

# Compact Cylindrical Proximity Sensors with Built-in Amplifier

# FL7(N/M) Series



The smallest amplifier in the industry, built into DC2-wire cylindrical sensors



- **Compact cylindrical sensor head**  
Unthreaded type (**FL7N**): 4 dia. mm x 30 mm  
Threaded type (**FL7M**): M5 mm x 30 mm

- **Sealed to IP67**

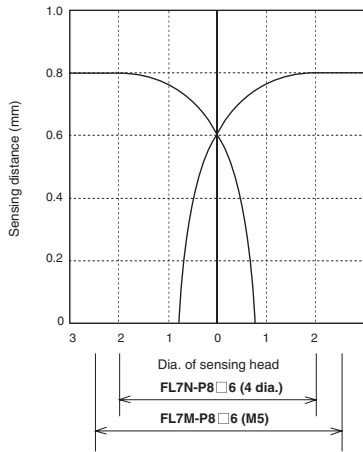
## ORDER GUIDE

| Sensor head shape  | Sensing distance | Catalog listing | Output type | Operation mode |
|--|------------------|-----------------|-------------|----------------|
| Unthreaded<br>4 dia. mm<br> | 0.8mm            | FL7N-P8J6       | DC2-wire    | N.O.           |
|  |                  | FL7N-P8K6       |             | N.C.           |
| Threaded<br>M5 mm<br>       | 0.8mm            | FL7M-P8J6       |             | N.O.           |
|  |                  | FL7M-P8K6       |             | N.C.           |

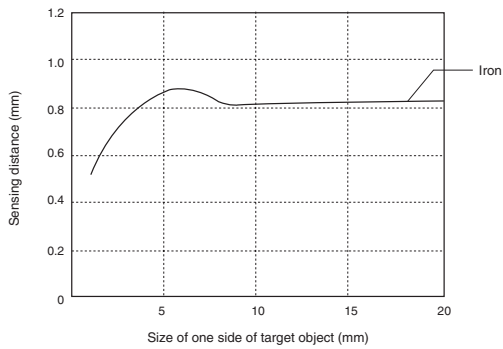
## SPECIFICATIONS

| Sensor head type        | Unthreaded type   |                        | Threaded type        |                        |
|-------------------------|---|------------------------|----------------------|------------------------|
| Catalog listing         | FL7N-P8J6   | FL7N-P8K6              | FL7M-P8J6            | FL7M-P8K6              |
| Actuation method        | High-frequency oscillation  |                        |                      |                        |
| Rated supply voltage    | 12/24 Vdc   |                        |                      |                        |
| Operating voltage range | 10 to 30 Vdc  |                        |                      |                        |
| Leakage current         | 0.6 mA max. (24 Vdc)  |                        |                      |                        |
| Rated sensing distance  | 0.8mm   |                        |                      |                        |
| Standard target object  | 5 x 5 x 1mm (SPCC)  |                        |                      |                        |
| Differential travel     | 15 % max. of sensing distance   |                        |                      |                        |
| Operating mode          | N.O. (normally open)  | N.C. (normally closed) | N.O. (normally open) | N.C. (normally closed) |
| Output operational mode | DC2-wire, transistor output   |                        |                      |                        |
| Control output          | Switching current 3 to 100 mA, voltage drop 3.0V max. (with 50 mA switching current and 2 m cable), output dielectric strength 30 Vdc |                        |                      |                        |
| Operating frequency     | 900 Hz min.   |                        |                      |                        |
| Temperature drift       | ±15 % max. of sensing distance (at 25°C) in the -25 to +70°C range  |                        |                      |                        |
| Operation indication    | Orange LED lights up when in sensing area   |                        |                      |                        |
| Operating temperature   | -25 to +70 °C   |                        |                      |                        |
| Insulation resistance   | 50 MΩ min. (by 500 Vdc megger)  |                        |                      |                        |
| Dielectric strength     | 1,000 Vac, 50/60 Hz for 1min between all live parts and case  |                        |                      |                        |
| Vibration resistance    | 10 to 55Hz, 1.5 mm peak-to-peak amplitude, 2 h each in X, Y and Z directions  |                        |                      |                        |
| Shock resistance        | 500m/s <sup>2</sup> 10 times each in X, Y and Z directions  |                        |                      |                        |
| Protective structure    | IP67 (IEC standard)   |                        |                      |                        |
| Max. tightening torque  | 0.2N·m max. 6–30mm from the sensing face<br>(assumes use of rubber spacer [included])   |                        | 0.98N·m max.         |                        |
| Weight                  | Approx. 28 g (including 2 m cable)  |                        |                      |                        |
| Circuit protection      | Surge absorption, load short-circuit protection, reverse connection protection circuit  |                        |                      |                        |

## SENSING AREA (typical)



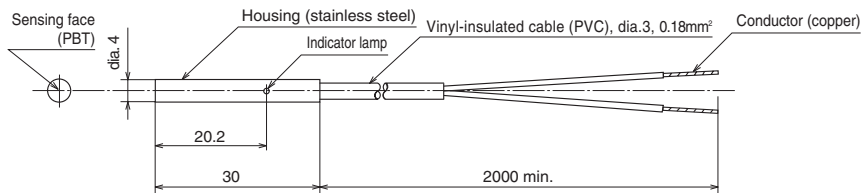
## SENSING DISTANCE ACCORDING TO MATERIAL AND SIZE OF OBJECT (typical)



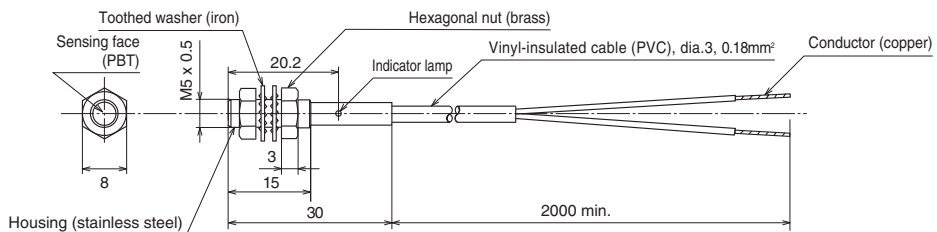
## EXTERNAL DIMENSIONS

(unit: mm)

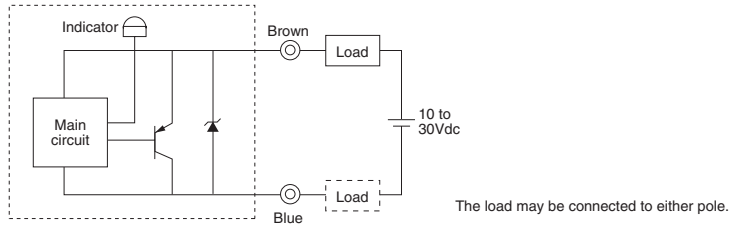
### Unthreaded type: FL7N-P8□6



### Threaded type: FL7M-P8□6



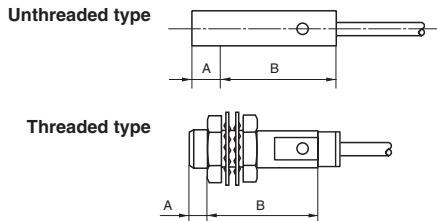
## WIRING DIAGRAMS



## PRECAUTIONS FOR USE

### 1. Mounting

The allowable tightening torque varies according to the distance from the sensing face



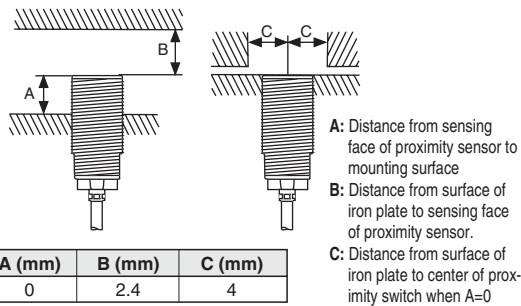
| Catalog listing | Length A (mm) | Max. tightening torque (N·m) |     |
|-----------------|---------------|------------------------------|-----|
|                 |               | A                            | B   |
| FL7N-P8□6□      | 6             | Do not tighten               | 0.2 |
| FL7M-P8□6□      | 0             | 1                            | 1   |

Note: The table shows max. tightening torque when toothed washers (provided) are used.

### 2. Influence of surrounding metal

Metal other than the target object surrounding the sensor may influence operating characteristics. Leave space between the sensor and surrounding metal as shown below.

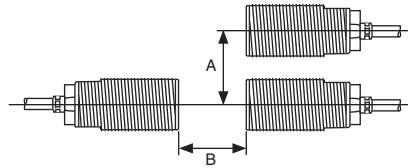
Shaded areas indicate surrounding metal other than the target object.



| A (mm) | B (mm) | C (mm) |
|--------|--------|--------|
| 0      | 2.4    | 4      |

### 3. Mutual interference prevention

When mounting proximity sensors either parallel to or facing each other, mutual interference may cause the sensor to malfunction. Maintain at least the distances indicated in the figures below.



| A (mm) | B (mm) |
|--------|--------|
| 15     | 20     |

### 4. Minimum cable bend radius (R)

The minimum bend radius (R) of the cable is 3 times the cable diameter. Take care not to bend the cable beyond this radius. Also, do not excessively bend the cable within 30 mm of the cable lead-in port.