KEYENCE

New Standard!

Metal Mini-Photoeye

NEW

Self-contained Miniature Photoelectric Sensor

PR-M/F SERIES

New Standard for Photoelectric Sensors

02

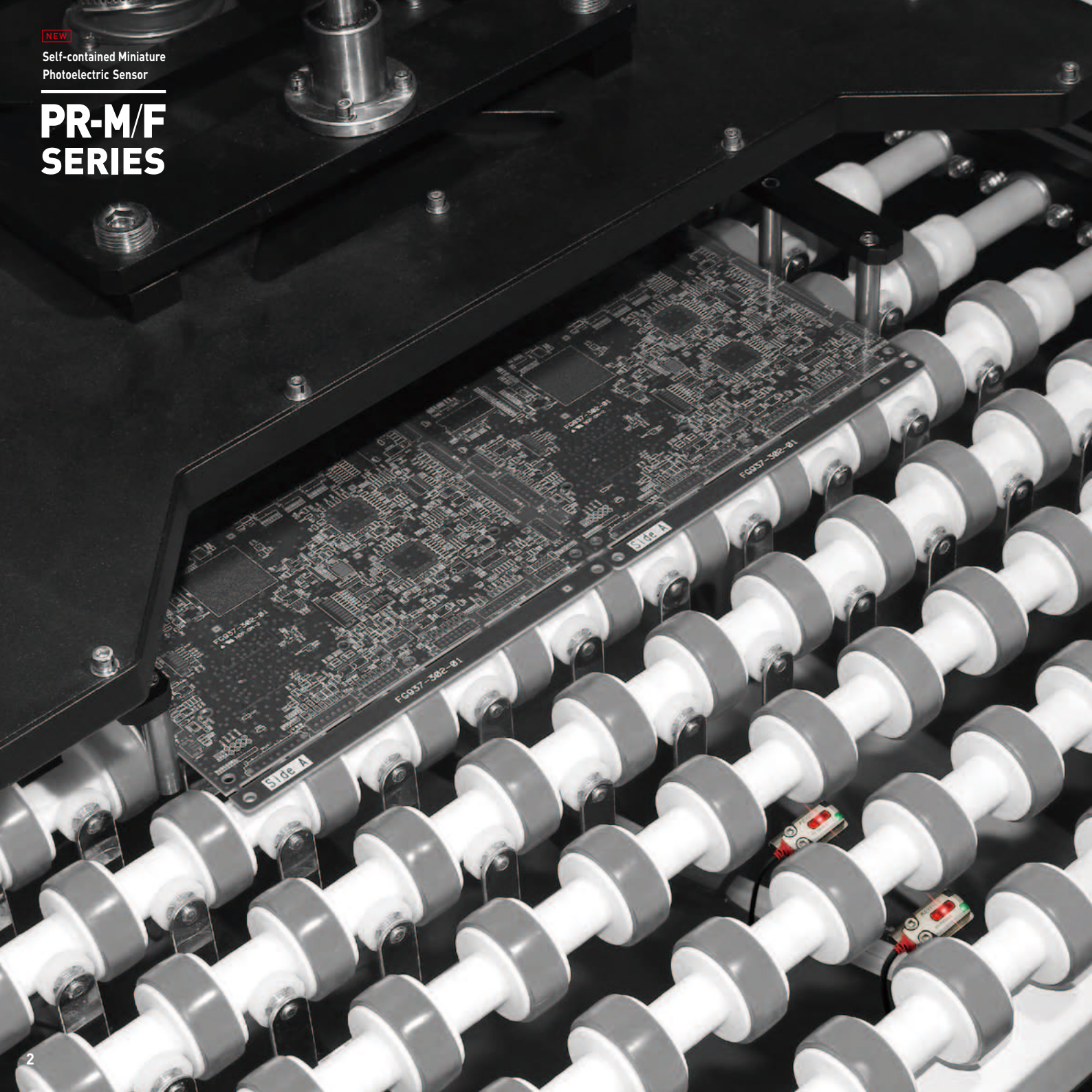
Value Priced

Quick Delivery

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

Value Priced

DURABLE & LONG LIFE

Resin filled, Stainless steel body (SUS316L)

5X

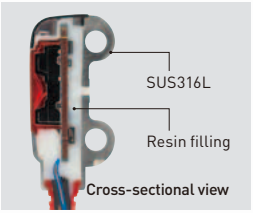
More resistant to
impact than conventional models

Smallest stainless steel photoelectric sensor in its class

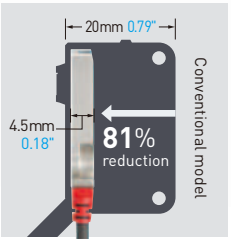
The “hybrid structure”, featuring a resin filled, SUS316L stainless steel body, was designed to achieve approximately five times greater shock resistance*. The heavy duty body of the PR-M/F is also highly resistant to oils, acids, and alkaline detergents and can be used in harsh environments due to its 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



Shock resistance
5X greater
Compared to conventional models



The smallest metal photoeye in its class

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

Cable protection

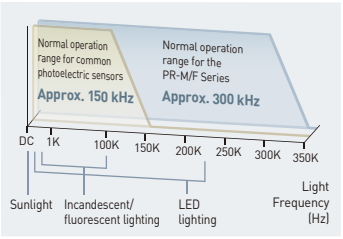
Thrubeam type
Maximum Detecting Distance
1.2 m 3.94'

Background suppression type
Maximum detecting distance
30 mm 1.18"/
15 mm 0.59"

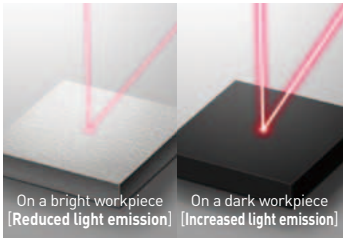
STABLE OPERATION

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.



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

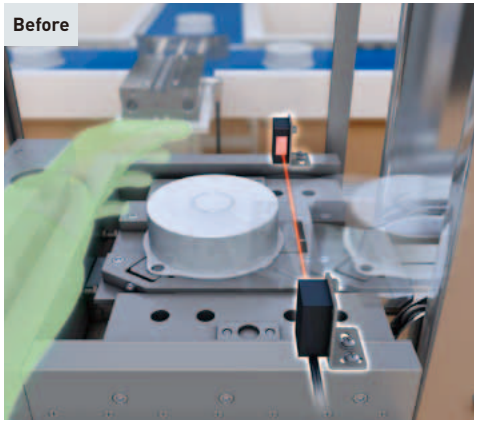
Install with standard M3 screws. No special hardware required.

Versatile for use in a wide variety of applications and industries

Improvement application

Presence/absence detection of handfed parts

Before



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

After

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.

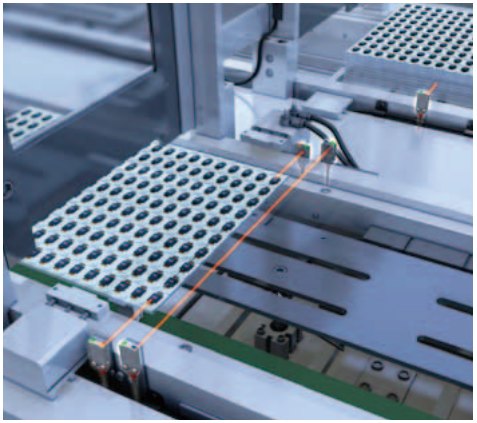
Bowl feeders

Presence/absence confirmation of connectors during parts feeding

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

Electronics

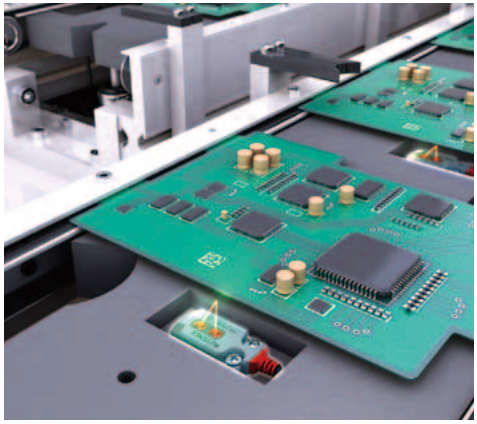
Detecting improper seating of IC chips



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

Electronics

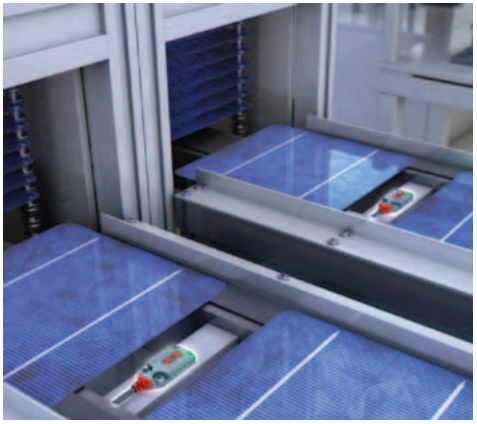
Arrival confirmation of electronic PCBs



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

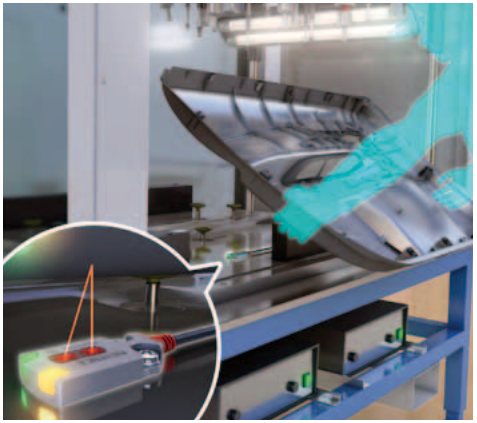
Passing bottle confirmation on side by side conveyors

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
					PNP	**PR-M51CP**	
			M8 3-pin Light-on *1		PNP	**PR-M51C3PL**	
			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
					PNP	**PR-F51CP**	
			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 to15 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
					PNP	**PR-MB15CP**	
			M8 3-pin Light-on *1		PNP	**PR-MB15C3PL**	
		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
					PNP	**PR-MB30CP**	
			M8 3-pin Light-on *1		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
					PNP	**PR-FB15CP**	
			M8 3-pin Light-on *1		PNP	**PR-FB15C3PL**	
		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
					PNP	**PR-FB30CP**	
			M8 3-pin Light-on *1		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
			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

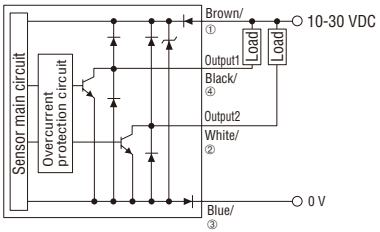
Enclosure ratings

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

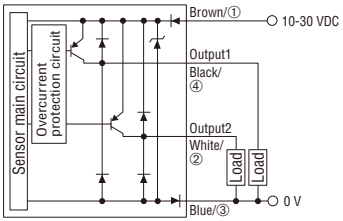
* Have passed resistance tests with cleaning agents from multiple manufactures.

I/O circuit diagram

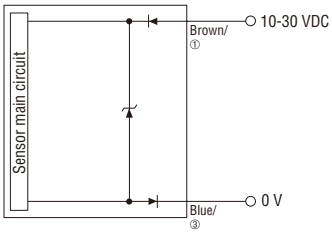
NPN type : Reflective & Thrubeam receiver



PNP type : Reflective & Thrubeam receiver



Thrubeam transmitter



M8 Connector pin layout (4-pin type) 

M8 Connector pin layout (3-pin type) 

Mounting bracket

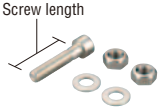
Type	Model	Material/Weight
 Flat type standard mounting bracket (M3 screw x 2 supplied) Qty: 1	**PR-B01**	SUS316L Approx. 8 g
 Flat type rear mounting bracket (M3 screw x 2 supplied) Qty: 1	**PR-B02**	SUS316L Approx. 10 g
 Miniature slim type standard mounting bracket (M3 screw x 2, plate nut supplied) 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 (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
Screw length  Locking screw for adjustable bracket	Screw length: 45 mm 1.77"	**OP-87406**	Iron nickel plating Approx. 70 g
	Screw length: 65 mm 2.56"	**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

OP-87406+87664+87666

OP-87404+87406+87668

Specifications

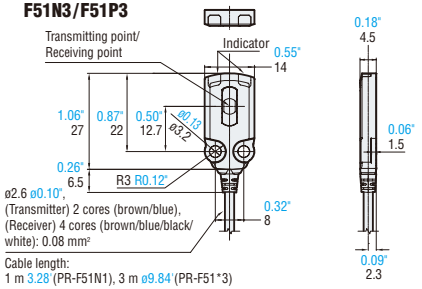
Appearance			Miniature slim			Flat		
Type			Thrubeam	Reflective with Background Suppression		Thrubeam	Reflective with Background Suppression	
Model	NPN output	Cable (1 m 3.28')	**PR-M51N1**	**PR-MB15N1**	**PR-MB30N1**	**PR-F51N1**	**PR-FB15N1**	**PR-FB30N1**
		Cable (3 m 9.84')	**PR-M51N3**	**PR-MB15N3**	**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/s² 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)					
		Withstand voltage	1000 VAC, 50/60 Hz, 1 min					
Material			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.

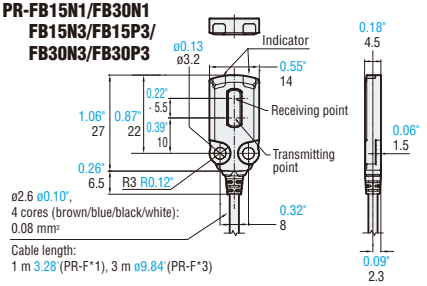
*2 Typical value.

*3 Cable type only.

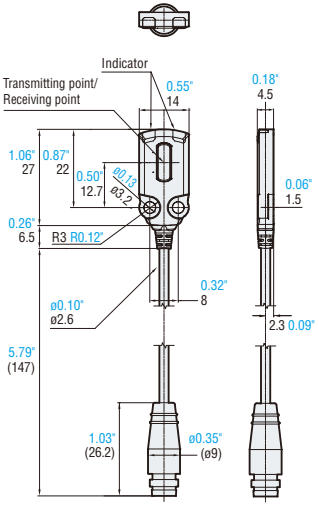
PR-F51N1/ F51N3/F51P3



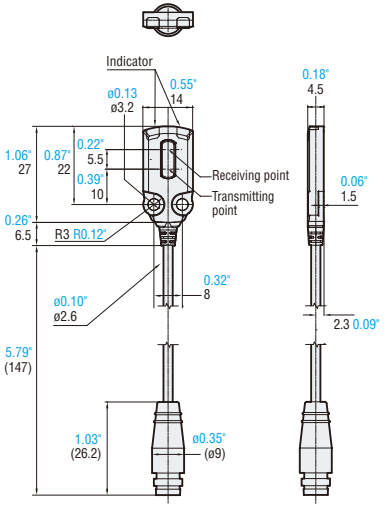
PR-FB15N1/FB30N1 FB15N3/FB15P3/ FB30N3/FB30P3



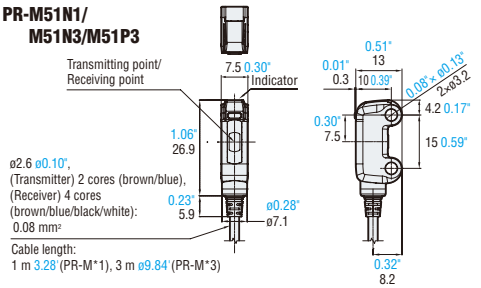
PR-F51CN/F51CP/ F51C3PL/F51C3PD



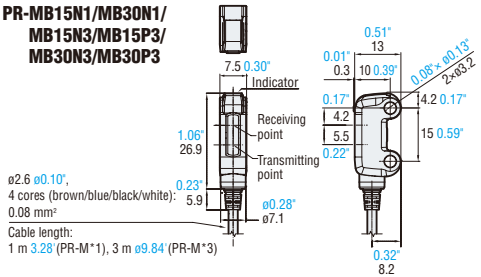
PR-FB15CN/FB15CP/FB30CN/FB30CP/ FB15C3PL/FB30C3PL



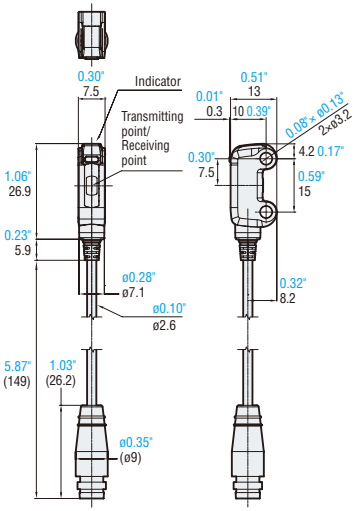
PR-M51N1/ M51N3/M51P3



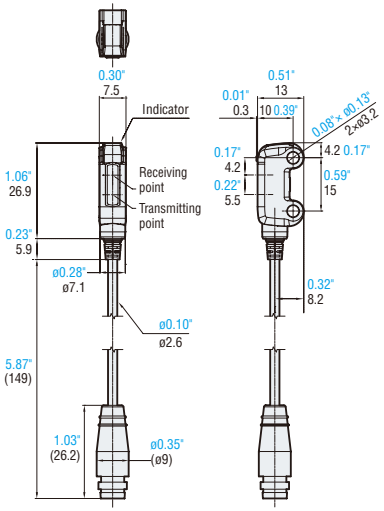
PR-MB15N1/MB30N1/ MB15N3/MB15P3/ MB30N3/MB30P3



PR-M51CN/M51CP/ M51C3PL/M51C3PD

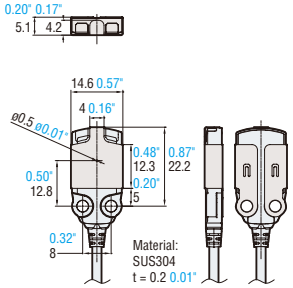


PR-MB15CN/MB15CP/MB30CN/ MB30CP/MB15C3PL/MB30C3PL

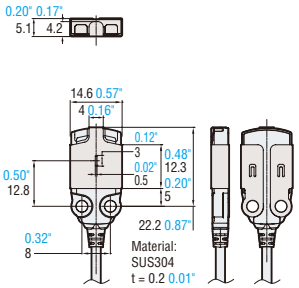


Unit: mm inch

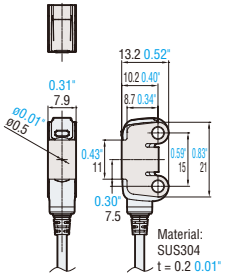
OP-87670



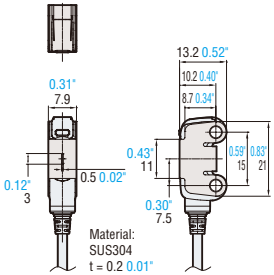
OP-87671



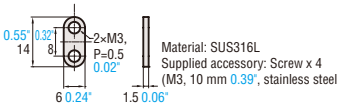
OP-87672



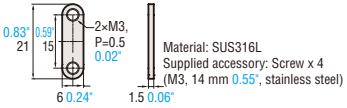
OP-87673



OP-87667

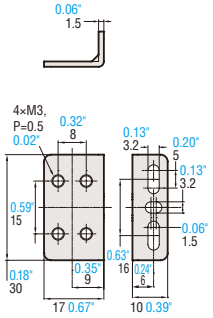


OP-87668



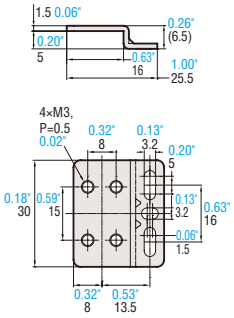
OP-87669

PR-B01



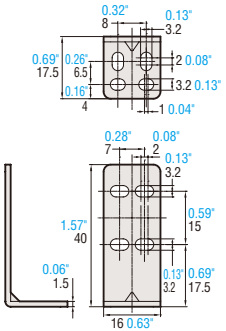
Material: SUS316L
Supplied accessory: Screw x 2
(M3, 6 mm 0.24", stainless steel)

PR-B02



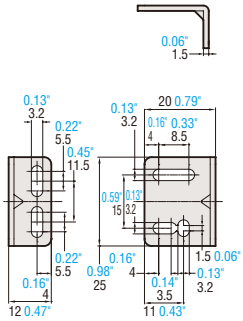
Material: SUS316L
Supplied accessory: Screw x 2
(M3, 6 mm 0.24", stainless steel)

PR-B03



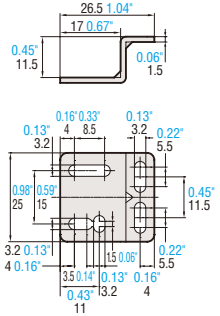
Material: SUS316L
Supplied accessory:
Screw x 2 (M3, 12 mm 0.47", stainless steel),
Plate nut (SUS316L)

PR-B04



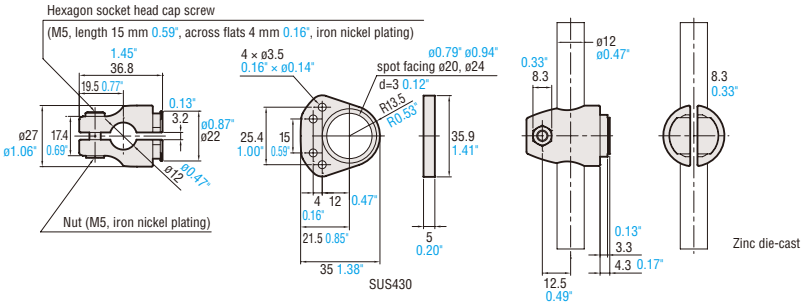
Material: SUS316L
Supplied accessory:
Screw x 2 (M3, 14 mm 0.55", stainless steel),
Plate nut (SUS316L)

PR-B05

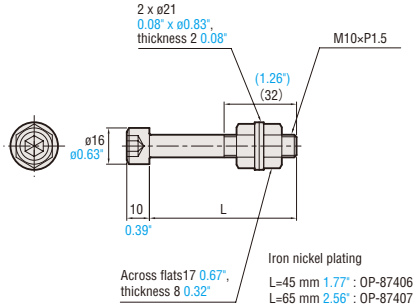


Material: SUS316L
Supplied accessory:
Screw x 2 (M3, 14 mm 0.55", stainless ste
Plate nut (SUS316L)

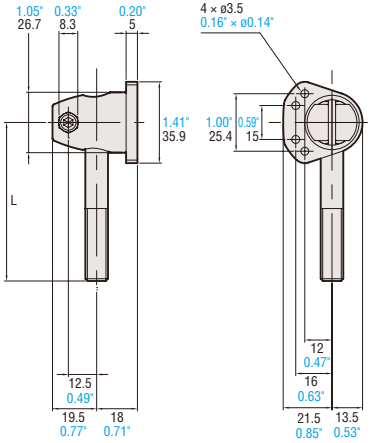
OP-87404



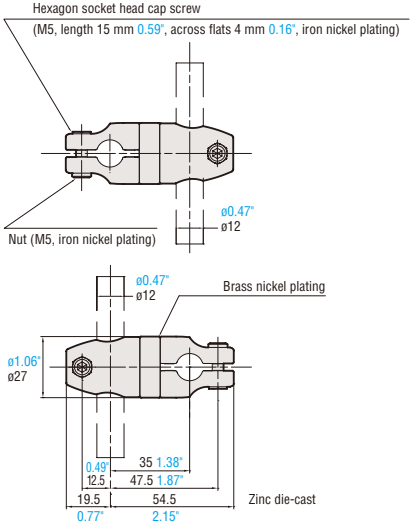
OP-87406/87407



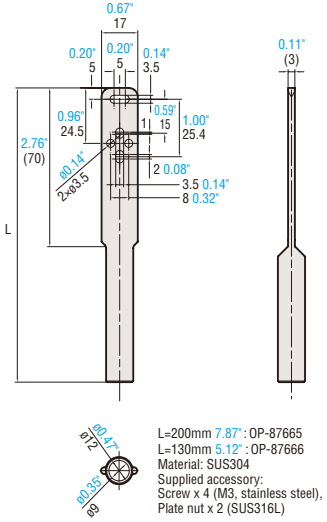
OP-87406 (87407) + OP-87404



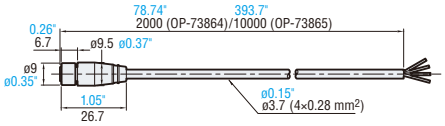
OP-87664



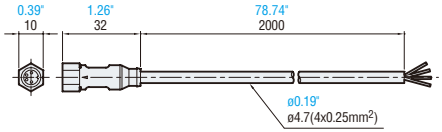
OP-87665/87666



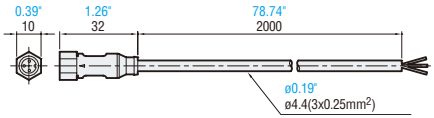
OP-73864 / 73865



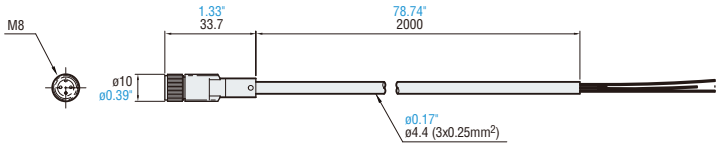
OP-87621



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

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SELF-CONTAINED PHOTOELECTRIC SENSOR

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LR-Z SERIES

01

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02

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