

Self-contained Miniature Photoelectric Sensor

PR-M/PR-F Series

User's Manual

Read this manual before using the product in order to achieve maximum performance.
Keep this manual in a safe place after reading it so that it can be used at any time.

The following symbols alert you to important messages.
Be sure to read these messages carefully.

WARNING	It indicates a hazardous situation which, if not avoided, could result in death or serious injury.
NOTICE	It indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Safety Information for PR-M/F Series

WARNING	<ul style="list-style-type: none"> This product is only intended to detect object(s). Do not use this product to protect a human body or part of a human body. This product is not intended for use as an explosion-proof product. Do not use this product in a hazardous location and/or potentially explosive atmosphere. This product uses DC power. The product may explode or burn if an AC voltage is applied.
NOTICE	<ul style="list-style-type: none"> Do not wire the sensor together with power lines or high voltage lines. If the sensor is wired together with power lines or high voltage lines, there is a risk of malfunction from noise or damage to the sensor. When using a commercially available switching regulator, always ground the frame and ground terminal. Do not use the sensor outdoors or in locations where ambient light hits the receiving surface.

Precautions on Regulations and Standards

■ UL Certificate

This product is a UL/C-UL Recognized component.
File No.: E301717, Category: NRKH2/NRKH8, Enclosure Type: 1 (UL50)
Be sure to consider the following specifications when using Normal type or Resin type as an UL/C-UL Recognized component.

- Use a power supply with Class 2 output defined in NFPA70 (NEC: National Electrical Code).
- Power supply / Control output shall be connected to a single Class 2 source only.
- Use with an over current protection device which is rated 30 V or more and not more than 0.8 A.

■ CE Marking

Keyence Corporation has confirmed that this product complies with the essential requirements of the applicable EC Directive(s), based on the following specifications. Be sure to consider the following specifications when using this product in the Member States of European Union.

● EMC Directive (2004/108/EC)

Applicable standard: EMI: EN60947-5-2, Class A / EMS: EN60947-5-2
Remarks:
These specifications do not give any guarantee that the end-product with this product incorporated complies with the essential requirements of EMC Directive. The manufacturer of the end-product is solely responsible for the compliance on the end-product itself according to EMC Directive.

Packed Items

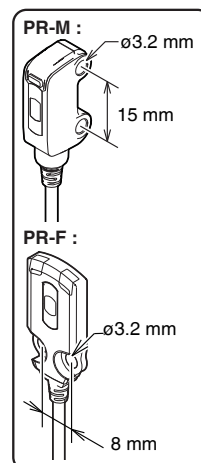
- PR-M/PR-F sensor
- Instruction Manual



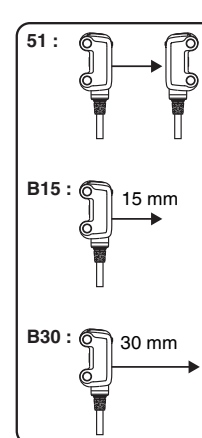
Interpreting the Model Code

PR-M 51 C N □ □
(1) (2) (3) (4) (5) (6)

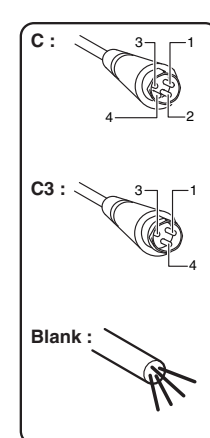
(1) Body type



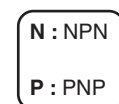
(2) Detection type



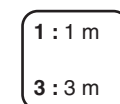
(3) Cable connection



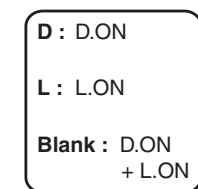
(4) Output type



(5) Cable length



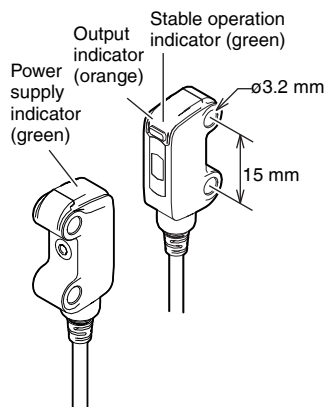
(6) Output operation



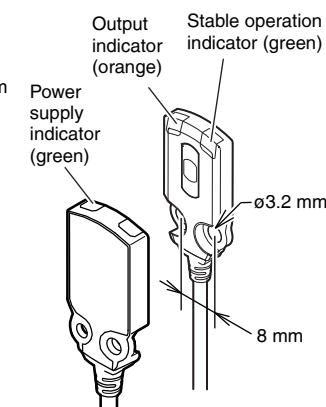
Part Names

■ Thru-beam type

PR-M

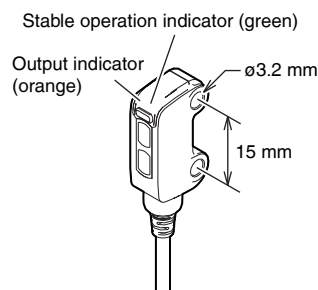


PR-F

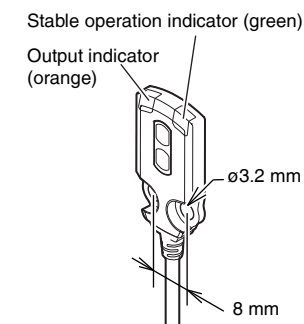


■ Reflective type

PR-M

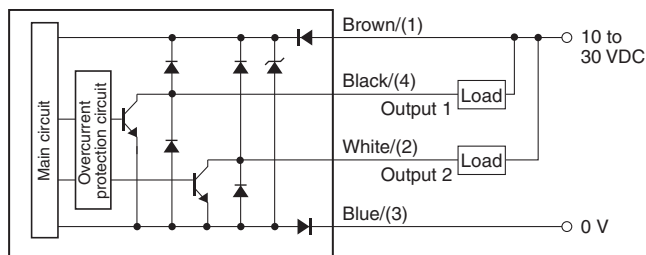


PR-F

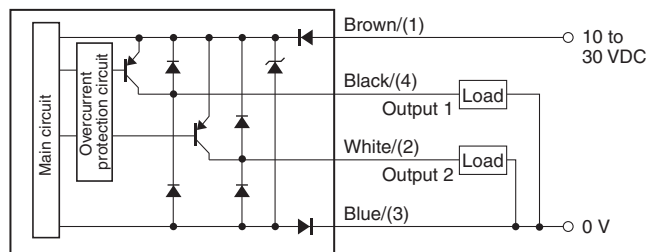


Wiring

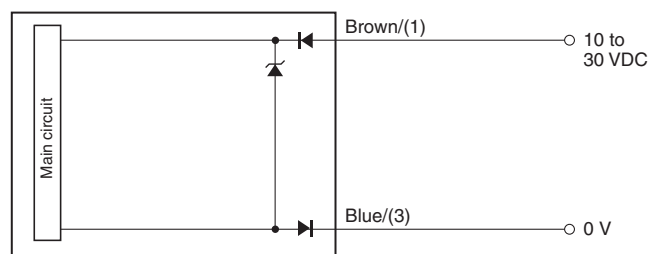
■ NPN



■ PNP



■ Thrubeam type transmitter



■ Connector type pin layout

M8 connector (4 pin) type



M8 connector (3 pin) type

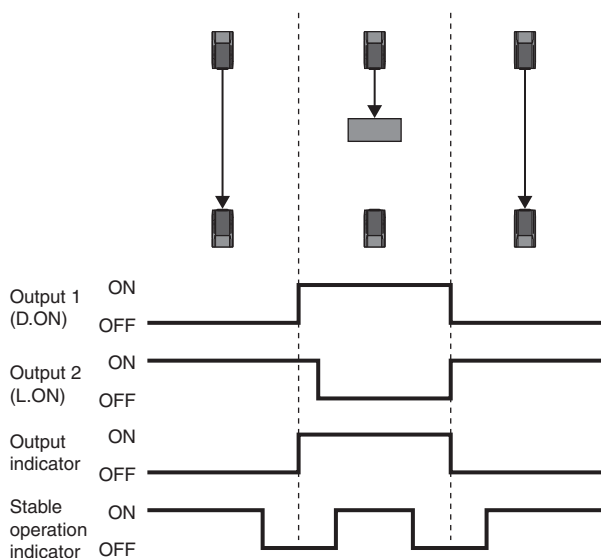


Point

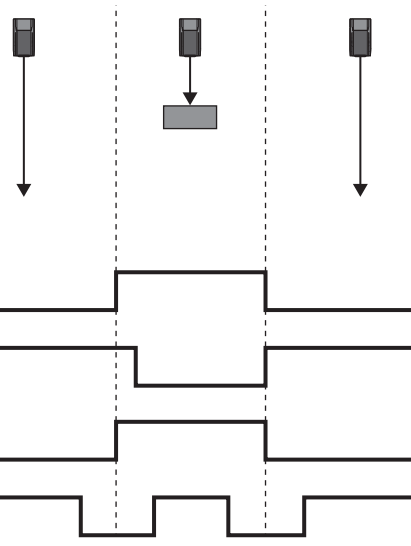
The recommended tightening torque for the M8 connector (4 pin) is 0.4 Nm. The recommended tightening torque for the M8 connector (3 pin) is 0.2 Nm. Waterproof performance will decrease when the connection is loose, so tighten it with a tool.

Output and Indicator Operation

■ Thrubeam type



■ Reflective type



Reference

- The ON→OFF response time differs between output 1 and output 2.
- "Specifications" (page 3)
- The stable operation indicator turns on with stable incoming light and with stable blocked light. When the stable operation indicator is turns off, adjust the sensor installation.
- The M8 connector (3 pin) type is equipped with either output D.ON (Dark-ON) or L.ON (Light-ON).

Troubleshooting

Problem	Cause	Check & Action
All indicators are off.	The power supply is not connected.	Connect the power supply.
The output indicators turn on and off but output does not turn on or off.	Mistaken wiring.	Check the wiring for the output wires.
	The input device has failed.	Try inputting the sensor output to a separate input device.
	Sensor output has failed. Or an output wire is broken.	
The output indicator is flashing.	Overcurrent has passed through an output.	Check that the rated current for the input device has not exceeded 50 mA.
		Check that the output wires are not shorted with any other wires.
	The sensor is affected by ambient light.	When there are light sources nearby (sensors, lighting), adjust the sensor installation.

Specifications

Body type			Mini-slim			Flat		
Type			Thrubeam	Reflective (Background suppression)		Thrubeam	Reflective (Background suppression)	
Model	NPN	1 m cable	PR-M51N1	PR-MB15N1	PR-MB30N1	PR-F51N1	PR-FB15N1	PR-FB30N1
		3 m cable	PR-M51N3	PR-MB15N3	PR-MB30N3	PR-F51N3	PR-FB15N3	PR-FB30N3
		M8 connector (4pin)	PR-M51CN	PR-MB15CN	PR-MB30CN	PR-F51CN	PR-FB15CN	PR-FB30CN
		M8 connector (3pin)	-	-	-	-	-	-
	PNP	1 m cable	-	-	-	-	-	-
		3 m cable	PR-M51P3	PR-MB15P3	PR-MB30P3	PR-F51P3	PR-FB15P3	PR-FB30P3
		M8 connector (4pin)	PR-M51CP	PR-MB15CP	PR-MB30CP	PR-F51CP	PR-FB15CP	PR-FB30CP
		M8 connector (3pin)	PR-M51C3PD PR-M51C3PL	PR-MB15C3PL	PR-MB30C3PL	PR-F51C3PD PR-F51C3PL	PR-FB15C3PL	PR-FB30C3PL
Detection distance			1.2 m	1 to 15 mm	1 to 30 mm	0.6 m	1 to 15 mm	1 to 30 mm
Cable connection			PR-*1: 1 m cable, PR-*3: 3 m cable PR-*C*: M8 connector (4 pin), PR-*C3*: M8 connector (3 pin)					
Number of control outputs ^{*1}			2 outputs					
Output operation ^{*1}	Output 1	Dark-ON	Light-ON			Dark-ON	Light-ON	
	Output 2	Light-ON	Dark-ON			Light-ON	Dark-ON	
Response time ^{*1}	Output 1	0.5 ms				0.5 ms		
	Output 2	ON→OFF: 2.7 ms, OFF→ON: 0.5 ms				ON→OFF: 2.7 ms, OFF→ON: 0.5 ms		
Sensitivity adjustment			None					
Spot diameter			—	Approx. φ3 mm (at 15 mm)	Approx. φ5.5 mm (at 30 mm)	—	Approx. 2.5 x 4.5 mm (at 15 mm)	Approx. φ5 mm (at 30 mm)
Light source			4 element, point light source, red LED (650 nm)					
Mutual interference prevention function			—	4 sensors		—	4 sensors	
Indicators			Output indicator (orange), stable operation indicator (green), thrubeam type transmitter: power supply indicator (green)					
Power supply voltage			10 to 30 VDC including 10% ripple (P-P)					
Consumed current			Transmitter: 11 mA Receiver: 16 mA	19 mA		Transmitter: 11 mA Receiver: 16 mA	19 mA	
Control output			30 VDC or lower, 50 mA or lower Leakage current: When 3 kΩ load resistance, 0.3 mA or lower. When 1 kΩ load resistance, 0.5 mA or lower. When 0.2 kΩ load resistance, 1.5 mA or lower Residual voltage: When 10 mA or lower, 1.0 V or lower. When 10 to 30 mA, 1.5 V or lower. When 30 to 50 mA, 2.0 V or lower.					
Protection circuit			Power supply reverse connection protection, output overcurrent protection, output surge protection, power supply surge protection					
Environment resistance	Enclosure rating	IP67 (IEC 60529), IP69K (DIN 40050-9), 4X, 6P, 13 (NEMA 250)						
	Ambient Light	Incandescent lamp 5,000 lx or lower, sunlight: 20,000 lx or lower						
	Ambient temperature	-25 to +55°C (no freezing)						
	Ambient storage temperature	-25 to +75°C						
	Ambient humidity	35 to 85% RH (no condensation)						
	Shock resistance	1,000 m/s ² , X, Y, Z each direction 6 times						
	Vibration resistance	10 to 55 Hz, double amplitude 1.5 mm, X, Y, Z each direction 2 hours						
	Insulation resistance	20 MΩ or higher (500 VDC)						
Withstand voltage			1,000 VAC 50/60Hz 1 min					
Materials			Case: SUS 316L, indicator cover/lens cover: polysulfone, cord protector: polymethylpentene, filler: polyester-based resin					
Weight	1 m cable	Approx. 42 g	Approx. 21 g		Approx. 36 g		Approx. 18 g	
	3 m cable	Approx. 90 g	Approx. 45 g		Approx. 80 g		Approx. 40 g	
	M8 connector	Approx. 26 g	Approx. 13 g		Approx. 20 g		Approx. 10 g	
Accessories			Instruction Manual					

*1 The number of control outputs for the M8 connector (3 pin) type is 1 output. If "D" is at the end of the model code, the sensor is equipped with a Dark-ON output. If "L" is at the end of the model code, the sensor is equipped with a Light-ON output.
Example: The PR-M51C3PL has a Light-ON output (output 2). (The response time also becomes the output 2 response time)

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