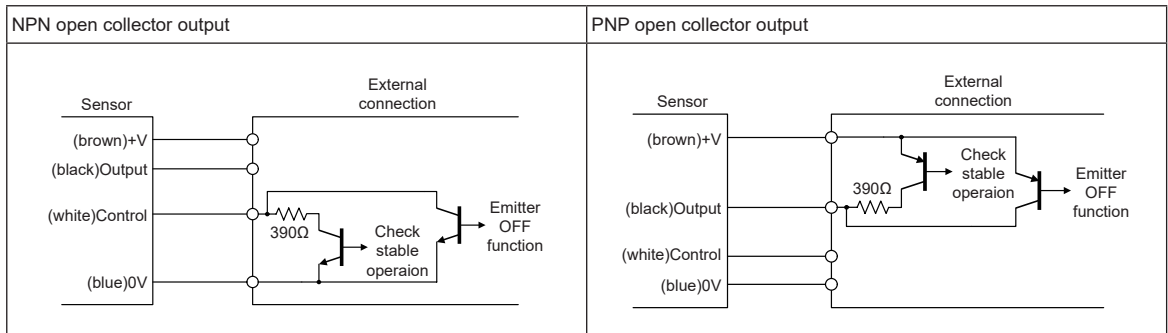| NPN open collector output	PNP open collector output
Sensor — External connection (brown)+V (black)Output (white)Control (blue)0V Emitter OFF function	Sensor — External connection (brown)+V (black)Output (white)Control (blue)0V Emitter OFF function

● 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
Sensor — External connection (brown)+V (black)Output (white)Control — 390Ω (blue)0V Check stable operaion	Sensor — External connection (brown)+V (black)Output — 390Ω (white)Control (blue)0V Check stable operaion

● Simultaneous use of emitter OFF and check stable operation function

Follow the circuit diagram below:

NPN open collector output	PNP open collector output
Sensor — External connection (brown)+V (black)Output (white)Control — 390Ω (blue)0V Check stable operaion / Emitter OFF function	Sensor — External connection (brown)+V (black)Output — 390Ω (white)Control (blue)0V Check stable operaion / Emitter OFF function

※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.

※When emitter OFF function and stable operation check function is not used, insulate the control (white) wire. Otherwise, it may result in product damage.

SENSORS

CONTROLLERS

MOTION DEVICES

SOFTWARE

(A)
Photoelectric
Sensors

(B)
Fiber Optic
Sensors

(C)
LiDAR

(D)
Door/Area
Sensors

(E)
Vision
Sensors

(F)
Proximity
Sensors

(G)
Pressure
Sensors

(H)
Rotary
Encoders

(I)
Connectors/
Connector Cables/
Sensor Distribution
Boxes/ Sockets