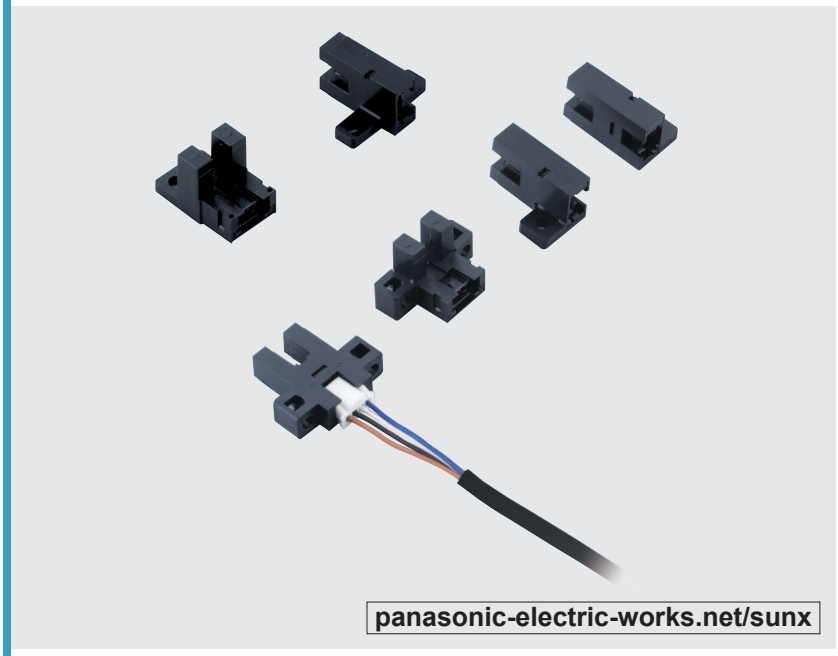
Connector Built-in U-shaped Micro Photoelectric Sensor Amplifier Built-in

# PM-64 SERIES

Related Information
■ General terms and conditions ..... F-17
■ Glossary of terms ..... P.1359~
■ Sensor selection guide..... P.441~
■ General precautions ..... P.1405



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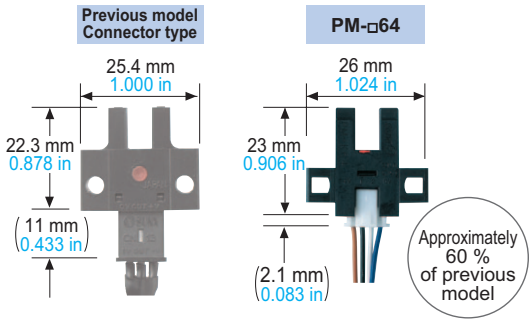
CE Conforming to EMC Directive

cULus Recognition

## Easy connection with a single touch using commercially-available connectors

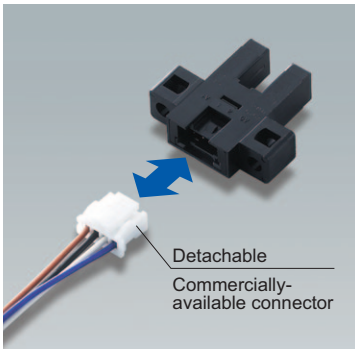
### Built-in connector saves space

This greatly reduces the amount of space taken up compared to previous models.
The dimension between the beam axis and cable bending part has been reduced to half at maximum.




### Can be connected using commercially-available connectors

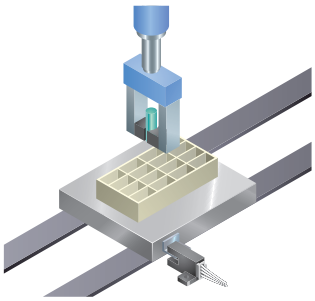
The connector connection type eliminates the extra work of soldering and insulation processing. In addition, the connector used is a commercially-available multi-purpose connector which is also currently used by the **DP-100** series of digital pressure sensors.




Digital pressure sensor **DP-100** series

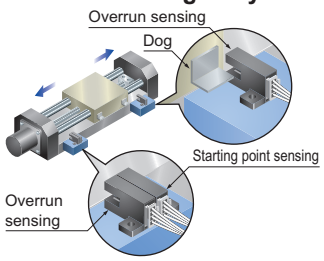
## APPLICATIONS

### Determining the pallet position



Pallet is stopped by sensing the dog.

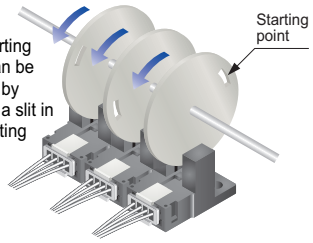
### Sensing the starting point and overrun of a moving body




Starting point and overrun is sensed using the dog on the base.

### Sensing the starting point on a rotating body

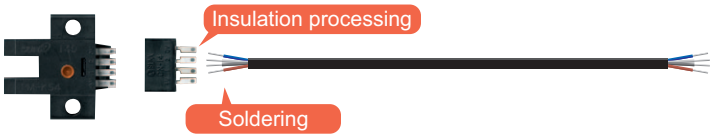
The starting point can be sensed by making a slit in the rotating body.




## Improved maintenance and workability significantly reduces total cost

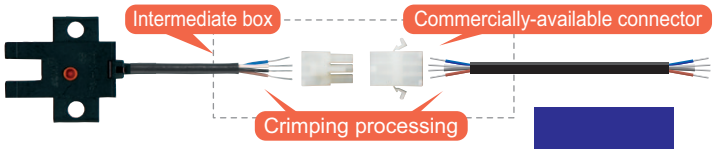
The processing cost of the connector cables can be drastically reduced through the use of commercially-available crimping connectors.

**Previous model (Soldering: Connector type)**




- **Automation is hard because of soldering.**
- **Insulation processing is required.**
- **A large space is necessary at the terminal area.**
- **Connectors are not reliable (not fully connected or seated).**

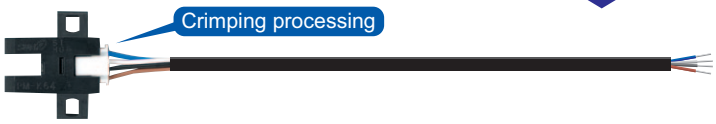
**Previous model (Converted to the cable-type commercially-available connector)**




- **Crimping processing is required in two places.**
- **A set of commercially-available connectors is necessary.**
- **There are many processes for cable connections.**
- **An intermediate box is required.**

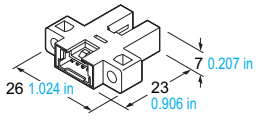
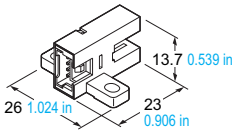
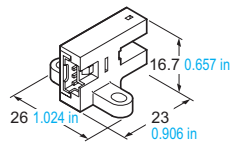
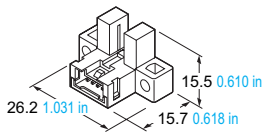
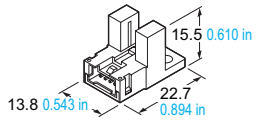
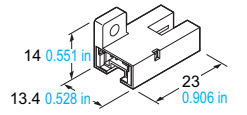
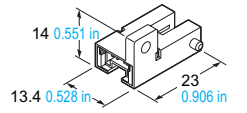
**Suggestion**

**PM-64 series (Commercially-available connectors can be used)**




- **Crimping processing makes automation possible so the connectors are also highly reliable.**
- **Soldering, insulation processing, and an intermediate box are not necessary.**
- **Connectors are widely available.**
- **Mounting in a small space is easy.**
- **Strongly connected using a locking connector.**
- **1 m 3.281 ft, 2 m 6.562 ft, 3 m 9.843 ft, and 5 m 16.404 ft connector cables are available.**

## ORDER GUIDE

| Type | | Appearance (mm in) | Sensing range | Model No. | Output | Output operation |
|---|---|---|---|---|---|---|
| Small and built-in connector type | K type |  | 5 mm 0.197 in (fixed) | **PM-K64** | NPN open-collector transistor | Incorporated with 2 outputs: Light-ON / Dark-ON |
| | | | | **PM-K64P** | PNP open-collector transistor | |
| | T type |  | | **PM-T64** | NPN open-collector transistor | |
| | | | | **PM-T64P** | PNP open-collector transistor | |
| | |  | | **PM-T64W** (Note) | NPN open-collector transistor | |
| | L type |  | | **PM-L64** | NPN open-collector transistor | |
| | | | | **PM-L64P** | PNP open-collector transistor | |
| | Y type |  | | **PM-Y64** | NPN open-collector transistor | |
| | | | | **PM-Y64P** | PNP open-collector transistor | |
| | F type |  | | **PM-F64** | NPN open-collector transistor | |
| | | | | **PM-F64P** | PNP open-collector transistor | |
| | R type |  | | **PM-R64** | NPN open-collector transistor | |
| | | | | **PM-R64P** | PNP open-collector transistor | |

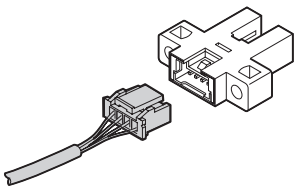
Note: **PM-T64W** is compatible with our conventional **PM-T53**(**B**).

## OPTIONS

| Designation | Model No. | Description | |
|---|---|---|---|
| Connector attached cable | **CN-14A-C1** | Length: 1m 3.281 ft | 0.2 mm² 4-core cabtyre cable with connector on one end<br>Cable outer diameter: ø3.7mm ø0.146 in |
| | **CN-14A-C2** | Length: 2m 6.562 ft | |
| | **CN-14A-C3** | Length: 3m 9.843 ft | |
| | **CN-14A-C5** | Length: 5m 16.404 ft | |
| Connector attached cable (Flexible cable) | **CN-14A-R-C1** | Length: 1m 3.281 ft | |
| | **CN-14A-R-C2** | Length: 2m 6.562 ft | |
| | **CN-14A-R-C3** | Length: 3m 9.843 ft | |
| | **CN-14A-R-C5** | Length: 5m 16.404 ft | |
| Connector | **CN-14A** | Set of 10 housings and 40 contacts | |

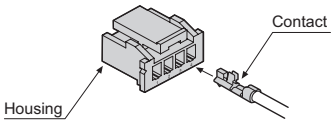
### Connector attached cable

• **CN-14A(-R)-C□**



### Connector

• **CN-14A**




### Recommended connector

Contact: SPHD-001T-P0.5, Housing: PAP-04V-S (Manufactured by J.S.T. Mfg. Co., Ltd.)
Note: Contact the manufacturer for details of the recommended products.

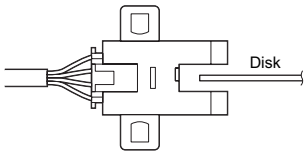
### Recommended crimping tool

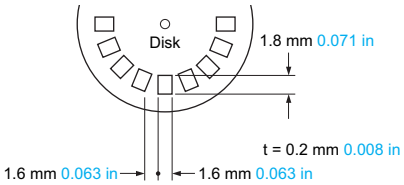
Model No. : YC-610R (Manufactured by J.S.T. Mfg. Co., Ltd.)
Note: Contact the manufacturer for details of the recommended products.

## SPECIFICATIONS

| Item \ Type | | Small and built-in connector type | | | | | |
|---|---|---|---|---|---|---|---|
| | | K type | T type | L type | Y type | F type | R type |
| Model No. | NPN output | **PM-K64** | **PM-T64(W)** | **PM-L64** | **PM-Y64** | **PM-F64** | **PM-R64** |
| | PNP output | **PM-K64P** | **PM-T64P** | **PM-L64P** | **PM-Y64P** | **PM-F64P** | **PM-R64P** |
| 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 (Note 2) | | | | | |
| Repeatability | | 0.01 mm 0.0004 in or less (Note 3) | | | | | |
| Supply voltage | | 5 to 24 V DC ±10 % Ripple P-P 10 % or less | | | | | |
| Current consumption | | 15 mA or less | | | | | |
| Output | | <NPN output type><br>NPN open-collector transistor<br>• Maximum sink current: 50 mA<br>• Applied voltage: 30 V DC or less (between output and 0 V)<br>• Residual voltage: 0.7 V or less (at 50 mA sink current)<br>0.4 V or less (at 16 mA sink current) | | | <PNP output type><br>PNP open-collector transistor<br>• Maximum source current: 50 mA<br>• Applied voltage: 30 V DC or less (between output and +V)<br>• Residual voltage: 0.7 V or less (at 50 mA source current)<br>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<br>Under light interrupted condition: 100 µs or less<br>(Response frequency: 1 kHz or more) (Note 4) | | | | | |
| Operation indicator | | Orange 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: 5 to 95 % RH (Note 5) | | | | | |
| | 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 length | | Total length up to 100 m 328.084 ft is possible with 0.3 mm², or more, cable. (Note 6) | | | | | |
| Weight | | 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) This is the value when a sensing object is moved in a lateral direction to the U-shape.
3) This is the value when a sensing object is moved in a lateral direction to the U-shape and when the inserting length of the sensing board is 5 mm 0.197 in.
4) The response frequency is the value when the disc, given in the figure below, is rotated.



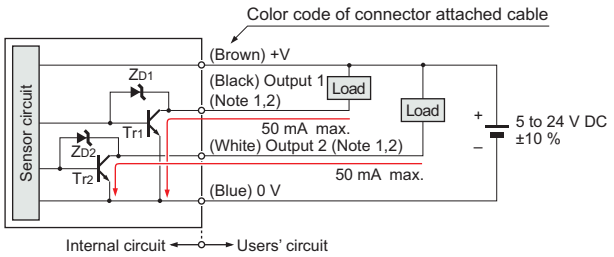




5) 5-35% RH in an ambient temperature of +23 °C +73.4 °F.
6) Confirm that the sensor terminal voltage is more than 4.5 V when using an extension of over 20 m 65.617 ft.

# I/O CIRCUIT AND WIRING DIAGRAMS

## PM-□64(W) — NPN output type

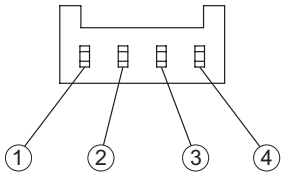
### I/O circuit diagram




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

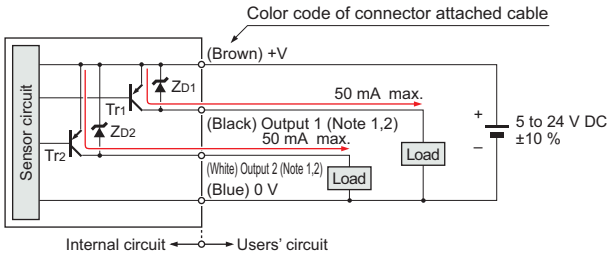
### Terminal arrangement diagram




| Terminal No. | Designation |
|---|---|
| ① | +V |
| ② | Output1: Light-ON |
| ③ | Output2: Dark-ON |
| ④ | 0 V |

## PM-□64P — PNP output type

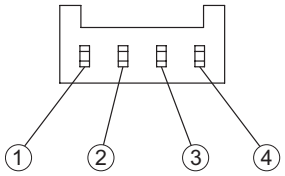
### I/O circuit diagram




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

### Terminal arrangement diagram

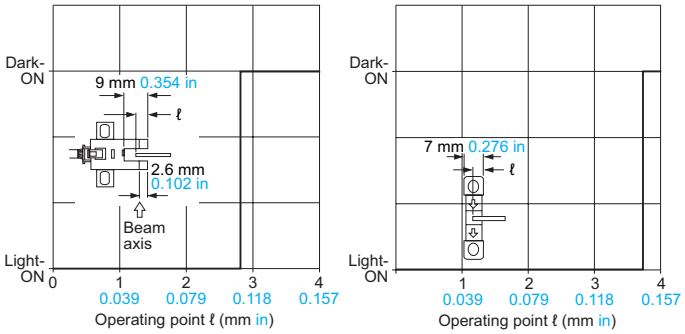



| Terminal No. | Designation |
|---|---|
| ① | +V |
| ② | Output1: Light-ON |
| ③ | Output2: Dark-ON |
| ④ | 0 V |

# SENSING CHARACTERISTICS (TYPICAL)

## PM-K64(P) PM-L64(P)

### Sensing position



## PRECAUTIONS FOR PROPER USE

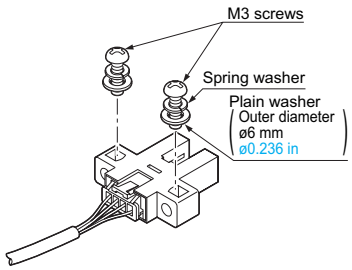
Refer to General precautions.

- 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

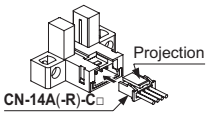
- When fixing the sensor with screws, use M3 screws and the tightening torque should be 0.5 N·m or less. Further, use small, round type plain washers (ø6 mm ø0.236 in).




### Wiring

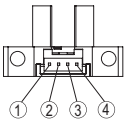
#### Connection method

- Insert the connector attached cable **CN-14A(-R)-C□** in the connector part of this product as shown in the right figure.




<Connector>
Housing: PAP-04V-S
(Manufactured by J.S.T. Mfg. Co., Ltd.)

<Connector pin position>




| Connector pin No. | ① | ② | ③ | ④ |
|---|---|---|---|---|
| Terminal designation | +V | Output 1 | Output 2 | 0V |

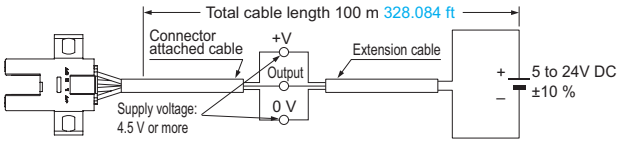
#### Disconnection method

- Pressing the projection of the connector attached cable, pull out the connector.

Note: Take care that if the cable is pulled out without pressing the projection, the cable may break.

### 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.

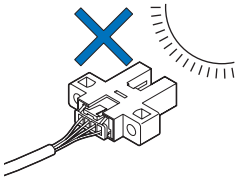



But, when the overall cable length, including the cable attached to the sensor, is as given below, there is no need to confirm the voltage.

| 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.

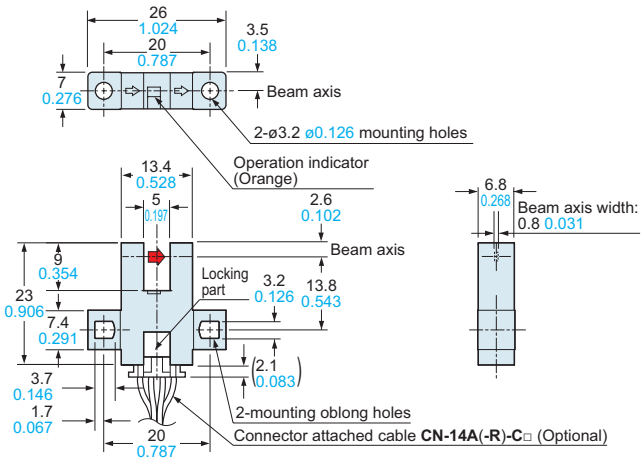


- Do not use during the initial transient time (50 ms) after the power supply is switched on.
- If the sensor is used in a place having excessive dust, periodically clean the emitting and receiving sections with a dry, soft cloth.
- If there is a large surge generating equipment, such as, motor, solenoid, electromagnetic valve, etc., in the vicinity of the sensor, use a surge absorber on that equipment. Further, do not run the sensor cables along power lines and use a capacitor between +V and 0 V, if required. Use the sensor after confirming that the surge has been eliminated.

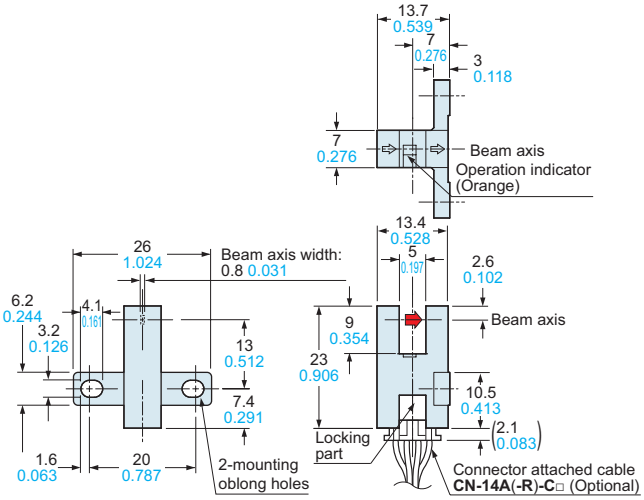
## DIMENSIONS (Unit: mm in)

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

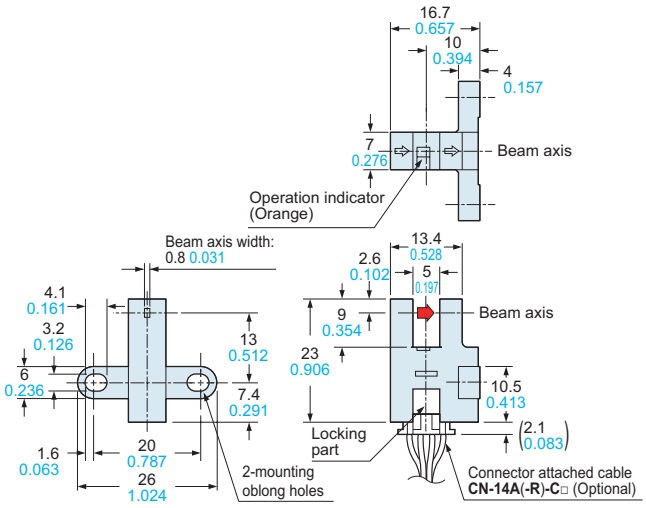
### PM-K64(P) Sensor



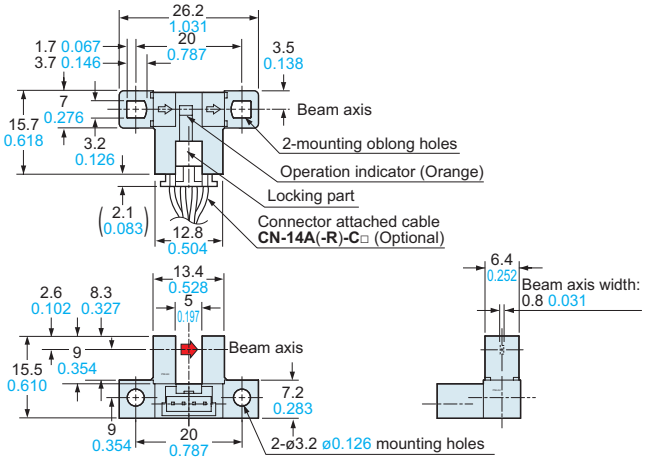

### PM-T64(P) Sensor



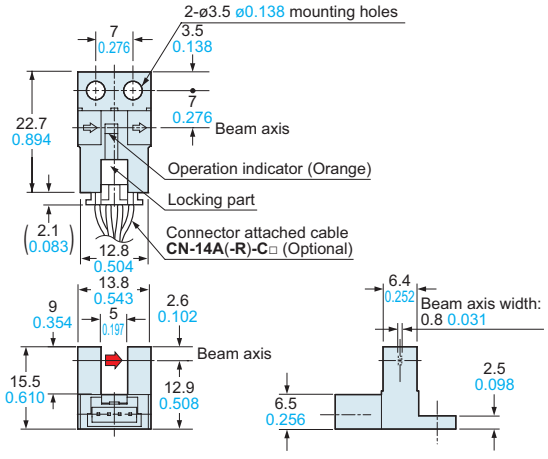

### PM-T64W Sensor



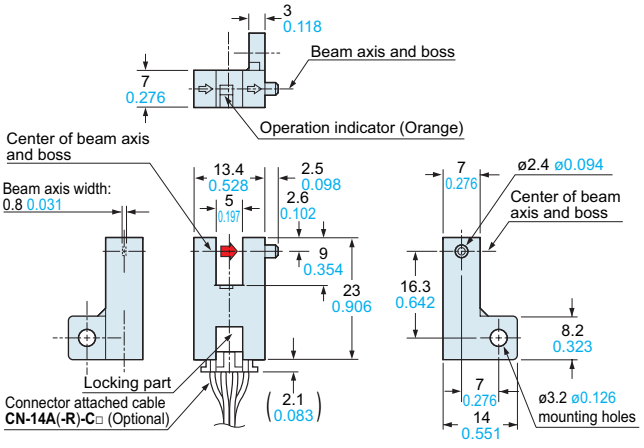

### PM-L64(P) Sensor




### PM-Y64(P) Sensor



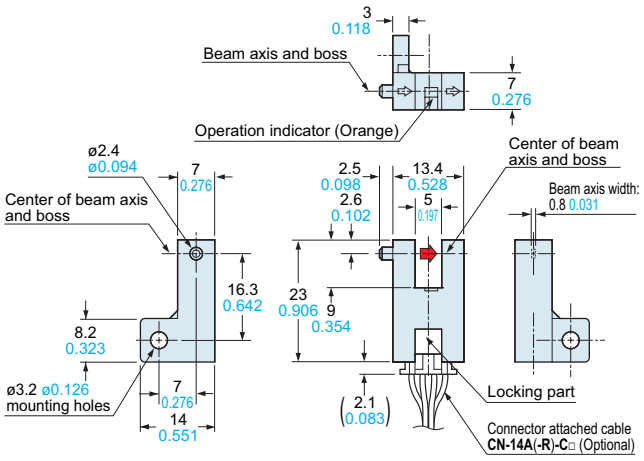

### PM-F64(P) Sensor



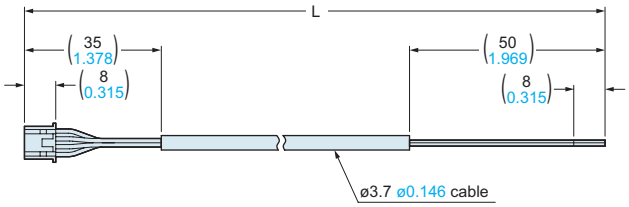
## DIMENSIONS (Unit: mm in)

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

### PM-R64(P) Sensor




### CN-14A-C□ CN-14A-R-C□ Connector attached cable (Optional)




• Length L

| Model No. | Length L |
|---|---|
| **CN-14A(-R)-C1** | 1,000 39.370 |
| **CN-14A(-R)-C2** | 2,000 78.740 |
| **CN-14A(-R)-C3** | 3,000 118.110 |
| **CN-14A(-R)-C5** | 5,000 196.850 |