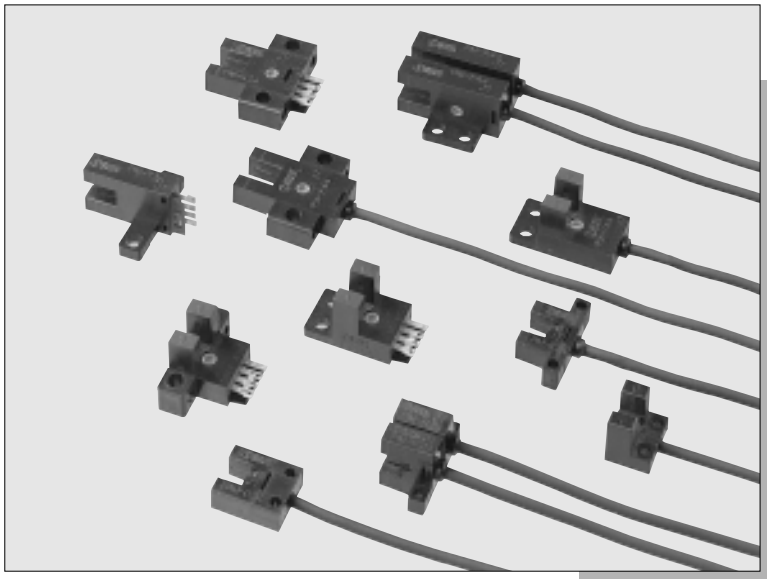
PM SERIES
U-shaped Micro Photoelectric Sensor

NEW

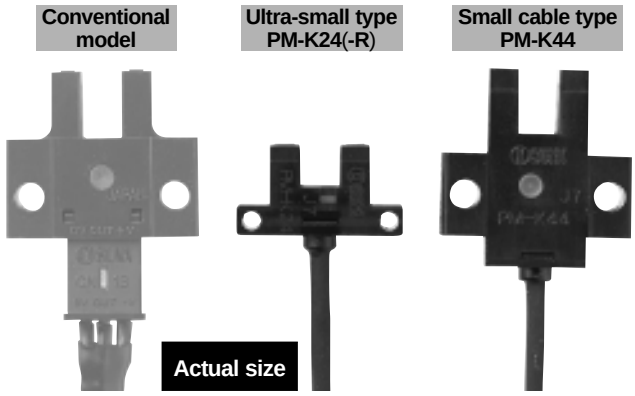


Extremely Small Size Enables Space Saving and Quick Installation!

CE Marked
Conforming to EMC Directive

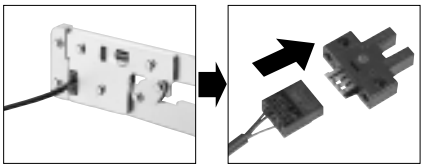
Extremely Small

Ultra-small type **PM-□24(-R)** contributes to the miniaturization of your equipment. Even the small cable type has become very compact.



Quick Fitting Hook-up Connector

Easy to maintain connector type models are available. Its exclusive connector is the industry's first hook-up connector. Since only crimping with exclusive pliers is to be done, cumbersome soldering or insulation is absolutely not required. Further, connector attached cable is also available.



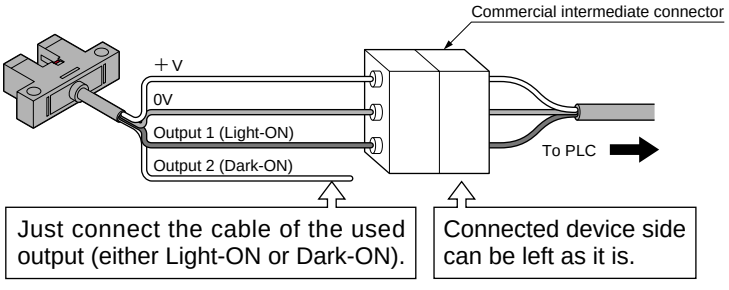
Crimp the connector on the cable.

Quick connection to the sensor.

Equipped with Two Independent Outputs

All models are equipped with two independent outputs – Light-ON and Dark-ON. Hence, one model suffices even if the output is to be used differently, depending upon the location of use.
Also, since two independent outputs have been provided, cumbersome handling of the output conversion control input, or fear of logic inversion due to a cable break, is eliminated. The sensor can be connected to the existing wiring as it is.

Example of connection with a commercial intermediate connector



Note: Ensure to insulate the unused output wire.

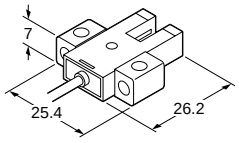
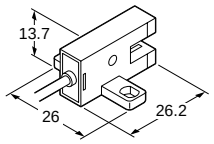
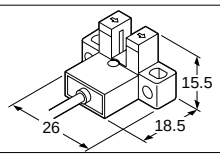
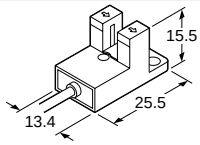
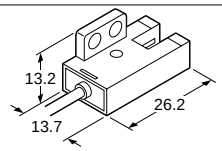
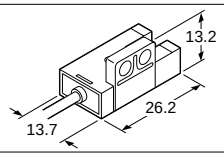
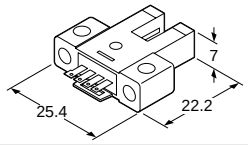
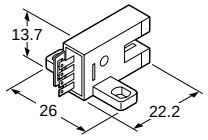
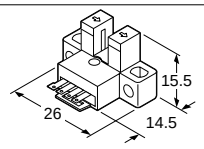
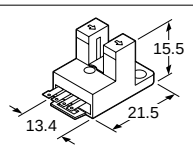
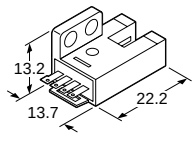
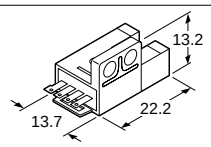
Wide Model Variety

A wide variety of 17 shapes and 29 models is available. You may select from this wide range to suit the mounting conditions.

Meets Global Requirements

Conforms to Europe's EMC Directive. Both, NPN and PNP output models are available.

ORDER GUIDE

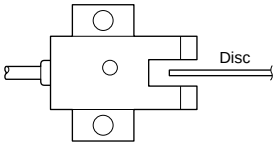
Type			Appearance (mm)	Sensing range	Model No.	Output	Output operation
Small	With cable	K type		5mm (fixed)	**PM-K44**	NPN open-collector transistor	Incorporated with 2 outputs: Light-ON/Dark-ON
					PM-K44P	PNP open-collector transistor	
		T type			**PM-T44**	NPN open-collector transistor	
					PM-T44P	PNP open-collector transistor	
		L type			**PM-L44**	NPN open-collector transistor	
					PM-L44P	PNP open-collector transistor	
		Y type			**PM-Y44**	NPN open-collector transistor	
					PM-Y44P	PNP open-collector transistor	
		F type			**PM-F44**	NPN open-collector transistor	
					PM-F44P	PNP open-collector transistor	
		R type			**PM-R44**	NPN open-collector transistor	
					PM-R44P	PNP open-collector transistor	
	With connector	K type			**PM-K54**	NPN open-collector transistor	
					PM-K54P	PNP open-collector transistor	
		T type			**PM-T54**	NPN open-collector transistor	
					PM-T54P	PNP open-collector transistor	
		L type			**PM-L54**	NPN open-collector transistor	
					PM-L54P	PNP open-collector transistor	
		Y type			**PM-Y54**	NPN open-collector transistor	
					PM-Y54P	PNP open-collector transistor	
		F type			**PM-F54**	NPN open-collector transistor	
					PM-F54P	PNP open-collector transistor	
		R type			**PM-R54**	NPN open-collector transistor	
					PM-R54P	PNP open-collector transistor	

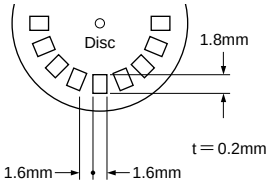
PM

SPECIFICATIONS

Item \ Type		Ultra-small		Small	
			With inflection resistant cable	With cable	With connector
Model No.	NPN output type	**PM-□24**	**PM-□24-R**	**PM-□44**	**PM-□54**
	PNP output type	———		**PM-□44P**	**PM-□54P**
Sensing range		5mm (fixed)			
Minimum sensing object		0.8 × 1.8mm opaque object			
Hysteresis		0.05mm or less			
Repeatability		0.03mm or less			
Supply voltage		5 to 24V DC ± 10% Ripple P-P 10% or less			
Current consumption		15mA or less			
Output		<NPN output type> NPN open-collector transistor • Maximum sink current: 50mA • Applied voltage: 30V DC or less (between output and 0V) • Residual voltage: 0.7V or less (at 50mA sink current) 0.4V or less (at 16mA sink current)		<PNP output type> PNP open-collector transistor • Maximum source current: 50mA • Applied voltage: 30V DC or less (between output and +V) • Residual voltage: 0.7V or less (at 50mA source current) 0.4V or less (at 16mA source current)	
	Utilization category	DC-12 or DC-13			
	Output operation	Incorporated with 2 outputs: Light-ON/Dark-ON			
Response time		Under light received condition: 20μs or less Under light interrupted condition: 100μs or less (Response frequency: 1kHz or more)(Note 1)			
Operation indicator		Vermilion LED (lights up under light received condition)			
Environmental resistance	Pollution degree	3 (Industrial environment)			
	Ambient temperature (Note 2, 3)	−25 to +55°C (No dew condensation or icing allowed), Storage: −30 to +80°C			
	Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH			
	Ambient illuminance	Fluorescent light: 1,000ℓx at the light-receiving face			
	EMC	Emission: EN50081-2, Immunity: EN50082-2			
	Voltage withstandability	1,000V AC for one min. between all supply terminals connected together and enclosure			
	Insulation resistance	50MΩ, or more, with 250V DC megger between all supply terminals connected together and enclosure			
	Vibration resistance	10 to 2,000Hz frequency, 1.5mm amplitude in X, Y and Z directions for two hours each			
	Shock resistance	15,000m/s² acceleration (1,500G approx.) in X, Y and Z directions for three times each			
Emitting element		Infrared LED (non-modulated)			
Material		Enclosure: PBT, Slit cover: Polycarbonate, Terminal part [**PM-□54**(**P**) only]: Solder plated			
Cable		0.09mm² 4-core cabtyre cable (**PM-□24-R**: 0.1mm² inflection, oil and heat resistant cabtyre cable), 1m long			———
Cable extension		Extension up to total 100m is possible with 0.3mm², or more, cable.			
Weight		10g approx.		15g approx.	3g approx.

Notes: 1) The response frequency is the value when the disc, given in the figure below, is rotated.





2) In case the ultra-small type **PM-□24**(**-R**) is used at an ambient temperature of +50°C, or more, make sure to mount it on a metal body.
3) Take care that the flexibility of the **PM-□24-R** cable is lost if the ambient temperature in near −10°C.

PRECAUTIONS FOR PROPER USE

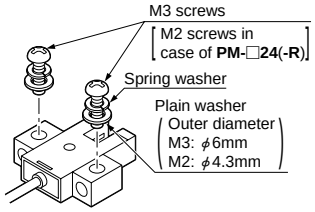
Refer to P.820～ for general precautions.

All models

Mounting

• When fixing the sensor with screws, use M3 screws [M2 screws in case of **PM-□24(-R)**] and the tightening torque should not exceed the values given below.
Further, use small, round type plain washers.
(M3: ϕ6mm, M2: ϕ4.3mm)

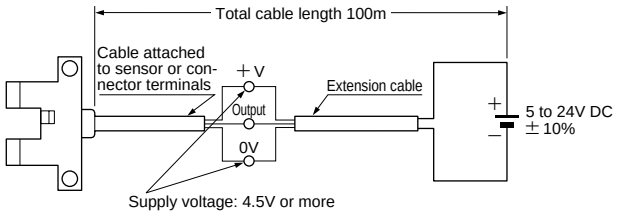
Model No.	Tightening torque
PM-□24(-R)	0.15N·m
PM-□44(P)	0.5N·m
PM-□54(P)	



Note: In case the ultra-small type **PM-□24(-R)** is used at an ambient temperature of +50°C, or more, make sure to mount it on a metal body.

Cable extension

• Cable extension is possible up to an overall length of 100m with a 0.3mm^2, or more, cable. However, since a voltage drop shall occur due to the cable extension, ensure that the power supply voltage at the end of the cable attached to the sensor or at the sensor terminals is within the rating.



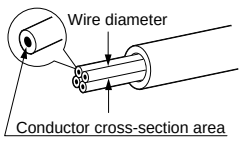
But, when the overall cable length, including the cable attached to the sensor, is as given below, there is no need to confirm the voltage.

Conductor cross-section area	Total cable length
0.08 to 0.1mm^2	Up to 5m
0.2mm^2	Up to 10m
0.3mm^2	Up to 20m

PM-□54 PM-□54P

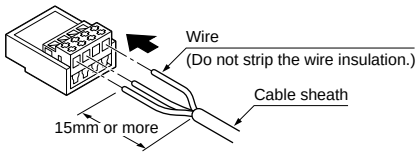
Crimping of hook-up connectors CN-14H and CN-14H-2

Item \ Model No.	CN-14H	CN-14H-2
Conductor cross-section area	0.08 to 0.2mm^2 (AWG28 to AWG24)	0.18 to 0.22mm^2 (AWG25 to AWG24)
Wire diameter	ϕ0.7 to ϕ1.2mm	ϕ1.2 to ϕ1.52mm
Wire insulation material	Vinyl chloride or soft polyethylene	

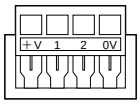


Crimping method

① Strip the cable sheath 15mm, or more, and insert the wires into the connector insertion holes till the wire tips reach the end.



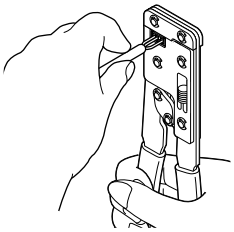
Arrangement of connector terminals



+V: +V
1: Output 1 (Light-ON)
2: Output 2 (Dark-ON)
0V : 0V
(Note)
Power supply

Note: Wire at Pin No.1 or 2 as per requirement.

② Crimp with the exclusive hook-up pliers **CN-HP**.

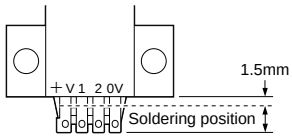


Caution: Make sure to use the exclusive hook-up pliers **CN-HP**. Commercially available pliers cannot be used.

Soldering

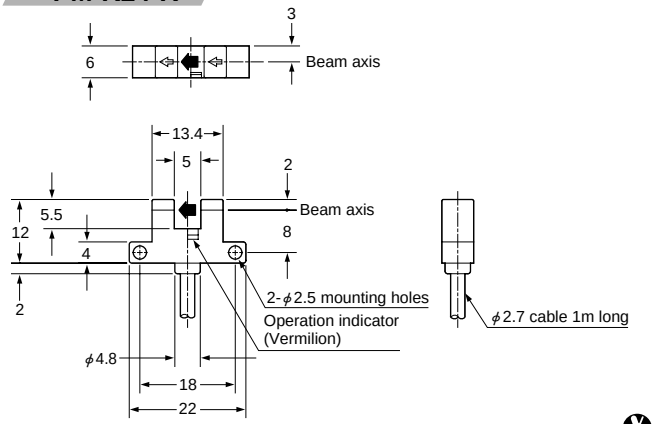
• If soldering is done directly on the terminals, strictly adhere to the conditions given below.

Item \ Model No.	PM-□54(P)
Soldering temperature	260°C or less
Soldering time	3 sec. or less
Soldering position	Refer to the right figure

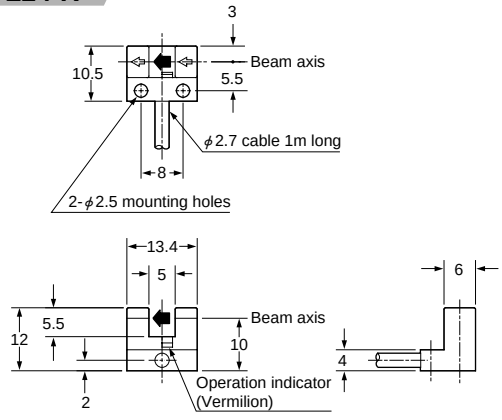


DIMENSIONS (Unit: mm)

PM-K24 PM-K24-R Sensor

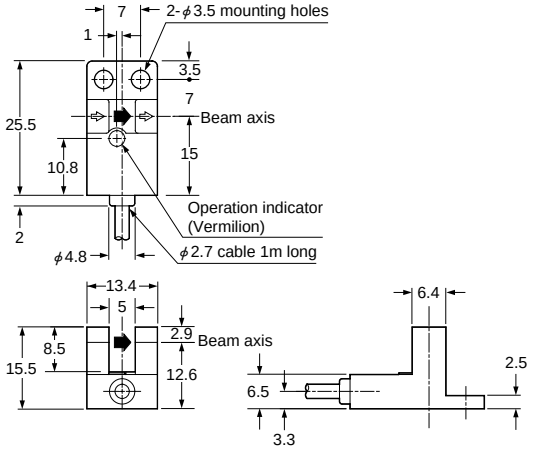


PM-L24 PM-L24-R Sensor

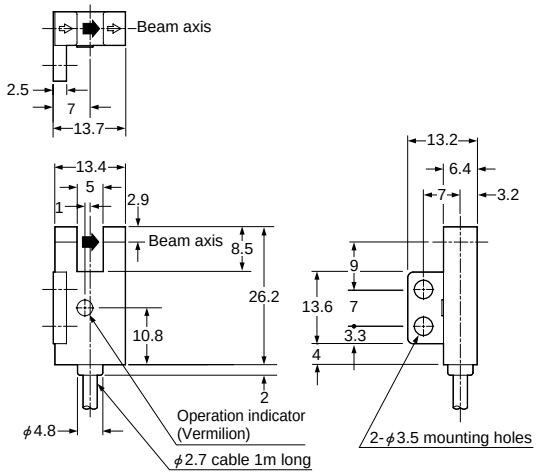


DIMENSIONS (Unit: mm)

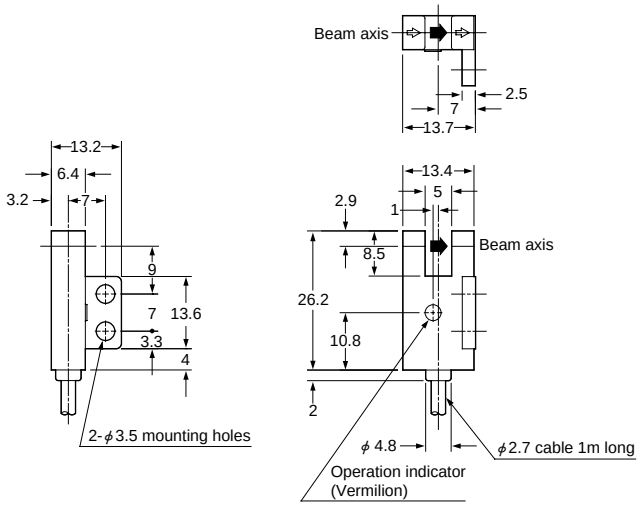
PM-Y44 PM-Y44P Sensor



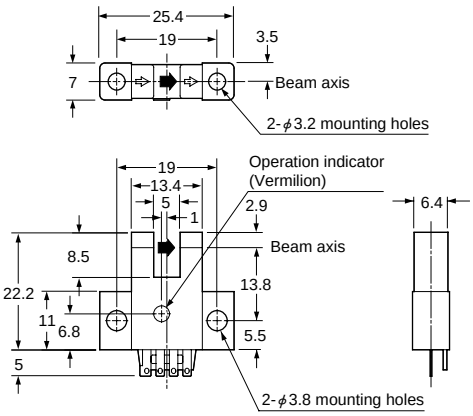
PM-F44 PM-F44P Sensor



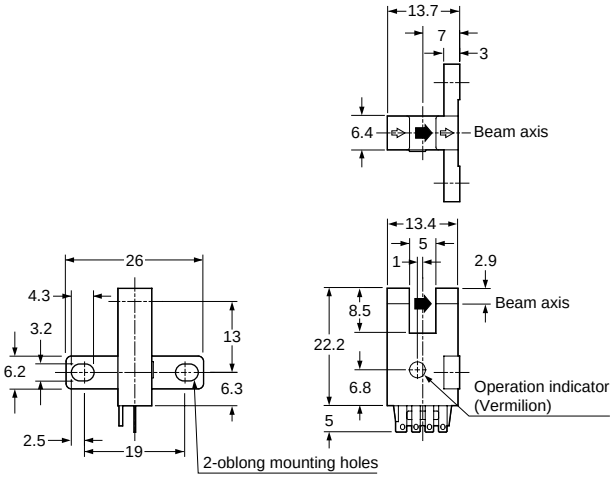
PM-R44 PM-R44P Sensor



PM-K54 PM-K54P Sensor



PM-T54 PM-T54P Sensor



PM-L54 PM-L54P Sensor