

# Autonics

## Push Button Type Photo Micro Sensor

### BS5-P 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

- 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.
- 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

- Do not use the unit outdoors.**  
Failure to follow this instruction may result in shortening the life cycle of the unit or product malfunction. Use the unit indoors only. Do not use the unit outdoors, where it may be affected by external environmental factors. (e.g. rain, dust, frost, sunlight, condensation, etc.)
- Do not wire the cables when power is ON.**  
Failure to follow this instruction may result in product damage.
- Do not use loads beyond the rated voltage range. Do not supply AC power.**  
Failure to follow these instructions may result in product damage.
- Do not use the unit where flammable or explosive gas may be present.**  
Failure to follow this instruction may result in fire or explosion.
- Check the polarity of the power before wiring the unit.**  
Failure to follow this instruction may result in product damage.
- When not using emitter OFF function, or check stable operation function, insulate control wire (white).**  
Failure to follow this instruction may result in product damage.
- Do not use water or oil-based detergent when cleaning the unit.**  
Failure to follow this instruction may result in fire.

#### ■ Model

Model	Operation range	Appearance	Connection	Operation	Control output
BS5-P1ML	0 to 5mm	Push button type	Cable type (1m)	Light ON (Output OFF when button is pushed)	NPN open collector output
BS5-P1ML-P				PNP open collector output	
BS5-P1MD				Dark ON (Output ON when button is pushed)	NPN open collector output
BS5-P1MD-P				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 operation	Received light Interrupted light	Received light Interrupted light
Operation indicator (red LED)	ON OFF	ON OFF
Transistor output	ON OFF	ON OFF

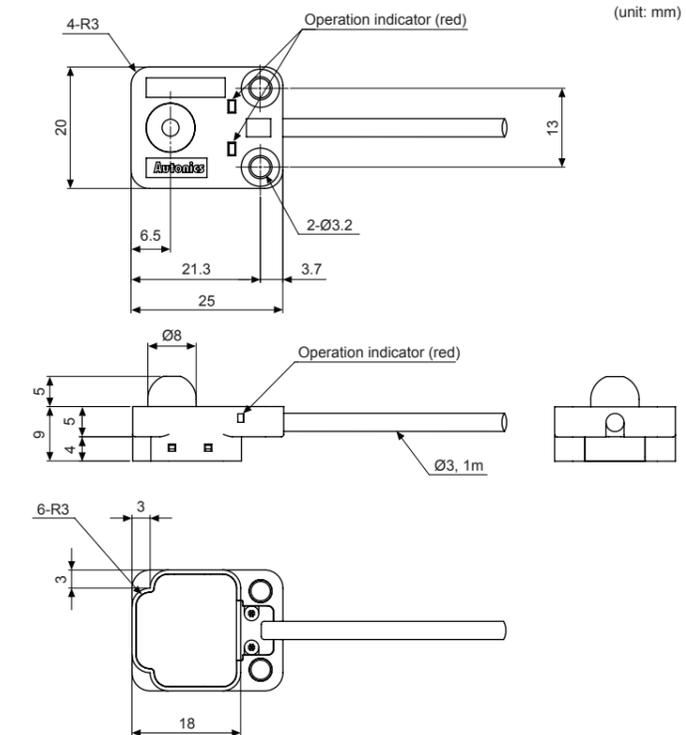
※The above specifications are subject to change and some models may be discontinued without notice.

#### ■ Specifications

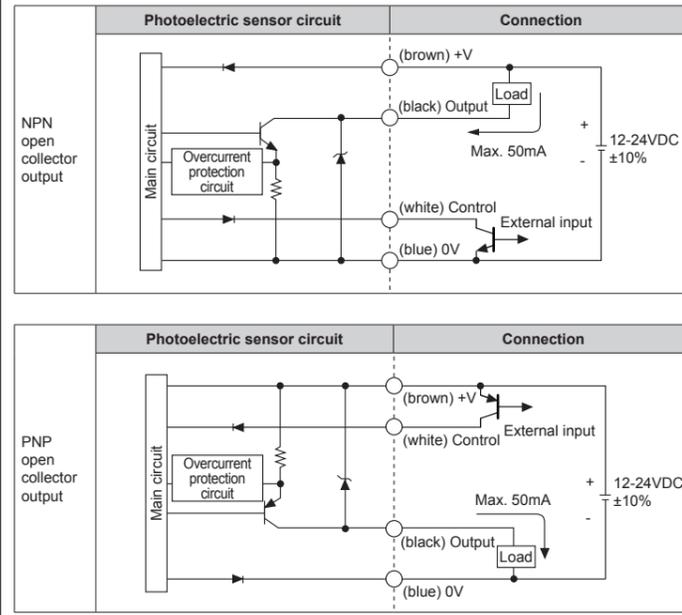
Model	NPN open collector output	BS5-P1ML	BS5-P1MD
	PNP open collector output	BS5-P1ML-P	BS5-P1MD-P
Operation method <sup>※1</sup>	Push button type		
Stop position	5.0±0.4mm		
Button operation <sup>※2</sup>	Output switching position	4.0±0.5mm	
	Operation limit position	Below 0mm	
Operation load <sup>※3</sup>	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 <sup>※4</sup>	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/s <sup>2</sup> (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°C, storage: -25 to 70°C	
	Ambient humidity	35 to 85%RH, storage: 35 to 85%RH	
Protection structure	IP40 (IEC standard)		
Material	Case: Polycarbonate + Glass fiber, Button: Polyoxymethylene		
Cable	Ø3mm, 4-wire, length: 1m (AWG 28, core diameter: 0.08mm, no. of core wires: 19, insulator diameter: Ø0.88mm)		
Weight <sup>※5</sup>	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.

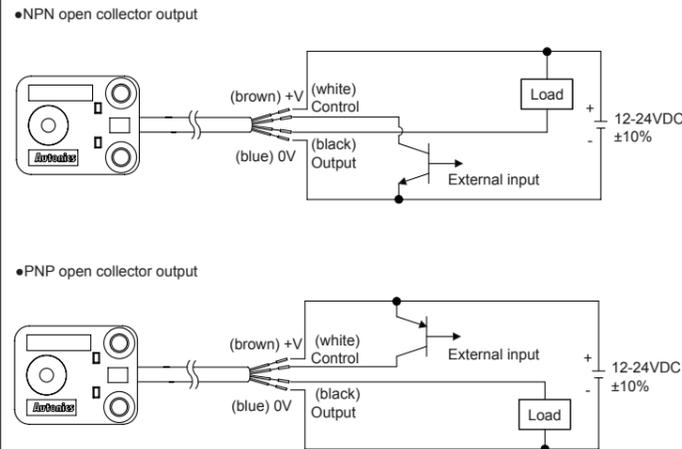
#### ■ Dimensions



#### ■ Control Output Circuit Diagram



#### ■ Connection



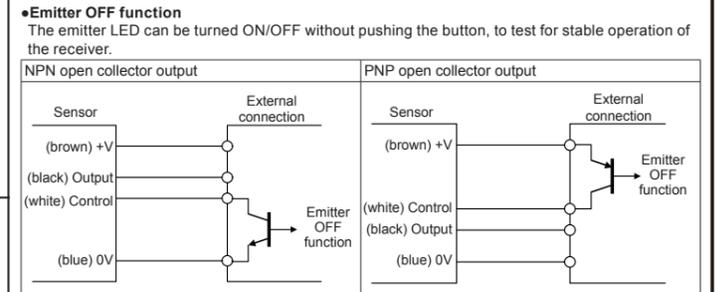
#### ■ Cautions During Use

- The sensor will be able to detect objects after 100ms of supplying power. If the sensor and the load are using separate power sources, power must be supplied to the sensor first.
  - Do not pull the cable with over force over 60N.
  - If the sensor is wired with a high voltage line or power line, it may cause product damage or malfunction. Use separate wiring or a dedicated conduit.
  - Avoid installation in places where dust, corrosion, or vibration may be present, as it may cause product malfunction.
  - When connecting a DC relay or other inductive load to the output, remove power surge by using diodes or varistors.
  - Please use short cables (power cable / output cable) for wiring the sensors. Power surge from extended wiring may cause product malfunction.
  - When using switching mode power supplies (SMPS) to supply power, the F.G. terminal must be grounded, and a noise removing condenser must be installed between 0V and F.G. terminals.
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- Do not install the unit at the below environment to prevent from product malfunction or damage.
    - Place where heavy steam, or dust may be present.
    - Place where water, oil, or chemicals (oil-based detergent, acid alkali, aromatic hydrocarbon, etc.) is directly contacted.
    - Outdoor or place where the ray of the sun is directly contacted.
  - This unit may be used in the following environments.
    - Indoors
    - Altitude: under 2,000m
    - Pollution degree 2
    - Installation category II
- ※Failure to follow these instructions may result in product damage.

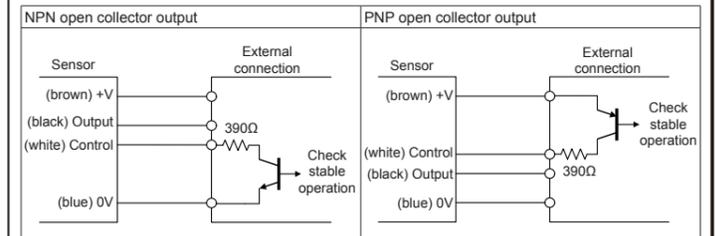
#### ■ Installation

- 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.
- Installation on non-flush surface  
Install the sensor after fitting the sensor in the opening as shown in the figure below.
  - Installation on flush surface  
Insert a spacer between the installation surface and the mounting surface of the sensor as shown in the figure below.

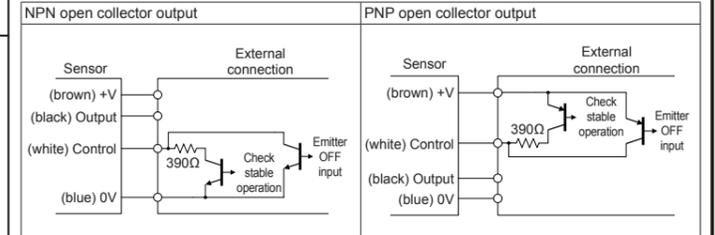
#### ■ Functions



- 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.



- Simultaneous use of emitter OFF and check stable operation function**  
Follow the circuit diagram below:



※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.

#### ■ Major Products

- Photoelectric Sensors
- Temperature Controllers
- Fiber Optic Sensors
- Temperature/Humidity Transducers
- Door Sensors
- SSRs/Power Controllers
- Door Side Sensors
- Counters
- Area Sensors
- Timers
- Proximity Sensors
- Panel Meters
- Pressure Sensors
- Tachometers/Pulse (Rate) Meters
- Rotary Encoders
- Display Units
- Connector/Sockets
- Sensor Controllers
- 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, Co, Nd:yag)
- Laser Welding/Cutting System

**Autonics Corporation**  
http://www.autonics.com

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■ HEADQUARTERS:  
18, Bansong-ro 513beon-gil, Haendae-gu, Busan, South Korea, 48002

■ OVERSEAS SALES:  
#402-303, Bucheon Techno Park, 655, Pyeongcheon-ro, Wonmi-gu, Bucheon, Gyeonggi-do, South Korea, 14502  
TEL: 82-32-610-2730 / FAX: 82-32-329-0728  
E-mail: sales@autonics.com

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