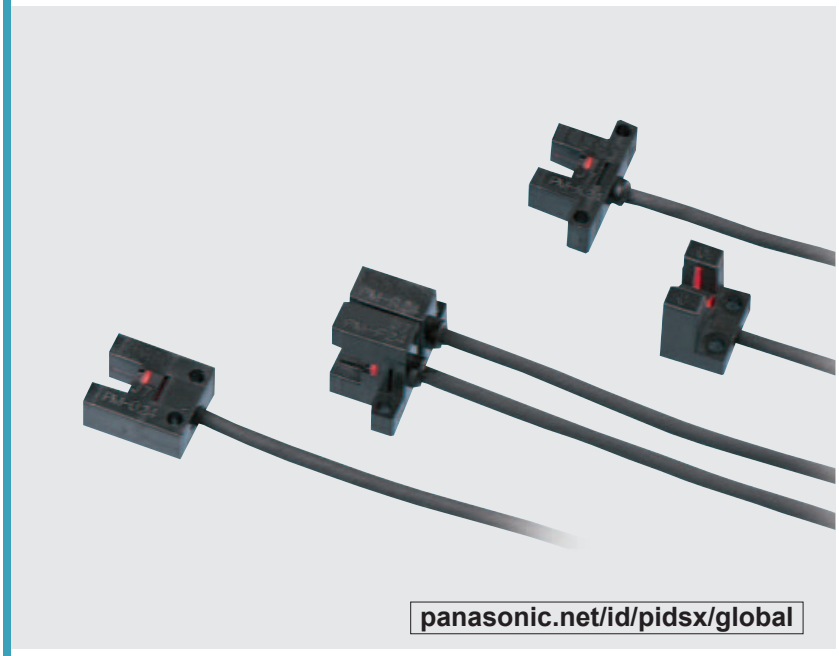
Ultra-small U-shaped Micro Photoelectric Sensor Amplifier Built-in

PM-24 SERIES

Related Information
■ General terms and conditions F-13
■ Glossary of terms / General precautions.....P.1455~ / P.1458~
■ Sensor selection guide..... P.427~
■ Korea's S-mark..... P.1506



panasonic.net/id/pidsx/global

Conforming to EMC Directive

Recognition

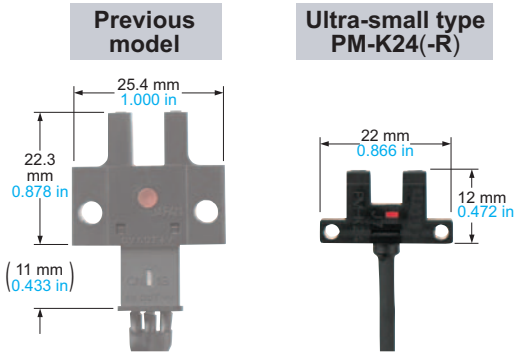
Certified (Some models only)

FIBER SENSORS
LASER SENSORS
PHOTOELECTRIC SENSORS
MICRO PHOTOELECTRIC SENSORS
AREA SENSORS
LIGHT CURTAINS / SAFETY COMPONENTS
PRESSURE / FLOW SENSORS
INDUCTIVE PROXIMITY SENSORS
PARTICULAR USE SENSORS
SENSOR OPTIONS
SIMPLE WIRE-SAVING UNITS
WIRE-SAVING SYSTEMS
MEASUREMENT SENSORS
STATIC ELECTRICITY PREVENTION DEVICES
LASER MARKERS
PLC
HUMAN MACHINE INTERFACES
ENERGY CONSUMPTION VISUALIZATION COMPONENTS
FA COMPONENTS
MACHINE VISION SYSTEMS
UV CURING SYSTEMS
Selection Guide
U-shaped
Convergent Reflective
PM-64
PM-24
PM-44/PM-54

Extremely small size enables space saving!!

Extremely small size and space saving

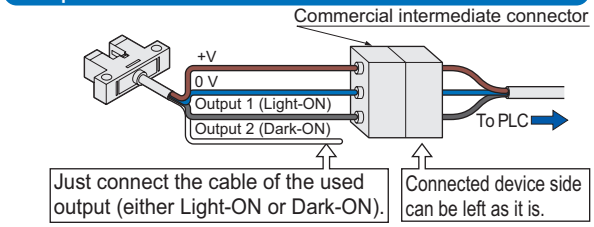
PM-24 series contributes to the miniaturization or space saving of your equipment.



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 5 shapes and 15 models is available. You may select from this wide range to suit the mounting conditions.

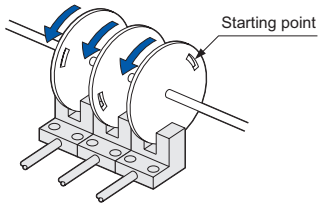
Meets global requirements

Conforms to Europe's EMC Directive and obtains UL Recognition.
Both, NPN and PNP output models are available.
The **PM-□24** has also obtained Korea's S-mark certification.

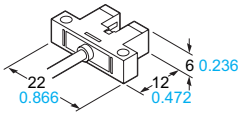
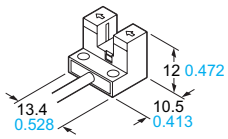
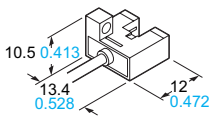
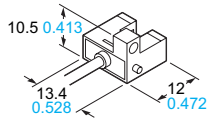
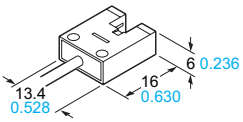
APPLICATIONS

Sensing the starting point on a rotating body

The starting point can be sensed by making a slit in the rotating body.



ORDER GUIDE

Type		Appearance (mm in)	Sensing range	Model No. (Note)	Output	Output operation
Ultra-small	K type		5 mm 0.197 in (fixed)	**PM-K24**	NPN open-collector transistor	Incorporated with 2 outputs: Light-ON / Dark-ON
				PM-K24P	PNP open-collector transistor	
				PM-K24-R	NPN open-collector transistor	
	L type			**PM-L24**	NPN open-collector transistor	
				PM-L24P	PNP open-collector transistor	
				PM-L24-R	NPN open-collector transistor	
	F type			**PM-F24**	NPN open-collector transistor	
				PM-F24P	PNP open-collector transistor	
				PM-F24-R	NPN open-collector transistor	
	R type			**PM-R24**	NPN open-collector transistor	
				PM-R24P	PNP open-collector transistor	
				PM-R24-R	NPN open-collector transistor	
	U type			**PM-U24**	NPN open-collector transistor	
				PM-U24P	PNP open-collector transistor	
				PM-U24-R	NPN open-collector transistor	

Note: The suffix "**-R**" indicates a flexible cable type.

3 m 9.843 ft cable length type

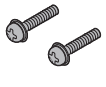
3 m 9.843 ft cable length type (standard: 1 m 3.281 ft) is also available. (excluding flexible cable type and PNP output type)
When ordering this type, suffix "**-C3**" to the model No.
(e.g.) 3m 9.843 ft cable length type of **PM-K24** is "**PM-K24-C3**".

OPTIONS

Designation	Model No.	Description
Mounting screw	**MS-M2**	Mounting screw with washers for the ultra-small type sensor (50 pcs. lot). It can mount securely as it is spring washer attached.

Mounting screw

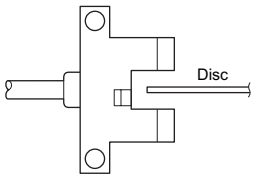
- **MS-M2**

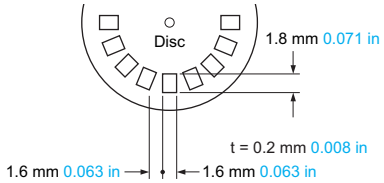


SPECIFICATIONS

Item \ Type		Ultra-small	With flexible cable
Model No.	NPN output	**PM-□24**	**PM-□24-R**
	PNP output	**PM-□24P**	———
Sensing range		5 mm 0.197 in (fixed)	
Minimum sensing object		0.8 × 1.8 mm 0.031 × 0.071 in opaque object	
Hysteresis		0.05 mm 0.002 in or less	
Repeatability		0.03 mm 0.001 in or less	
Supply voltage		5 to 24 V DC ±10 % Ripple P-P 10 % or less	
Current consumption		15 mA or less	
Output		<NPN output type> NPN open-collector transistor • Maximum sink current: 50 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 0.7 V or less (at 50 mA sink current) 0.4 V or less (at 16 mA sink current)	<PNP output type> PNP open-collector transistor • Maximum source current: 50 mA • Applied voltage: 30 V DC or less (between output and + V) • Residual voltage: 0.7 V or less (at 50 mA source current) 0.4 V or less (at 16 mA 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: 20 µs or less Under light interrupted condition: 100 µs or less (Response frequency: 1 kHz or more) (Note 2)	
Operation indicator		Vermilion LED (lights up under light received condition)	
Environmental resistance	Pollution degree	3 (Industrial environment)	
	Ambient temperature (Note 3, 4)	–25 to +55 °C –13 to +131 °F (No dew condensation or icing allowed), Storage: –30 to +80 °C –22 to +176 °F	
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH	
	Ambient illuminance	Fluorescent light: 1,000 ℓx at the light-receiving face	
	EMC	EN 60947-5-2	
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure	
	Insulation resistance	50 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure	
	Vibration resistance	10 to 2,000 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each	
	Shock resistance	15,000 m/s² acceleration (1,500 G approx.) in X, Y and Z directions for three times each	
Emitting element		Infrared LED (Peak emission wavelength: 940 nm 0.037 mil, non-modulated)	
Material		Enclosure: PBT, Slit cover: Polycarbonate	
Cable		0.09 mm² 4-core cabtyre cable [**PM-□24-R**: 0.1 mm² flexible, oil and heat resistant cabtyre cable (Note 5)], 1 m 3.281 ft long	
Cable extension		Extension up to total 100 m 328.084 ft is possible with 0.3 mm², or more, cable.	
Weight		Net weight: 10 g approx.	

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.
2) The response frequency is the value when the disc, given in the figure below, is rotated.



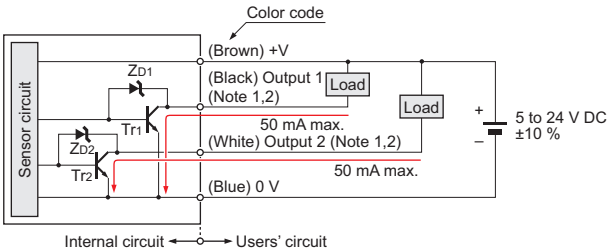


3) In case the **PM-24** series is used at an ambient temperature of +50 °C +122 °F, or more, make sure to mount it on a metal body.
4) Take care that the flexibility of the **PM-□24-R** cable is lost if the ambient temperature in –10 °C +14 °F or less.
5) The cable of **PM-□24-R** is a flexible cable usable on a moving base. When the sensor is mounted on a moving base, fix the sensor cable joint so that stress is not applied to it. (Models other than the **PM-□24-R** cannot be used on a moving base.)

I/O CIRCUIT AND WIRING DIAGRAMS

PM-□24 PM-□24-R — NPN output type

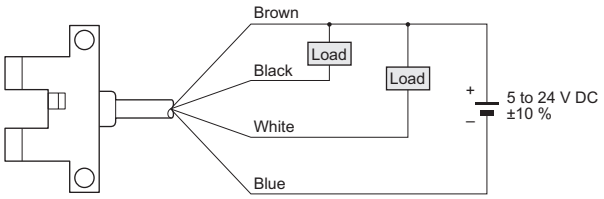
I/O circuit diagram



Notes: 1) Make sure to connect terminals correctly as the sensor does not incorporate a reverse polarity protection circuit.
Further, the output is not incorporated with a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load. Faulty wiring may result in damage.
2) Ensure to insulate the unused output wire.

Symbols … ZD1, ZD2: Surge absorption zener diode
Tr1, Tr2 : NPN output transistor

Wiring diagram

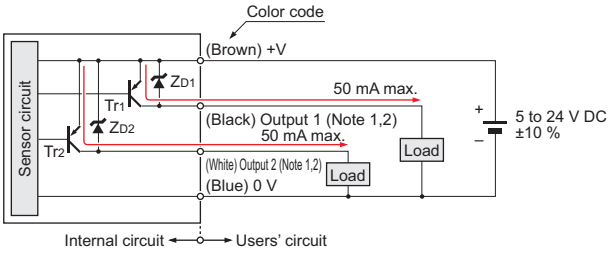


Output operation

	Color code	Output operation
Output 1	Black	Light-ON
Output 2	White	Dark-ON

PM-□24P — PNP output type

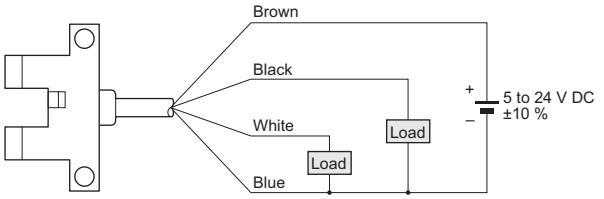
I/O circuit diagram



Notes: 1) Make sure to connect terminals correctly as the sensor does not incorporate a reverse polarity protection circuit.
Further, the output is not incorporated with a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load. Faulty wiring may result in damage.
2) Ensure to insulate the unused output wire.

Symbols … ZD1, ZD2 : Surge absorption zener diode
Tr1, Tr2 : PNP output transistor

Wiring diagram

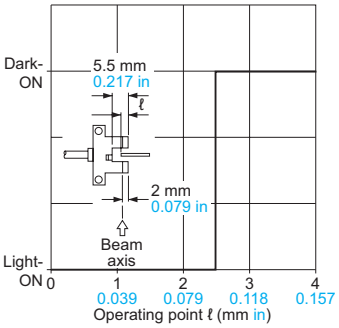


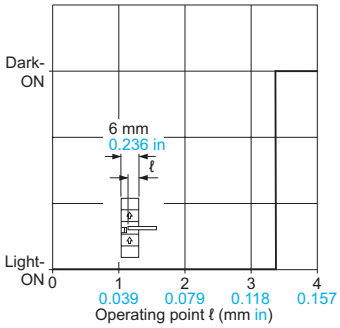
Output operation

	Color code	Output operation
Output 1	Black	Light-ON
Output 2	White	Dark-ON

SENSING CHARACTERISTICS (TYPICAL)

Sensing position





PRECAUTIONS FOR PROPER USE

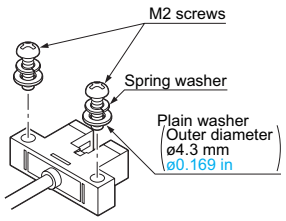
Refer to p.1458~ for general precautions.

- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

Make sure to connect terminals correctly as the sensor does not incorporate a reverse polarity protection circuit.
Further, the output is not incorporated with a short-circuit protection circuit. Do not connect it directly to a power supply or a capacitive load. Faulty wiring may result in damage.

Mounting

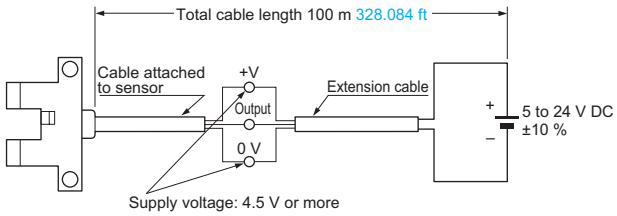
- When fixing the sensor with screws, use M2 screws and the tightening torque should be 0.15 N·m or less. Further, use small, round type plain washers. (ø4.3 mm ø0.169 in)
When using the optional mounting screw set **MS-M2**, a spring washer is included.



- In case the **PM-24** series is used at an ambient temperature of +50 °C +122 °F, or more, make sure to mount it on a metal body.

Cable extension

- Cable extension is possible up to an overall length of 100 m 328.084 ft with a 0.3 mm², 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 is within the rating.

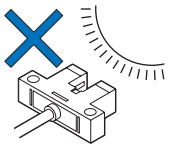


But, when the overall cable length, including the cable attached to the sensor, is as given below, there is no need to confirm the voltage.

Conductor cross-section area of extension cable	Total cable length
0.08 to 0.1 mm²	Up to 5 m 16.404 ft
0.2 mm²	Up to 10 m 32.808 ft
0.3 mm²	Up to 20 m 65.617 ft

Others

- Since the sensor is intended for use inside machines, no special countermeasures have been taken against extraneous light. Take care that extraneous light is not directly incident on the beam receiving section.

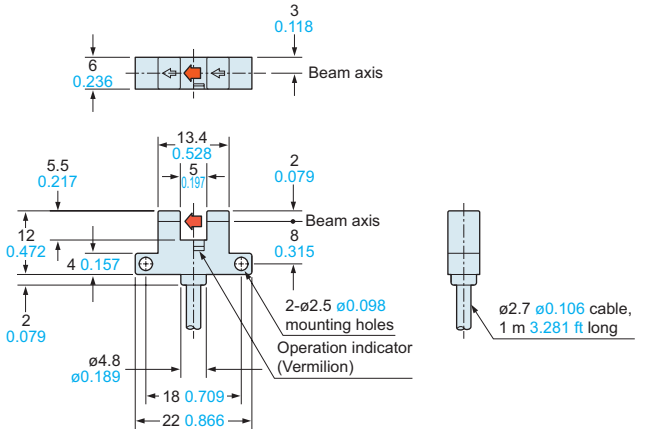


- Do not use during the initial transient time (50 ms) after the power supply is switched on.
- The cable of **PM-□24-R** is a flexible cable usable on a moving base. When the sensor is mounted on a moving base, fix the sensor cable joint so that stress is not applied to it. (Models other than the **PM-□24-R** cannot be used on a moving base.)
- Take care that the flexibility of the **PM-□24-R** cable is lost if the ambient temperature is –10 °C +14 °F or less.

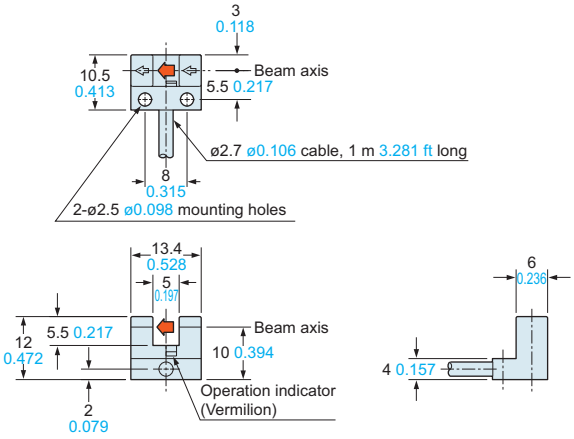
DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from our website.

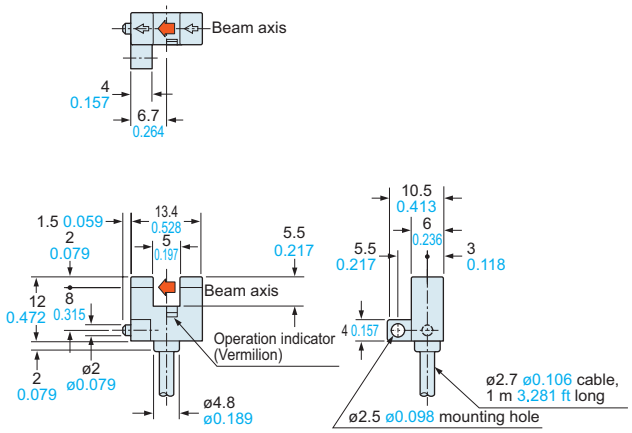
PM-K24(P) PM-K24-R — Sensor



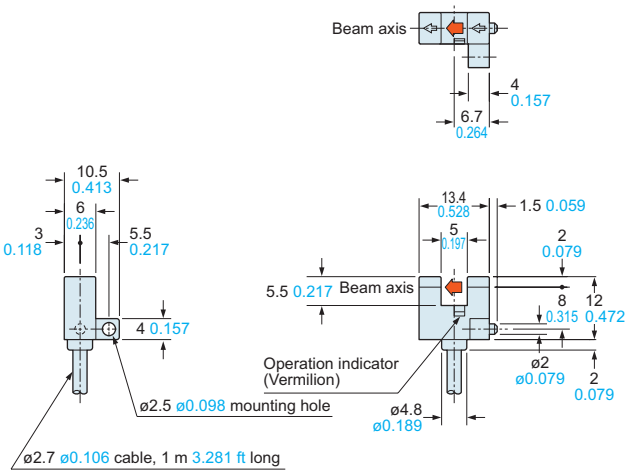
PM-L24(P) PM-L24-R — Sensor



PM-F24(P) PM-F24-R — Sensor



PM-R24(P) PM-R24-R — Sensor



PM-U24(P) PM-U24-R — Sensor