WINSOURCE ELECTRONICS

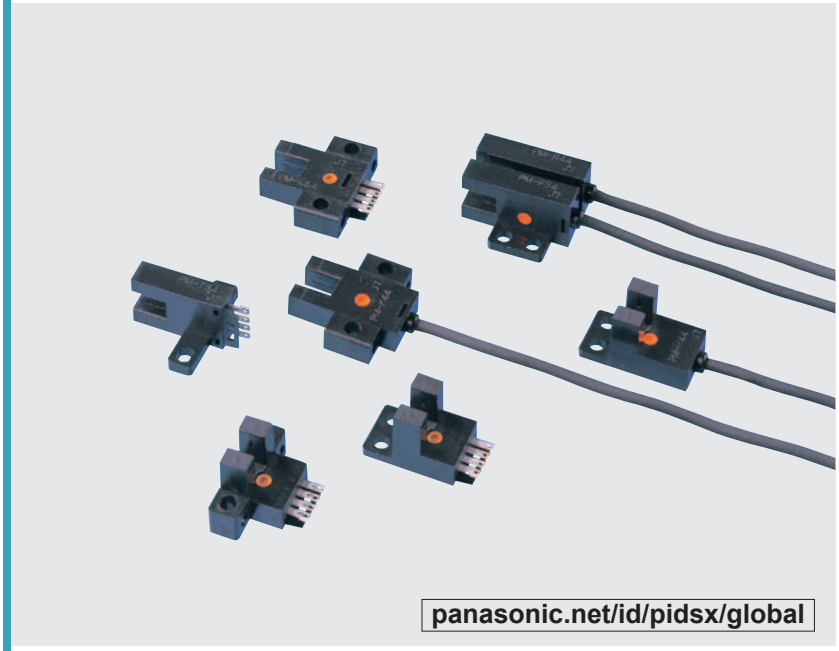
THE DATASHEET OF

PM-F44

Small U-shaped Micro Photoelectric Sensor **Amplifier Built-in**

PM-44 SERIES PM-54 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

c UL us Recognition

Certified (Some models only)

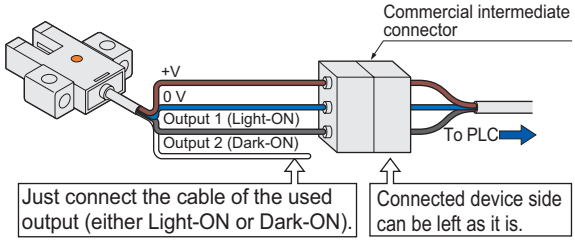
PNP output type available

Enables space saving and quick installation!

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

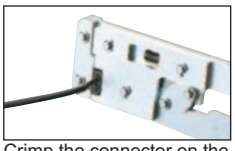
A wide variety of 12 shapes and 24 models is available. You may select from this wide range to suit the mounting conditions.

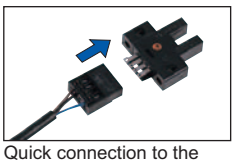
Meets global requirements

Conforms to Europe's EMC Directive and obtains UL Recognition.
The NPN output type with cable (excluding 3 m 9.843 ft cable length type) has also obtained Korea's S-mark certification.
Both, NPN and PNP output models are available.

Quick fitting hook-up connector

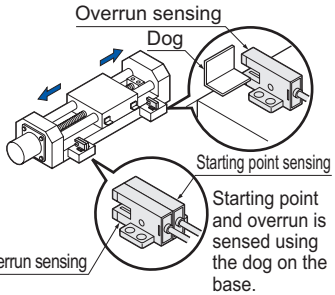
Easy to maintain connector type models are available. Its exclusive connector is the hook-up connector.
Since only crimping with exclusive pliers is to be done, cumbersome soldering or insulation is absolutely not required.
Further, connector attached cable is also available.


Crimp the connector on the cable.

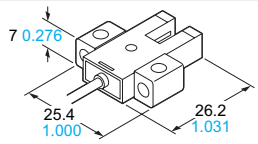
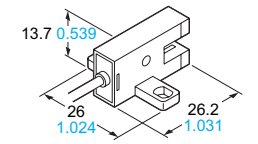
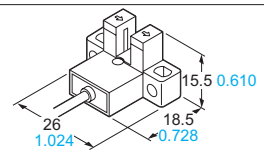
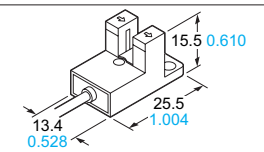
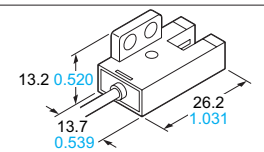
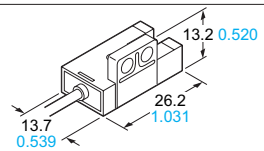
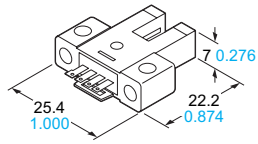
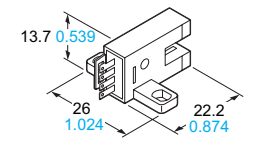
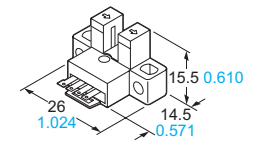
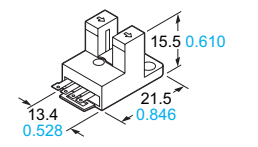
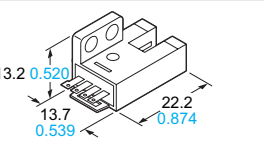
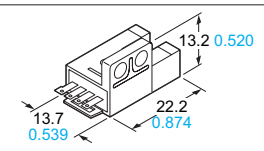

Quick connection to the sensor.

APPLICATIONS

Sensing the starting point and overrun of a moving body



ORDER GUIDE

Type			Appearance (mm in)	Sensing range	Model No.	Output	Output operation
Small	With cable	K type		5 mm 0.197 in (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	

ORDER GUIDE

3 m 9.843 ft cable length type

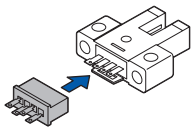
3 m 9.843 ft cable length type (standard: 1 m 3.281 ft) is also available.
When ordering this type, suffix "**-C3**" to the model No.
(e.g.) 3m 9.843 ft cable length type of **PM-K44** is "**PM-K44-C3**".

OPTIONS

Designation	Model No.	Description	
Connector	**CN-14**	Connector for soldering	
Hook-up connector	**CN-14H**	This connector can be hooked-up on 0.08 to 0.2 mm² cable simply in one grip. Wire diameter: ø0.7 to ø1.2 mm ø0.028 to ø0.047 in	
	CN-14H-2	Suitable for UL standard cable. This connector can be hooked-up on 0.18 to 0.22 mm² cable simply in one grip. Wire diameter: ø1.2 to ø1.52 mm ø0.047 to ø0.060 in	
Connector attached cable	**CN-14H-C1**	Length: 1 m 3.281 ft Net weight: 20 g approx.	For the connector type, with 0.2 mm² 4-core cabtyre cable Cable diameter: ø3.7 mm ø0.146 in
	CN-14H-C3	Length: 3 m 9.843 ft Net weight: 65 g approx.	
Hook-up pliers	**CN-HP**	These are exclusive pliers for hook-up connectors **CN-14H** and **CN-14H-2**.	

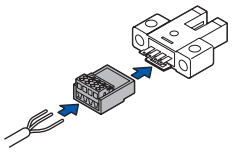
Connector

- **CN-14**



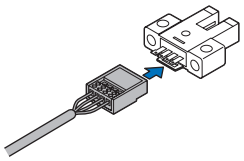
Hook-up connector

- **CN-14H**
- **CN-14H-2**



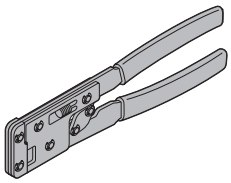
Connector attached cable

- **CN-14H-C1**
- **CN-14H-C3**



Hook-up pliers

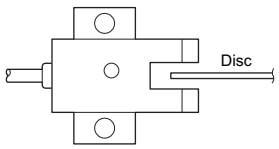
- **CN-HP**

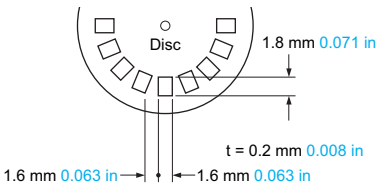


SPECIFICATIONS

Item \ Type		Small	
		With cable	With connector
Model No.	NPN output	**PM-□44**	**PM-□54**
	PNP output	**PM-□44P**	**PM-□54P**
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	–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, Terminal part [**PM-□54**(**P**) only]: Solder plated	
Cable		0.09 mm² 4-core cabtyre cable, 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: 15 g approx.	Net weight: 3 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.

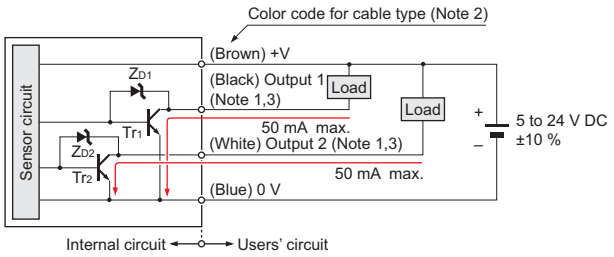




I/O CIRCUIT AND WIRING DIAGRAMS

PM-□44 PM-□54 — NPN output type

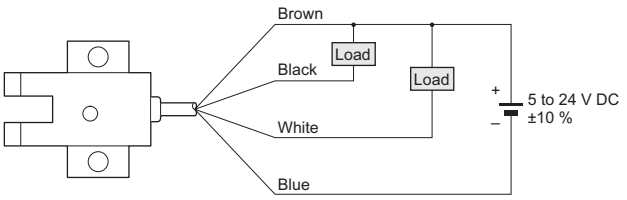
I/O circuit diagram



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) The color code of the connector attached cable is also the same.
3) Ensure to insulate the unused output wire.

Symbols … Z_{D1}, Z_{D2}: Surge absorption zener diode
Tr_1, Tr_2 : NPN output transistor

Wiring diagram

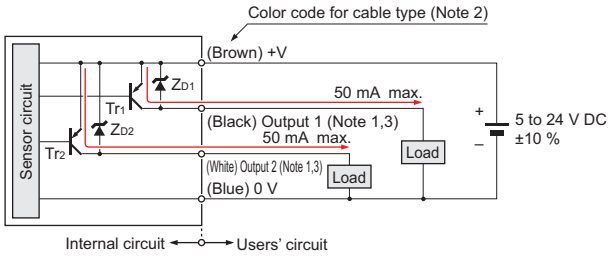


Output operation

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

PM-□44P PM-□54P — PNP output type

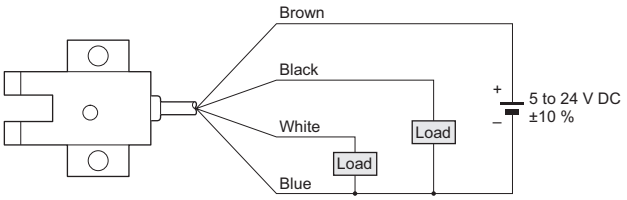
I/O circuit diagram



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) The color code of the connector attached cable is also the same.
3) Ensure to insulate the unused output wire.

Symbols … Z_{D1}, Z_{D2}: Surge absorption zener diode
Tr_1, Tr_2 : PNP output transistor

Wiring diagram



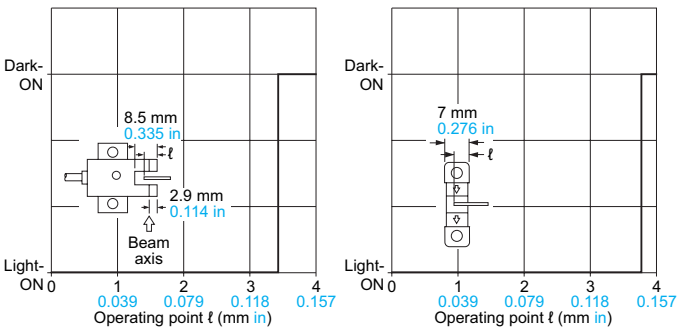
Output operation

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

SENSING CHARACTERISTICS (TYPICAL)

PM-L44(P)/K44(P) PM-L54(P)/K54(P)

Sensing position



PRECAUTIONS FOR PROPER USE

Refer to p.1458~ for general precautions.

All models

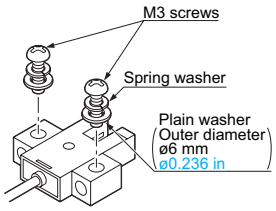
- Never use this product as a sensing device for personnel protection.
- In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

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

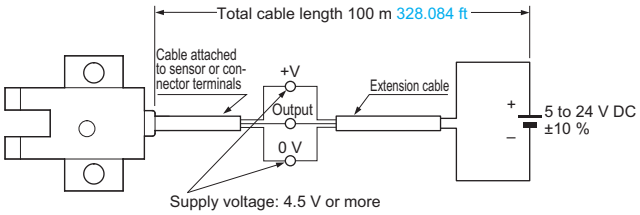
- When fixing the sensor with screws, use M3 screws and the tightening torque should not exceed the values given below.
  Further, use small, round type plain washers (ø6 mm ø0.236 in).

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



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 or at the sensor terminals is within the rating.

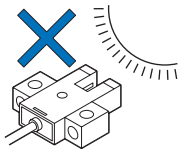


But, when the overall cable length, including the cable attached to the sensor, is as given below, there is no need to confirm the voltage.

Conductor cross-section area 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.



PRECAUTIONS FOR PROPER USE

Refer to p.1458~ for general precautions.

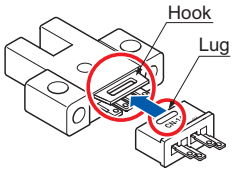
PM-□54 PM-□54P

Cautions in plugging or unplugging a connector

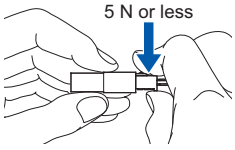
- Do not plug or unplug a connector more than 10 times.
- Be sure not to give stress more than 5 N to a terminal of both a connector and a sensor. If you do not follow the above cautions, it will cause a poor contact.

Procedures of plugging or unplugging a connector

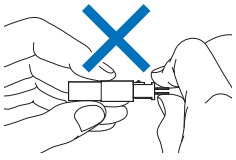
①Insert a connector straight into a sensor until the connector lug is locked by the sensor hook.



②When unplugging, give as much stress as a connector lug can be relieved from a hook. Then unplug it.



Caution: Be sure to hold a connector when plugging or unplugging it. Do not hold a terminal or a cable when plugging or unplugging the connector. Otherwise, it will cause a poor contact.

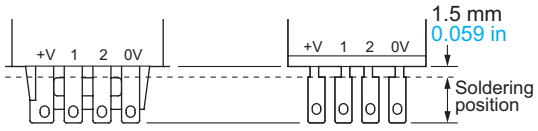


Soldering (Both connector CN-14 and sensor)

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

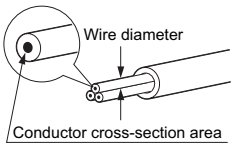
Soldering temperature	260 °C 500 °F or less
Soldering time	3 sec. or less
Soldering position	Refer to the below figure

Sensor **Connector**



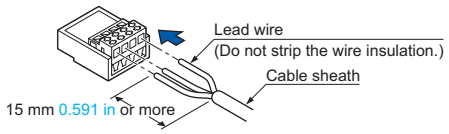
Crimping of hook-up connectors CN-14H and CN-14H-2

Item \ Model No.	CN-14H	CN-14H-2
Conductor cross-section area	0.08 to 0.2 mm² (AWG28 to AWG24)	0.18 to 0.22 mm² (AWG25 to AWG24)
Wire diameter	ø0.7 to ø1.2 mm ø0.028 to ø0.047 in	ø1.2 to ø1.52 mm ø0.047 to ø0.060 in
Wire insulation material	Vinyl chloride or soft polyethylene	

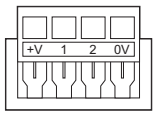


Crimping method

①Strip the cable sheath 15 mm 0.591 in, or more, and insert the wires into the connector insertion holes till the wire tips reach the end.



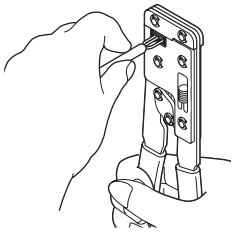
Arrangement of connector terminals



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

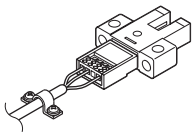
②Crimp with the exclusive hook-up pliers **CN-HP**.

Notes: 1) When attaching or detaching the connector fitted with a cable, make sure to hold the connector firmly before proceeding.
2) After crimping, do not pull on the cable.



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

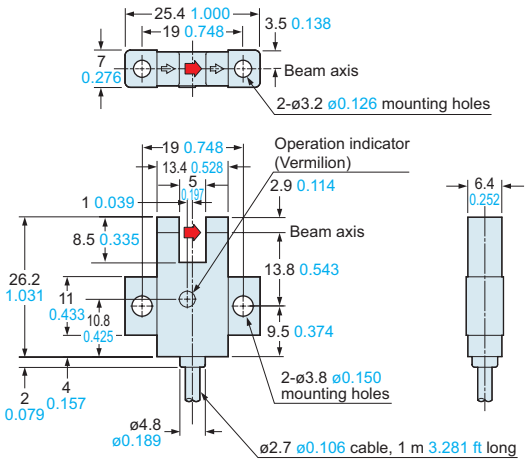
- Prior to using the sensor, affix the cable in a way as to avoid direct stress on the crimped part.



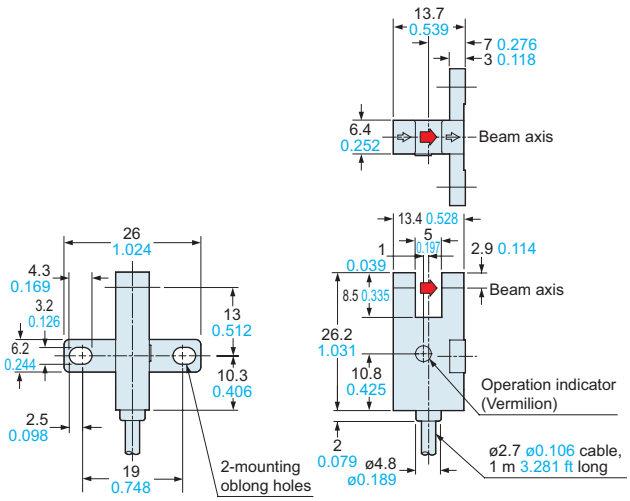
DIMENSIONS (Unit: mm in)

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

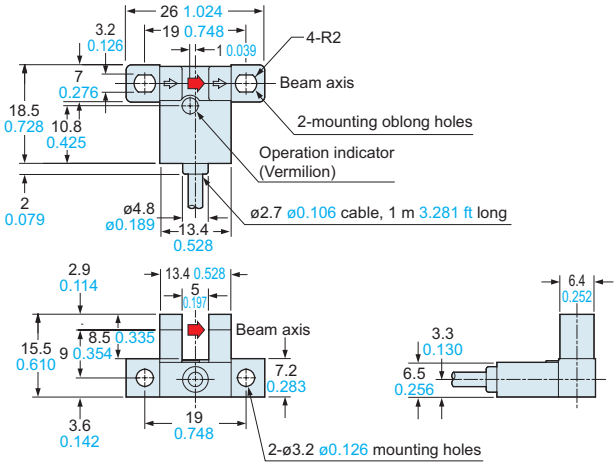
PM-K44 PM-K44P — Sensor



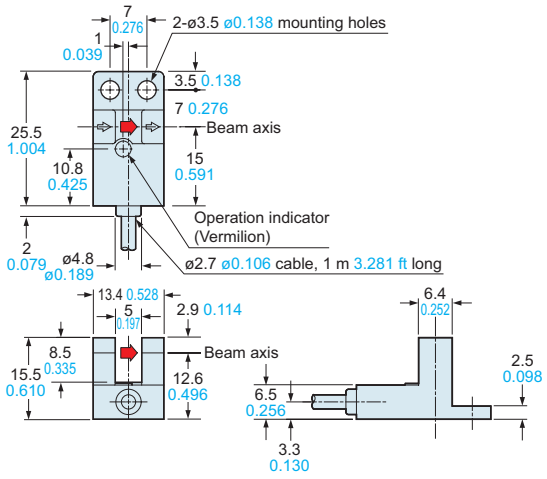
PM-T44 PM-T44P — Sensor



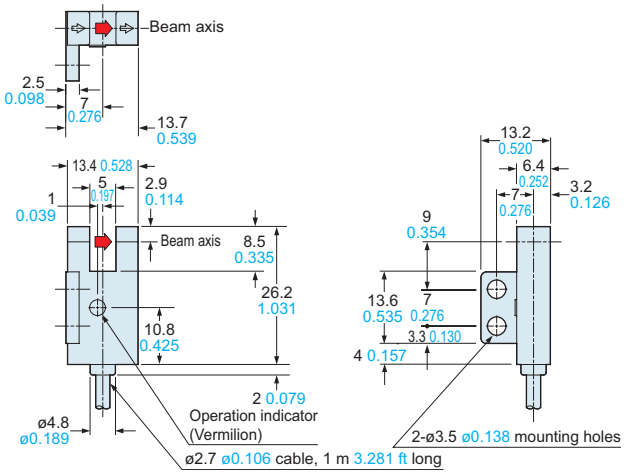
PM-L44 PM-L44P — Sensor



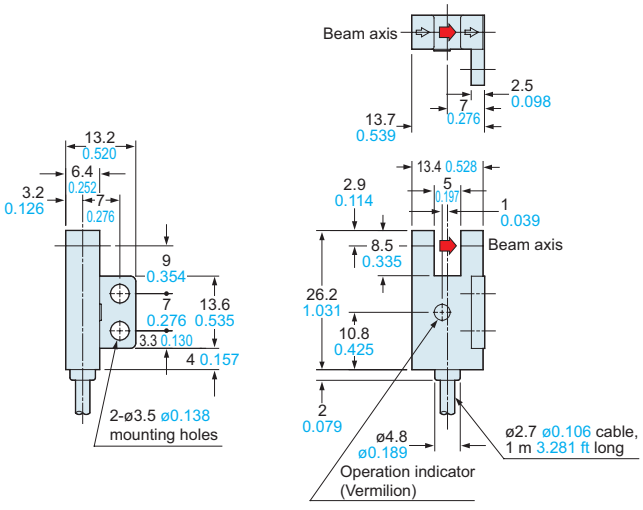
PM-Y44 PM-Y44P — Sensor



PM-F44 PM-F44P — Sensor



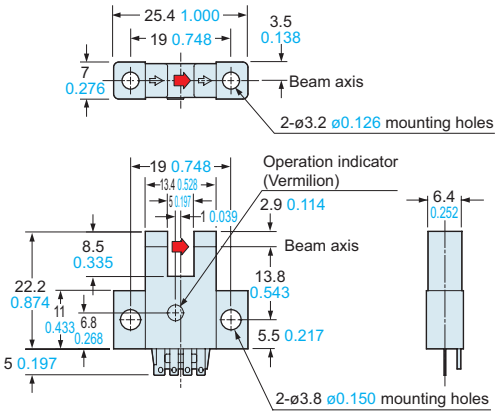
PM-R44 PM-R44P — Sensor



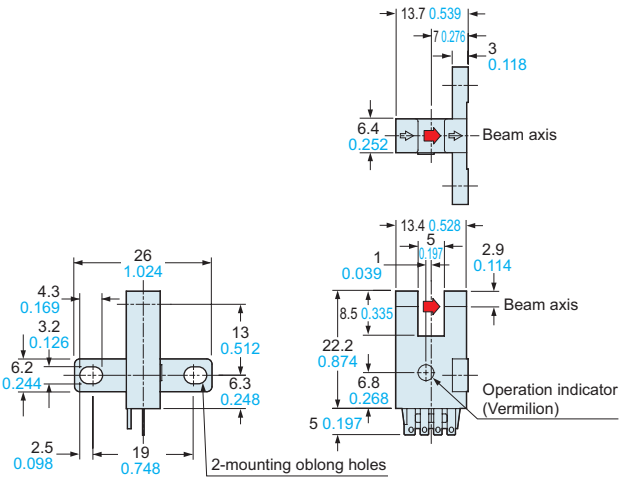
DIMENSIONS (Unit: mm in)

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

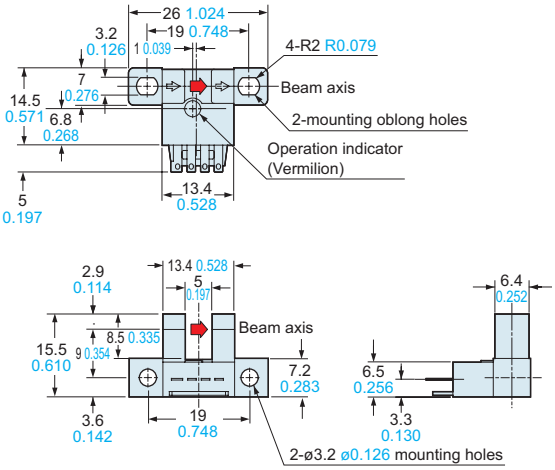
PM-K54 PM-K54P — Sensor



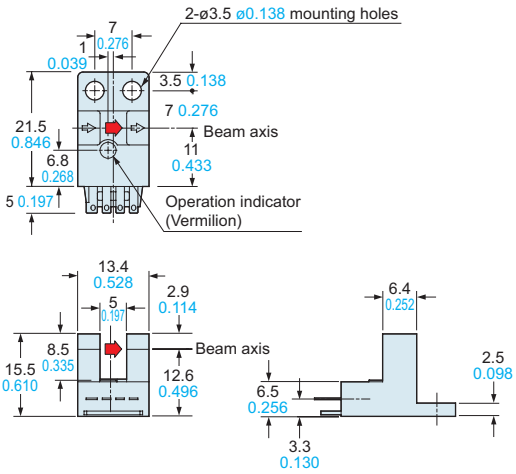
PM-T54 PM-T54P — Sensor



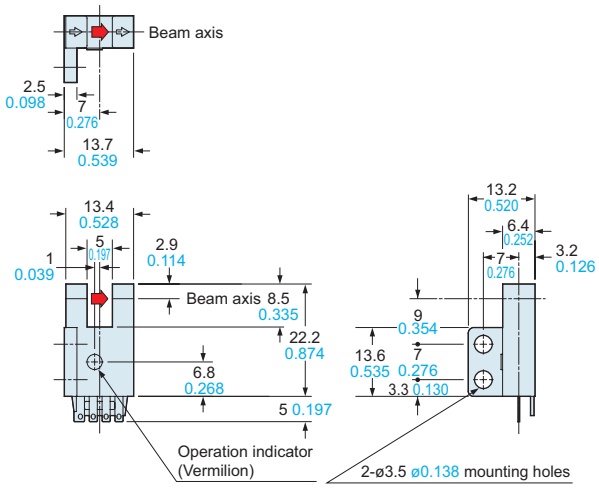
PM-L54 PM-L54P — Sensor



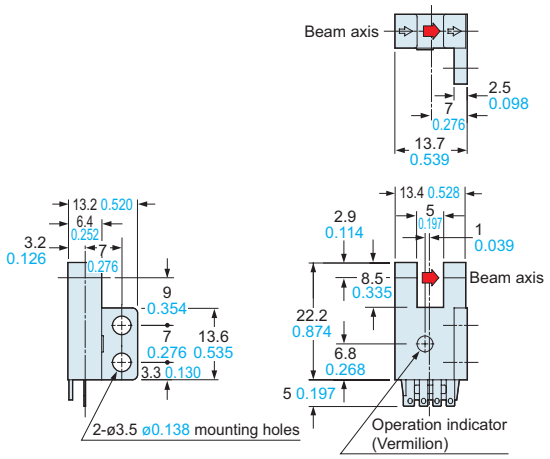
PM-Y54 PM-Y54P — Sensor



PM-F54 PM-F54P — Sensor



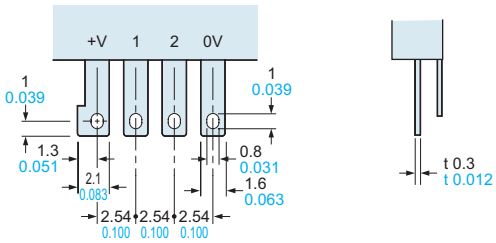
PM-R54 PM-R54P — Sensor



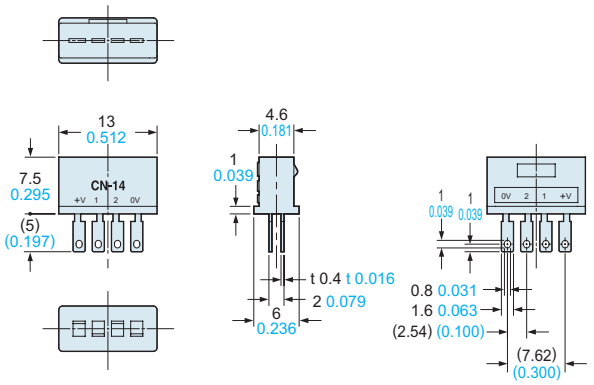
DIMENSIONS (Unit: mm in)

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

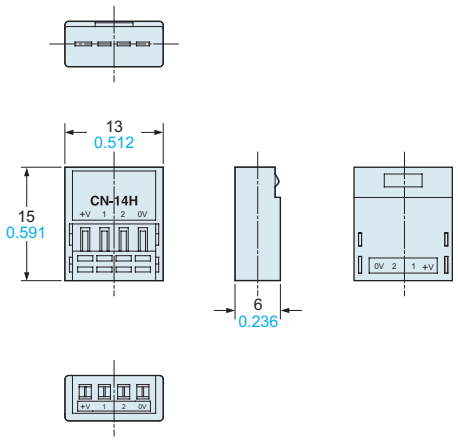
* Terminal part (PM-□54, PM-□54P)



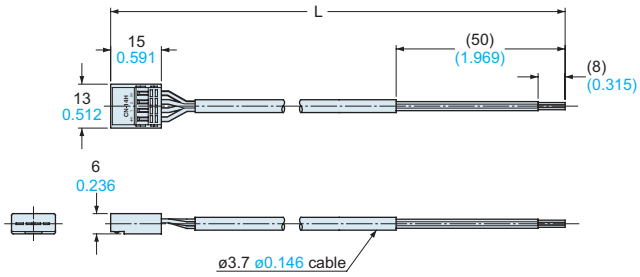
CN-14 Connector (Optional)



CN-14H CN-14H-2 Hook-up connector (Optional)



CN-14H-C1 CN-14H-C3 Connector attached cable (Optional)



• Length L

Model No.	Length L
CN-14H-C1	1 m 3.281 ft
CN-14H-C3	3 m 9.843 ft

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