

KEYENCE

New Standard!
Metal Mini-Photoeye



NEW

Self-contained Miniature
Photoelectric Sensor

PR-M/F SERIES

New Standard for
Photoelectric Sensors

02

**Value
Priced**



Quick Delivery

10 LR-Z SERIES



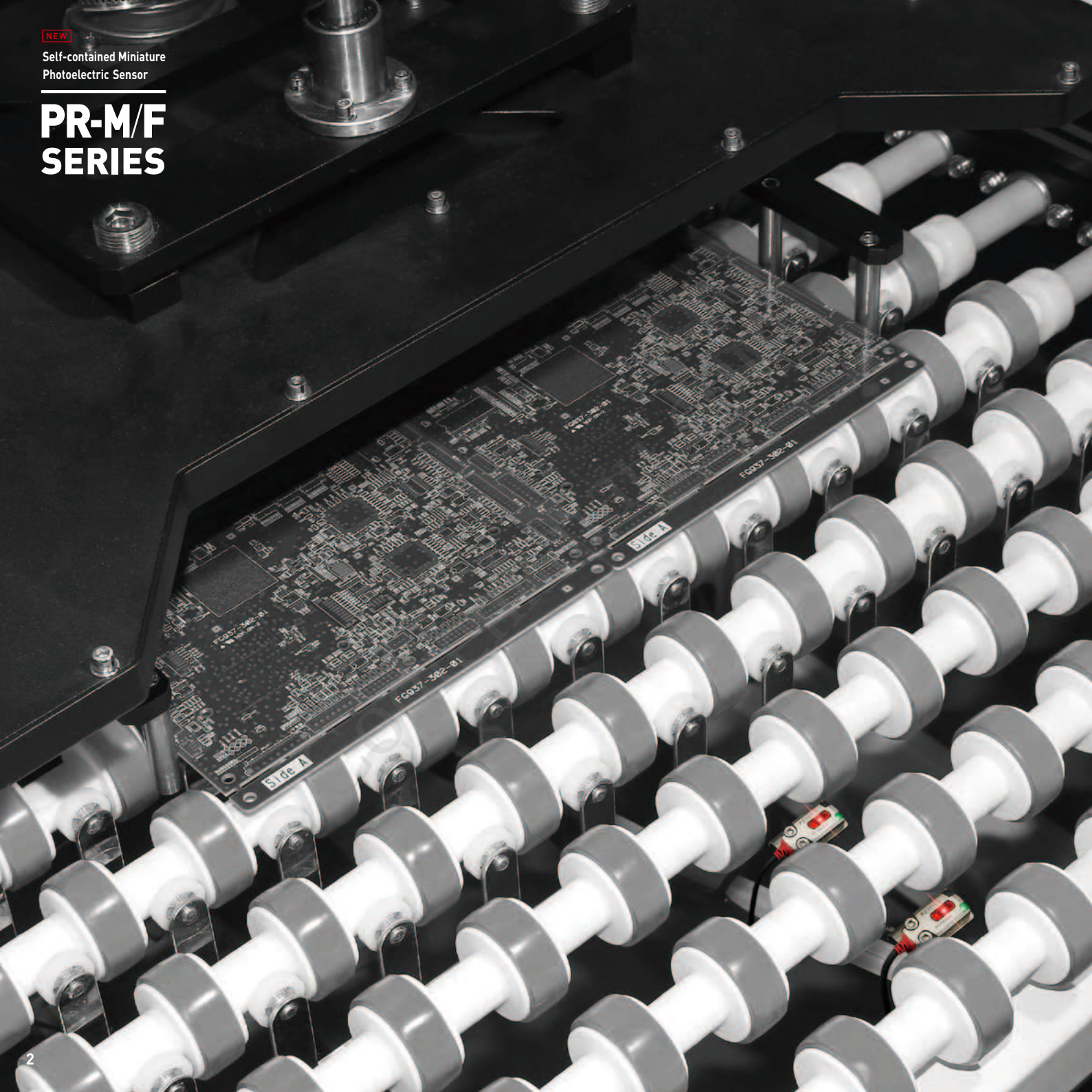
02 PR-M/F SERIES



NEW

Self-contained Miniature
Photoelectric Sensor

PR-M/F SERIES



Optimizing miniature photoelectric sensors

Conventional miniature photoelectric sensors typically do not provide long term reliability due to weak structural design and unstable operation. In order to solve these issues, operation stability features including background suppression and automatic cross talk prevention have been combined with a heavy duty metal housing to create a better miniature photoelectric sensor.

DURABLE & LONG LIFE

Resin filled, Stainless steel body (SUS316L)

STABLE OPERATION

Background suppression and
Automatic cross talk prevention

EASE OF USE

Simple installation and
No sensitivity adjustment required

DURABLE & LONG LIFE

Resin filled, Stainless steel body
(SUS316L)



5X

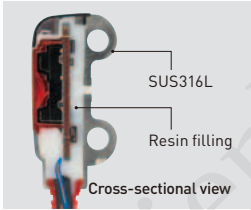
More resistant to
impact than conventional models

Smallest stainless steel photoelectric sensor in its class

The “hybrid structure”, featuring a resin filled, SUS316L stainless steel body, was designed to achieve approximately five times greater shock resistance*. The heavy duty body of the PR-M/F is also highly resistant to oils, acids, and alkaline detergents and can be used in harsh environments due to its NEMA and IP rated enclosure. These features, combined with an 81 percent reduction in size*, result in the smallest, most durable miniature photoelectric sensor in its class.

* Comparison with conventional models.

< Hybrid structure > Stainless steel (SUS316L) + Resin filled body



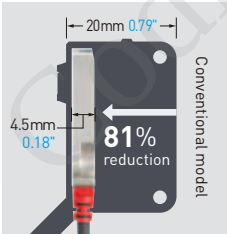
SUS316L
Resin filling
Cross-sectional view



Shock resistance

5X
greater

[Compared to conventional models]

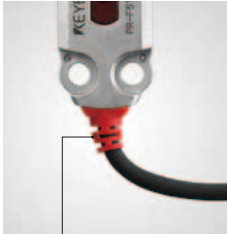


20mm 0.79"
4.5mm 0.18"
81% reduction
Conventional model

The smallest metal photoeye in its class



IP67/69K, NEMA 4X, 6P, 13



Cable protection

Thrubeam type
Maximum Detecting Distance

1.2 m 3.94'

STABLE OPERATION

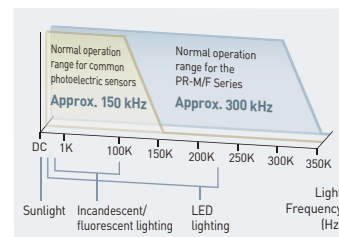
Background suppression and Automatic cross talk prevention

The PR-M/F Series improves detection stability, compared to conventional miniature photoelectric sensors, while maintaining ease of use. This sensor operates on a much higher light emitting frequency than most light sources, which greatly increases its immunity to ambient light. Combined with its built-in cross talk prevention algorithm, the PR-M/F Series eliminates the need to install additional shielding from other light sources. To further improve stability, an automatic power control function has been included to increase/reduce the light intensity of the sensor. Paired with its higher operating frequency and cross talk avoidance functions, this first in industry feature greatly reduces the effect of the target's color or angle to create the most reliable detection ability in its class.

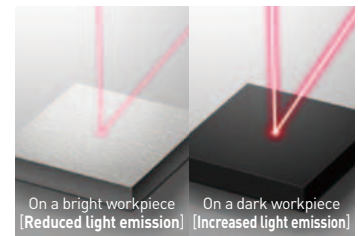
Background
suppression type

Maximum detecting distance

30 mm 1.18" /
15 mm 0.59"



Light frequency comparison



Automatic power control function



EASE OF USE

Simple installation and No sensitivity adjustment required

The PR-M/F was created with ease of use in mind from installation to operation. No special hardware is required as standard M3 screws are used for mounting. All models* feature both Light-on and Dark-on outputs, eliminating the need to maintain multiple part numbers. Once integrated, no sensitivity adjustment is required. Operation is instantly possible and easily monitored with the sensors highly visible indicators.

*Excludes M8 3pin connector type



Highly visible indicators



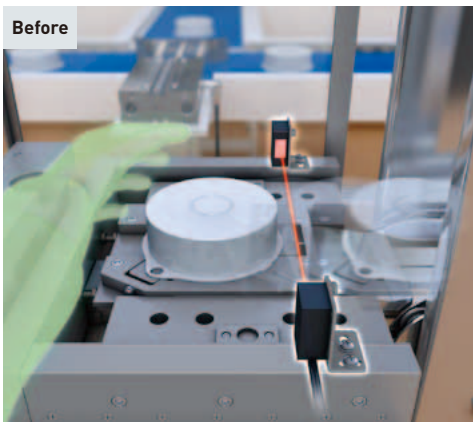
M8 connector types available



Install with standard M3 screws. No special hardware required.

Improvement application

Presence/absence detection of handfed parts



Presence/absence of handfed parts was detected with conventional photoelectric sensors, which interfered with the loading process and resulted in damage.



The profile of the sensor is greatly reduced, decreasing the potential for interference with the loading process while the stainless steel body resists damage when impact does occur.

Bowl feeders

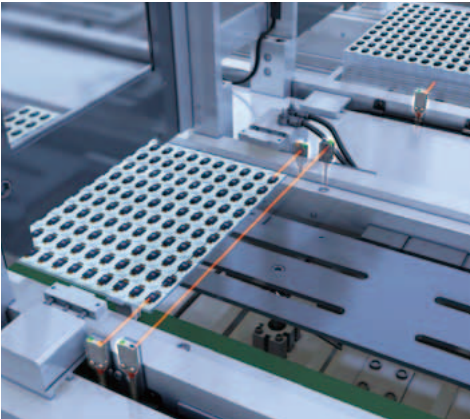
Presence/absence confirmation of connectors during parts feeding



The compact body enables easy installation even in a very narrow space.

Electronics

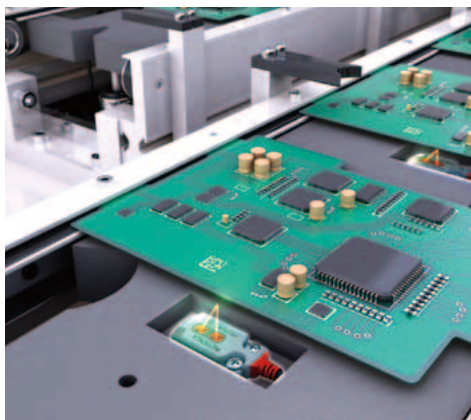
Detecting improper seating of IC chips



No sensitivity adjustment is required, which allows for quick and simple installation while maintaining completely reliable detection.

Electronics

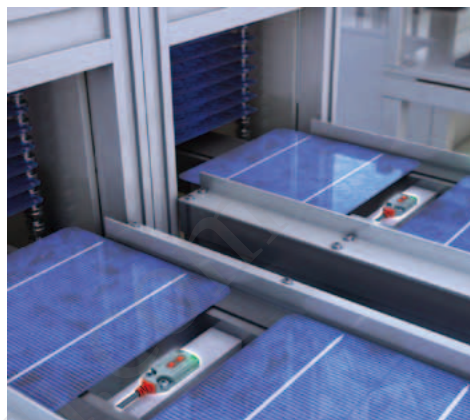
Arrival confirmation of electronic PCBs



The sensitivity is automatically adjusted according to the light intensity received by the sensor, which reduces the effects of the angle and color of the target, and results in stable operation.

Solar

Presence/absence confirmation of solar substrates



The background suppression function reduces the effects of ambient light, which results in stable detection in all conditions.

Packaging

Passing bottle confirmation on side by side conveyors

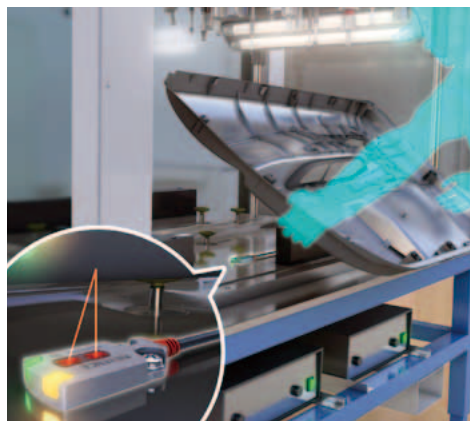


Reduced by 81% in size*, the PR-M/F can be installed in extremely narrow spaces.

*Compared to conventional models

Automotive

Presence/absence confirmation on instrument panels



The equipped background suppression function provides stable detection of components only in the specified operating range, eliminating false detection.

■ Lineup

Configuration	Type	Detecting distance	Connection method	Cable length	Output	Model	Weight
Thrubeam	 Miniature slim type	 1.2 m 47.24"	Cable	1 m 3.28'	NPN	PR-M51N1	Approx. 42 g
				3 m 9.84'	NPN	PR-M51N3	Approx. 90 g
					PNP	PR-M51P3	
			M8 4-pin *1	120 mm 4.72" *2	NPN	PR-M51CN	Approx. 26 g
			M8 3-pin Light-on *1		PNP	PR-M51CP	
			M8 3-pin Dark-on *1		PNP	PR-M51C3PD	
	 Flat type	 0.6 m 23.62"	Cable	1 m 3.28'	NPN	PR-F51N1	Approx. 36 g
				3 m 9.84'	NPN	PR-F51N3	Approx. 80 g
					PNP	PR-F51P3	
			M8 4-pin *1	120 mm 4.72" *2	NPN	PR-F51CN	Approx. 20 g
			M8 3-pin Light-on *1		PNP	PR-F51C3PL	
			M8 3-pin Dark-on *1		PNP	PR-F51C3PD	
Reflective with Background Suppression	 Miniature slim type	 1 to 15 mm 0.04" to 0.59"	Cable	1 m 3.28'	NPN	PR-MB15N1	Approx. 21 g
				3 m 9.84'	NPN	PR-MB15N3	Approx. 45 g
					PNP	PR-MB15P3	
			M8 4-pin *1	120 mm 4.72" *2	NPN	PR-MB15CN	Approx. 13 g
			M8 3-pin Light-on *1		PNP	PR-MB15CP	
					PNP	PR-MB15C3PL	
	 Flat type	 1 to 30 mm 0.04" to 1.18"	Cable	1 m 3.28'	NPN	PR-MB30N1	Approx. 21 g
				3 m 9.84'	NPN	PR-MB30N3	Approx. 45 g
					PNP	PR-MB30P3	
			M8 4-pin *1	120 mm 4.72" *2	NPN	PR-MB30CN	Approx. 13 g
			M8 3-pin Light-on *1		PNP	PR-MB30CP	
					PNP	PR-MB30C3PL	
	 Flat type	 1 to 15 mm 0.04" to 0.59"	Cable	1 m 3.28'	NPN	PR-FB15N1	Approx. 18 g
				3 m 9.84'	NPN	PR-FB15N3	Approx. 40 g
					PNP	PR-FB15P3	
			M8 4-pin *1	120 mm 4.72" *2	NPN	PR-FB15CN	Approx. 10 g
			M8 3-pin Light-on *1		PNP	PR-FB15CP	
					PNP	PR-FB15C3PL	
	 Flat type	 1 to 30 mm 0.04" to 1.18"	Cable	1 m 3.28'	NPN	PR-FB30N1	Approx. 18 g
				3 m 9.84'	NPN	PR-FB30N3	Approx. 40 g
					PNP	PR-FB30P3	
			M8 4-pin *1	120 mm 4.72" *2	NPN	PR-FB30CN	Approx. 10 g
			M8 3-pin Light-on *1		PNP	PR-FB30CP	
					PNP	PR-FB30C3PL	

*1 Cable is sold separately.

*2 Length between the main unit and connector.

■ Extension Cable

Specifications	Material	Appearance	Connection method	Length	Model	Weight
Standard	Cable: PVC Connector: Brass nickel plating	 Straight type	M8 4-pin	2 m 6.56'	OP-73864	55 g
				10 m 32.81'	OP-73865	220 g
	Cable: PVC Connector: Zinc nickel plating		M8 3-pin	2 m 6.56'	OP-87627	80 g
Chemical resistant	Cable: PVC Connector: SUS316L		M8 4-pin	2 m 6.56'	OP-87621	75 g
			M8 3-pin	2 m 6.56'	OP-87622	60 g

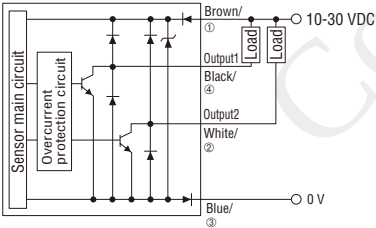
■ Enclosure ratings

Enclosure rating	Conector type		Cable type
	w/ standard extension cable	w/ chemical resistant extension cable	
IP67 IEC60529	✓	✓	✓
IP69K DIN40050-9	—	—	✓
ECOLAB, Diversey	—	✓*	✓*

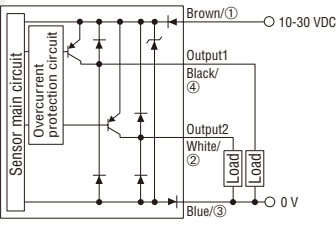
* Have passed resistance tests with cleaning agents from multiple manufactures.

■ I/O circuit diagram

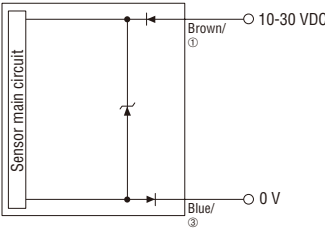
NPN type : Reflective & Thrubeam receiver



PNP type : Reflective & Thrubeam receiver



Thrubeam transmitter



M8 Connector pin layout (4-pin type)



M8 Connector pin layout (3-pin type)



■ Mounting bracket

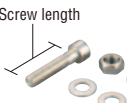
Type	Model	Material/Weight
 Flat type standard mounting bracket (M3 screw x 2 supplied) Qty: 1	PR-B01	SUS316L Approx. 8 g
 Flat type rear mounting bracket (M3 screw x 2 supplied) Qty: 1	PR-B02	SUS316L Approx. 10 g
 Miniature slim type standard mounting bracket (M3 screw x 2, plate nut supplied) Qty: 1	PR-B03	SUS316L Approx. 8 g
 Miniature slim type rear mounting bracket (M3 screw x 2, plate nut supplied) Qty: 1	PR-B04	SUS316L Approx. 10 g
 Miniature slim type side mounting bracket (M3 screw x 2, plate nut supplied) Qty: 1	PR-B05	

■ Accessory

Type	Model	Material/Weight
 Plate nut (for the flat type) Qty: 2 (M3 screw x 4 supplied)	OP-87667	SUS316L Approx. 1 g
 Plate nut (for the miniature slim type) Qty: 2 (M3 screw x 4 supplied)	OP-87668	SUS316L Approx. 2 g
 Spacer (for the flat type) Qty: 2 x 2 (M3 screw x 4 supplied)	OP-87669	SUS303 Approx. 1 g
 Slit, ø0.5 (for the flat type) Qty: 1 Detecting distance: 30 mm 1.18" *	OP-87670	SUS304 Approx. 1 g
 Slit, 0.5 x 3 (for the flat type) Qty: 1 Detecting distance: 120 mm 4.72" *	OP-87671	
 Slit, ø0.5 (for the miniature slim type) Qty: 1 Detecting distance: 30 mm 1.18" *	OP-87672	
 Slit, 0.5 x 3 (for the miniature slim type) Qty: 1 Detecting distance: 180 mm 7.09" *	OP-87673	

* Dedicated to the thrubeam type. The detecting distance is when attached to both the transmitter and receiver.

■ Mounting bracket (adjustable bracket)

Type	Model	Material/Weight
 Adjustable bracket for the miniature slim type (M3 screw x 2 supplied)	OP-87404	Zinc nickel plating Approx. 95 g
 Locking screw for adjustable bracket Screw length: 45 mm 1.77"	OP-87406	Iron nickel plating Approx. 70 g
	OP-87407	Iron nickel plating Approx. 80 g
 Adjustable mount for the flat type mounting bracket	OP-87664	Zinc nickel plating and others Approx. 190 g
 Mounting bracket for the flat type (M3 screw x 4, plate nut x 1 for the compact slim/flat types supplied)	200 mm 7.87"	OP-87665 SUS304 Approx. 77 g
	130 mm 5.12"	OP-87666 SUS304 Approx. 50 g



Specifications



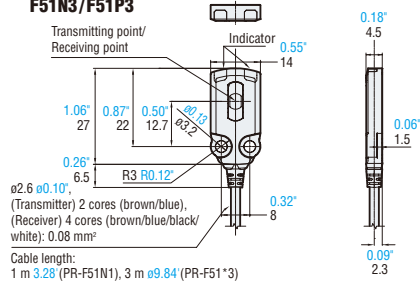
Appearance			Miniature slim			Flat		
Type			Thrubeam	Reflective with Background Suppression		Thrubeam	Reflective with Background Suppression	
Model	NPN output	Cable (1 m 3.28')	PR-M51N1	PR-MB15N1	PR-MB30N1	PR-F51N1	PR-FB15N1	PR-FB30N1
		Cable (3 m 9.84')	PR-M51N3	PR-MB15N3	PR-MB30N3	PR-F51N3	PR-FB15N3	PR-FB30N3
		M8 connector 4-pin	PR-M51CN	PR-MB15CN	PR-MB30CN	PR-F51CN	PR-FB15CN	PR-FB30CN
		M8 connector 3-pin	—					
	PNP output	Cable (1 m 3.28')	—					
		Cable (3 m 9.84')	PR-M51P3	PR-MB15P3	PR-MB30P3	PR-F51P3	PR-FB15P3	PR-FB30P3
		M8 connector 4-pin	PR-M51CP	PR-MB15CP	PR-MB30CP	PR-F51CP	PR-FB15CP	PR-FB30CP
		M8 connector 3-pin*1	PR-M51C3PD PR-M51C3PL	PR-MB15C3PL	PR-MB30C3PL	PR-F51C3PD PR-F51C3PL	PR-FB15C3PL	PR-FB30C3PL
Detectable distance			1.2 m 3.94'	1 to 15 mm 0.04" to 0.59"	1 to 30 mm 0.04" to 1.18"	0.6 m 1.97'	1 to 15 mm 0.04" to 0.59"	1 to 30 mm 0.04" to 1.18"
Max. distance at which the sensor turns OFF (white paper*2)			—	20 mm 0.79"	43 mm 1.69"	—	20 mm 0.79"	47 mm 1.85"
No. of control outputs*1			2 : 1 Light-ON, 1 Dark-ON					
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	ON -> OFF: 0.5 ms, OFF -> ON: 0.5 ms						
	Output 2	ON -> OFF: 2.7 ms, OFF -> ON: 0.5 ms						
Sensitivity adjustment			None					
Spot diameter			—	Approx. ø3 mm ø0.12" (at 15 mm 0.59")	Approx. ø5.5 mm ø0.22" (at 30 mm 0.18")	—	Approx. 2.5 x 4.5 mm 0.10" x 0.18" (at 15 mm 0.59")	Approx. ø5 mm 0.20" (at 30 mm 0.18")
Light source			4 element, Red LED (650 nm)					
Mutual interference prevention			—	4 units		—	4 units	
Indicator			Output indicator (orange), Stable operation indicator (green), Thrubeam transmitter: power indicator (green)					
Power voltage			10 to 30 VDC, including 10% ripple (P-P)					
Power consumption			Transmitter: 11 mA Receiver: 16 mA	19 mA		Transmitter: 11 mA Receiver: 16 mA	19 mA	
Control output			NPN output type: NPN open collector, PNP output type: PNP open collector 30 VDC or less, 50 mA or less Residual voltage: 1.0 V or less at 10 mA or less, 1.5 V or less at 10 to 30 mA, 2.0 V or less at 30 to 50 mA Leakage current: 0.3 mA or less at 3 kΩ of load resistance, 0.5 mA or less at 1 kΩ of load resistance, 1.5 mA or less at 0.2 kΩ of load resistance					
Protection circuit			Protection against reverse power connection, output overcurrent, power supply surge, output surge					
Environmental resistance	Enclosure rating		IP67 (IEC60529), IP69K (DIN40050-9)*3, 4X, 6P, 13 (NEMA250)					
	Ambient light		Incandescent lamp: 5000 lux or less, Sunlight: 20000 lux or less					
	Ambient temperature		-25 to +55°C -13°F to +131°F (No freezing)					
	Storage temperature		-25 to +75°C -13°F to +167°F					
	Ambient humidity		35 to 85% RH (No condensation)					
	Shock resistance		1000 m/s ² in X, Y, Z axis directions respectively 6 times					
	Vibration resistance		10 to 55 Hz, 1.5 mm 0.06" double amplitude in the X, Y, and Z directions, 2 hours respectively					
	Insulating resistance		20 MΩ or more (500 VDC)					
Material	Withstand voltage		1000 VAC, 50/60 Hz, 1 min					
			Case: SUS316L, Indicator cover/Lens cover: Polysulfone, Cable: PVC, Cable protection: PMP, Filler: Polyester resin, Connector (connector type only): Brass nickel plating/Polyester elastomer					
Weight	1 m 3.28' cable		Approx. 42 g	Approx. 21 g		Approx. 36 g	Approx. 18 g	
	3 m 9.84' 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	
Accompanying items			Instruction Manual					

*1 The M8 connector (3 pin) type has 1 control output. If "D" is at the end of the part number, the sensor is equipped with a Dark-ON output. If "L" is at the end of the part number, the sensor is equipped with a Light-ON output. Example: The PR-M51C3PL has a Light-ON output.

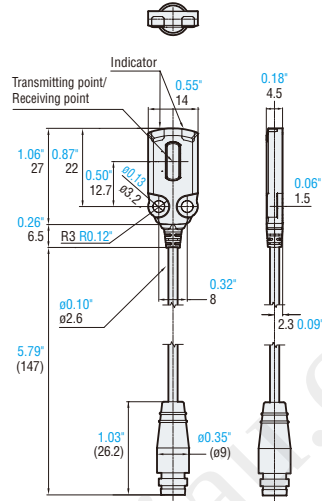
*2 Typical value.

*3 Cable type only.

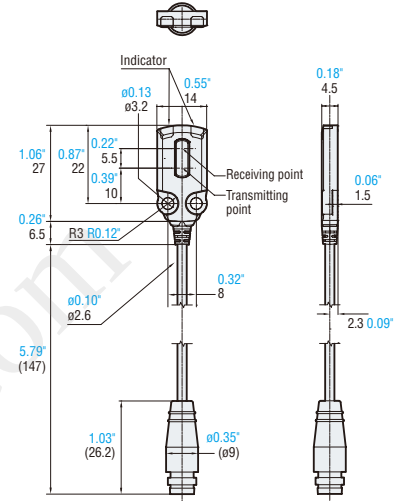
**PR-F51N1/
F51N3/F51P3**



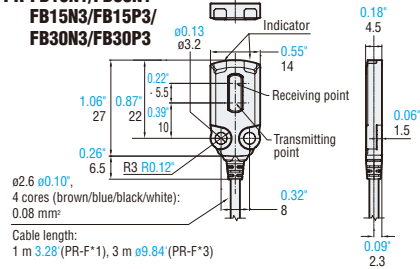
**PR-F51CN/F51CP/
F51C3PL/F51C3PD**



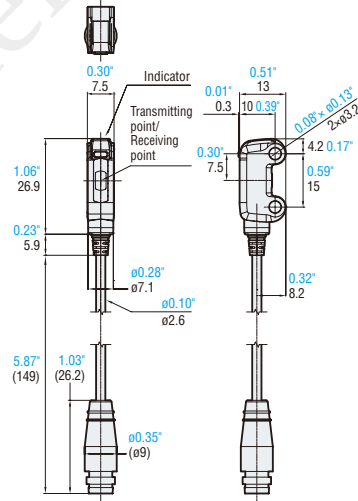
**PR-FB15CN/FB15CP/FB30CN/FB30CP/
FB15C3PL/FB30C3PL**



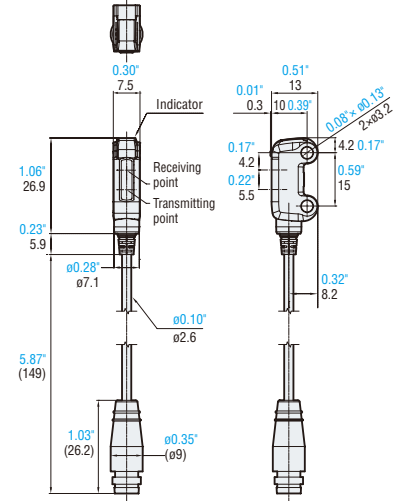
**PR-FB15N1/FB30N1
FB15N3/FB15P3/
FB30N3/FB30P3**



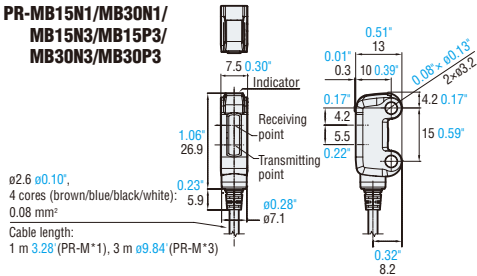
**PR-M51CN/M51CP/
M51C3PL/M51C3PD**



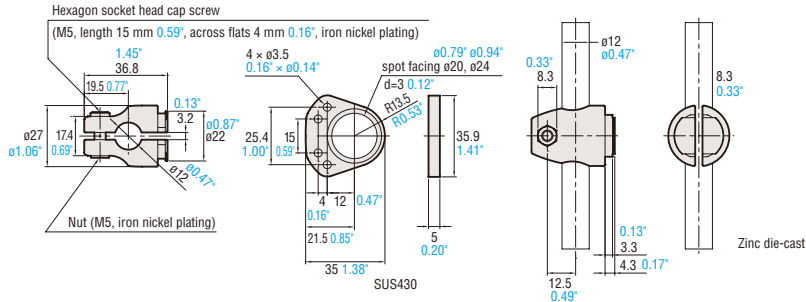
**PR-MB15CN/MB15CP/MB30CN/
MB30CP/MB15C3PL/MB30C3PL**



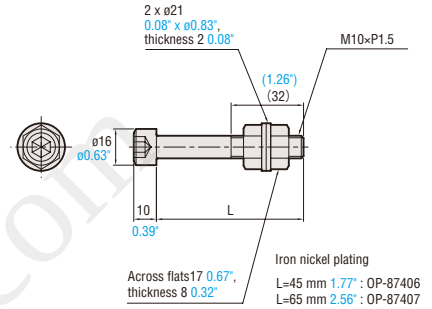
**PR-MB15N1/MB30N1/
MB15N3/MB15P3/
MB30N3/MB30P3**



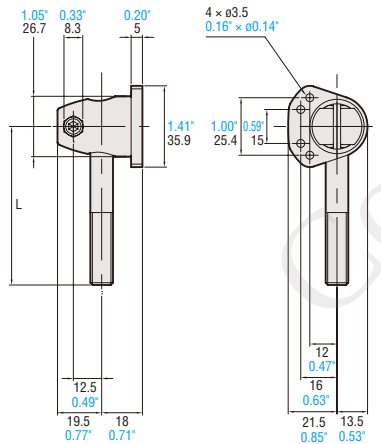
OP-87404



OP-87406/87407

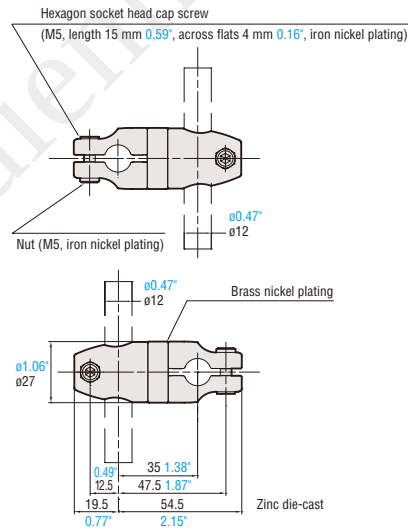


OP-87406 (87407) + OP-87404

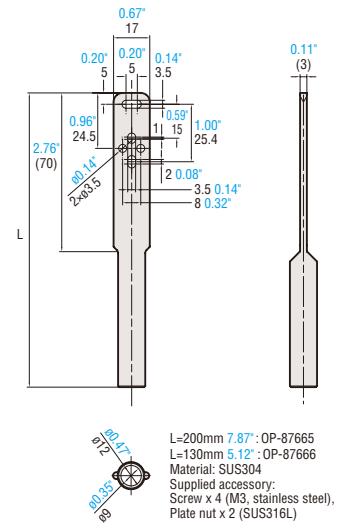


L=50mm 1.97": OP-87406
L=70mm 2.76": OP-87407

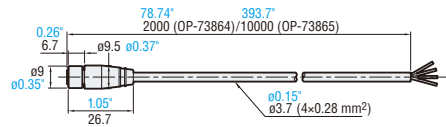
OP-87664



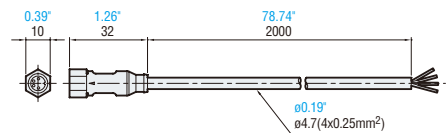
OP-87665/87666



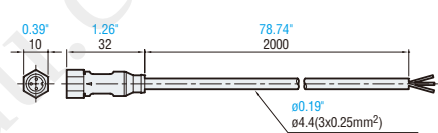
OP-73864 / 73865



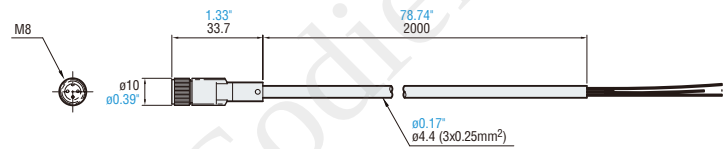
OP-87621



OP-87622



OP-87627



M8 Connector pin layout
(4-pin type)



M8 Connector pin layout
(3-pin type)



No.	Color
①	Brown
②	White
③	Blue
④	Black

CAD DATA DOWNLOAD
www.keyence.com/CADG

SELF-CONTAINED PHOTOELECTRIC SENSOR

PZ-G Series LED



Optical axis adjustment is simple with the built-in alignment indicator



One-touch mounting bracket simplifies installation



Laser marked tags eliminate possible contamination caused by deteriorating paint or sticker type labels

Detecting distance	High-Power Dual LED-type		4-element red LED-type				
	High-power thru-beam type PZ-G52	40 m131.2'	Thru-beam type PZ-G51	20 m65.6'	Reflective type PZ-G41	1 m3.3'	Retro-reflective type PZ-G61

SELF-CONTAINED CMOS LASER SENSOR

LR-Z Series

CMOS Laser

All-Purpose Laser Photoeye



Best Detection Ability
in its class with CMOS
laser stability



High enclosure rating and
Stainless steel body (SUS316L)
ensure durability and long life



One-touch setup and Digital
display simplify operation

Detecting distance

Short-range type

LR-ZB100 **35 to 100 mm** 1.38 to 3.94"

Long-range type

LR-ZB250 **35 to 250 mm** 1.38 to 9.84"



Self-contained
CMOS Laser Sensor

**LR-Z
SERIES**

01



Self-contained Miniature
Photoelectric Sensor

**PR-M/F
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02



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Please read the instruction manual carefully in order to safely operate any KEYENCE product.

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