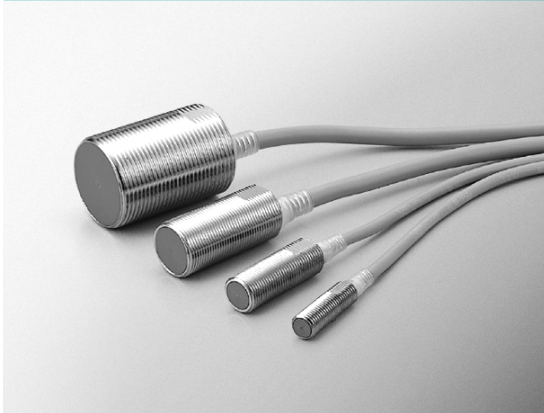


DC 3-Wire Cylindrical Proximity Sensors

FL7M Series

Extensive lineup includes M8 to M30 sizes, with NPN and PNP output models available for each.



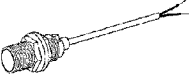
- Compact size saves space
- Indicator lamp can be checked even from the rear
- Sealed to IP67
- Numerous variations
- Enhanced circuit protection
(surge absorption, load short circuit and reverse connection countermeasures)






CLICK

ORDER GUIDE

● Main unit

| Exterior | | Sensing distance | Output operation mode | | Catalog listing | | |
|--|-------|------------------|-------------------------|------------------|-------------------|------|------------------|
| Appearance | O.D. | | | | | | |
| Firefly indicator  | M8 | 1.5mm | NPN | N.O. | FL7M-1P5A6 | | |
| | | | | N.C. | FL7M-1P5B6 | | |
| | | | PNP | N.O. | FL7M-1P5D6 | | |
| | | | | N.C. | FL7M-1P5E6 | | |
| | M12 | 2 mm | NPN | N.O. | FL7M-2A6 | | |
| | | | | N.C. | FL7M-2B6 | | |
| | | | PNP | N.O. | FL7M-2D6 | | |
| | | | | N.C. | FL7M-2E6 | | |
| | | | M12 (long-body type) | 2 mm | NPN | N.O. | FL7M-2A6G |
| | | | | | | N.C. | FL7M-2B6G |
| | PNP | N.O. | FL7M-2D6G | | | | |
| | | N.C. | FL7M-2E6G | | | | |
| | M18 | 5 mm | NPN | N.O. | FL7M-5A6 | | |
| | | | | N.C. | FL7M-5B6 | | |
| PNP | | | N.O. | FL7M-5D6 | | | |
| | | | N.C. | FL7M-5E6 | | | |
| M30 | 10 mm | NPN | N.O. | FL7M-10A6 | | | |
| | | | N.C. | FL7M-10B6 | | | |
| | | PNP | N.O. | FL7M-10D6 | | | |
| | | | N.C. | FL7M-10E6 | | | |

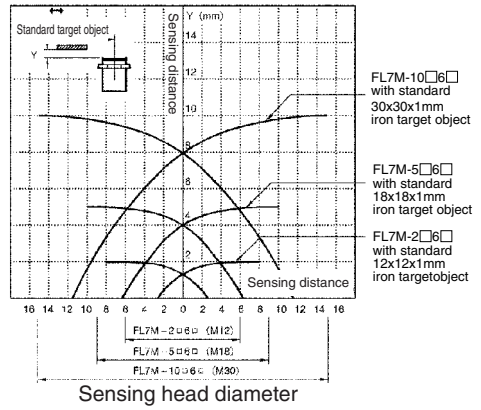
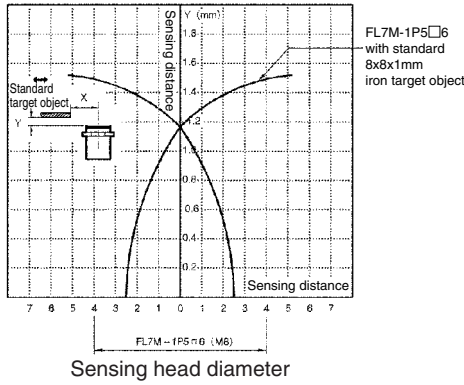
● Accessories (sold separately)

| Name | Appearance | O.D. | Catalog listing |
|----------------------------------|---|---------|-----------------|
| Mounting bracket |  | For M12 | FL-PA112 |
| | | For M18 | FL-PA118 |
| | | For M30 | FL-PA130 |
| Protective cover |  | For M12 | FL-PA12 |
| | | For M18 | FL-PA18 |
| | | For M30 | FL-PA30 |
| Spatter-guarded protective cover |  | For M8 | FL-PA08W |
| | | For M12 | FL-PA12W |
| | | For M18 | FL-PA18W |
| | | For M30 | FL-PA30W |

SPECIFICATIONS

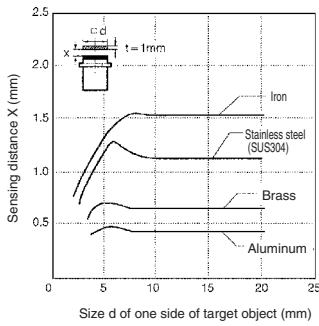
| Catalog listing | FL7M-1P5□6 | FL7M-2□6 | FL7M-5□6 | FL7M-10□6 |
|---|---|--|---------------------|---------------------|
| Actuation method | High-frequency oscillation(shielded) | | | |
| Rated sensing distance | 1.5 ±0.15mm | 2 ±0.2mm | 5 ±0.5mm | 10 ±1mm |
| Usable sensing distance | 0 to 1.2mm | 0 to 1.6mm | 0 to 4mm | 0 to 8mm |
| Standard target object | 8 x 8 x 1 mm iron | 12 x 12 x 1 mm iron | 18 x 18 x 1 mm iron | 30 x 30 x 1 mm iron |
| Differential travel | 10% max. of sensing distance | | | |
| Rated supply voltage | 12/24Vdc | | | |
| Operating voltage range | 10 to 30Vdc | | | |
| Current consumption | 13mA max. | | | |
| Control output | Switching current | 100mA max. | | |
| | Voltage drop | 2V max. (at 100mA switching current with 2m cable) | | |
| | Output dielectric strength | 30Vdc. | | |
| Operating frequency | 2kHz | 1.5kHz | 600kHz | 400kHz |
| Temperature drift | ±10% max. of sensing distance for the -25 to +70°C range, taking +25°C as standard temperature | | | -10 to +60°C |
| Supply voltage drift | ±1% max. of sensing distance with ±15% voltage fluctuation, taking rated supply voltage as standard voltage | | | |
| Indicator lamp | Lights up red at output ON | | | |
| Operating temperature | -25 to +70°C | | | -10 to +60°C |
| Insulation resistance | 50MΩmin. (by 500V megger) | | | |
| Dielectric strength | 1000Vac, 50/60Hz for 1 minute between case and electrically live metal | | | |
| Vibration resistance | 10 to 55Hz, 1.5mm peak-to-peak amplitude, 2 hrs each in X, Y and Z directions | | | |
| Shock resistance | 980m/s ² 10 times each in X, Y and Z directions | | | |
| Protective structure | IP67 (IEC standard), IP67G (JEM standard) | | | |
| Weight (main unit + 2m preleaded cable) | Approx. 55g | Approx. 65g | Approx. 140g | Approx. 190g |
| Circuit protection | Surge absorption, load short-circuit protection, reverse connection protection | | | |
| Wiring method | Preleaded (2m cable is standard) | | | |
| Material | Sensor | Case | Ni-plated brass | |
| | | Sensing face | PBT resin | |

SENSING AREA (typical)

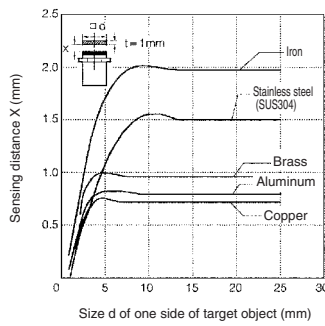


SENSING DISTANCE ACCORDING TO MATERIAL AND SIZE OF OBJECT (typical)

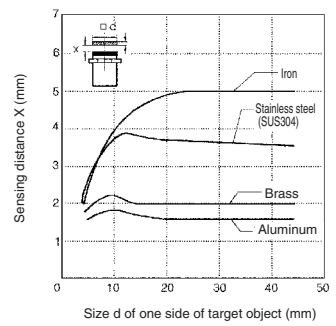
●FL7M-1P5□6



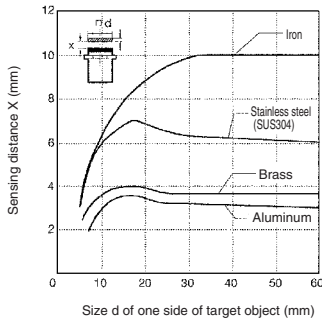
●FL7M-2□6



●FL7M-5□6



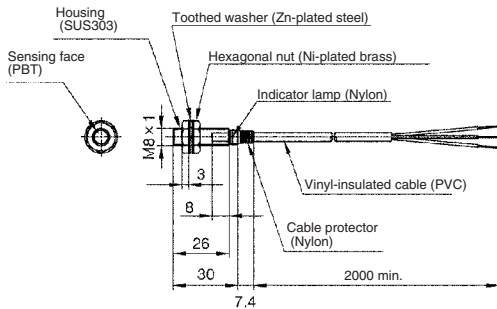
●FL7M-10□6



EXTERNAL DIMENSIONS

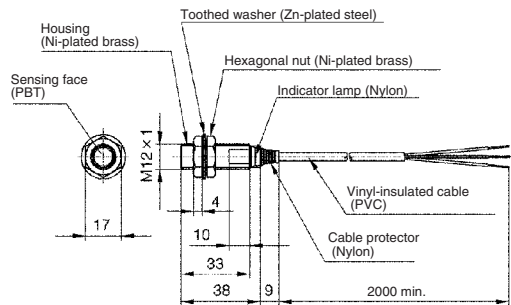
(unit: mm)

FL7M-1P5□6



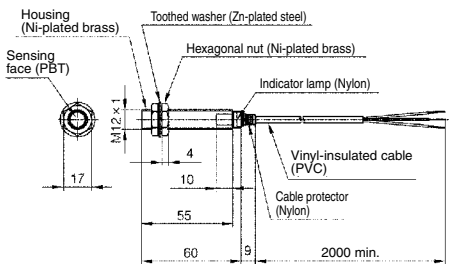
Vinyl-insulated cable (oil-resistant: 0.3mm², 60/0.08, 3-core),
dia. 4. Cap color: blue.

FL7M-2□6



Vinyl-insulated cable (oil-resistant: 0.3mm², 60/0.08, 3-core),
dia. 4. Cap color: blue.

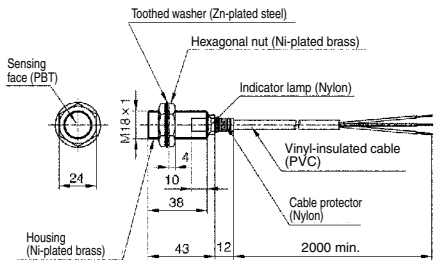
FL7M-2□6G..... long body type



Vinyl-insulated cable (oil-resistant: 0.3mm², 60/0.08, 3-core), dia. 4. Cap color: blue.

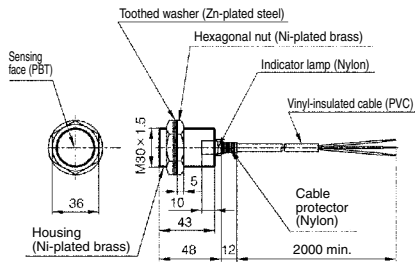
FL7M-5□6

(unit: mm)



Vinyl-insulated cable (oil-resistant: 0.5mm², 45/0.12, 3-core), dia. 6. Cap color: blue.

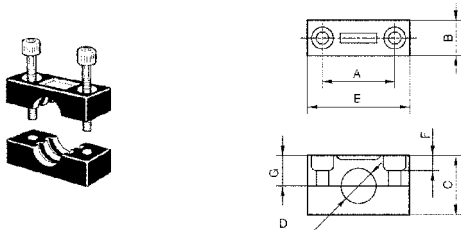
FL7M-10□6



Vinyl-insulated cable (oil-resistant: 0.5mm², 45/0.12, 3-core), dia. 6. Cap color: blue.

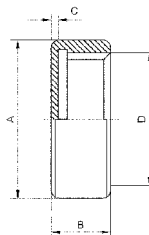
MOUNTING BRACKET (sold separately)

Mounting brackets are made of polyacetal resin. Two screws and two washers are provided for each bracket.



PROTECTIVE COVER (sold separately)

Protective covers made of polyacetal resin are available for shielded models. Select a model according to the sensor's external dimensions



FL-PA118 and FL-PA130 screw holes are oblong.

| Catalog listing | Dimensions (mm) | | | | | | | | Screw size |
|-----------------|-----------------|----|----|--------|----|-----|------|----------|------------|
| | A | B | C | D | E | F | G | Di. Neck | |
| FL-PA112 | 25 | 12 | 20 | 12dia. | 36 | 6 | 9.5 | M4 | 25 |
| FL-PA118 | 30/32 | 15 | 30 | 18dia. | 45 | 7.5 | 14.5 | M5 | 35 |
| FL-PA130 | 40/45 | 15 | 50 | 30dia. | 60 | 10 | 24.5 | M5 | 55 |

| Catalog listing | Dimensions (mm) | | | |
|-----------------|-----------------|---|-----|---------|
| | A | B | C | D |
| FL-PA12 | 14dia. | 5 | 0.5 | M12x1 |
| FL-PA18 | 21dia. | 6 | 0.5 | M18x1 |
| FL-PA30 | 33dia. | 8 | 1.5 | M30x1.5 |

Allowable tightening torque of bracket screws

| Catalog listing | Max. torque (N·m) |
|-----------------|-------------------|
| FL-PA112 | 0.98 |
| FL-PA118 | 1.5 |
| FL-PA130 | 1.5 |

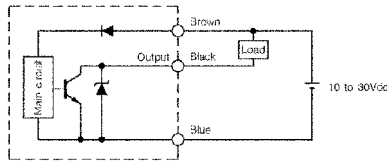
SPATTER-GUARDED PROTECTIVE COVER (sold separately)

Spatter-guarded protective covers made of fluorine resin and designed especially for shielded sensors are available. Select a model according to the sensor's external dimensions.

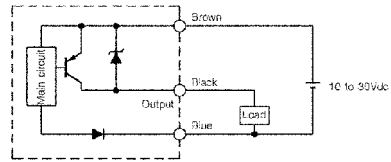
| Catalog listing | Dimensions (mm) | | | |
|-----------------|-----------------|---|-----|---------|
| | A | B | C | D |
| FL-PA08W | 10dia. | 5 | 0.5 | M8x1 |
| FL-PA12W | 15dia. | 5 | 0.7 | M12x1 |
| FL-PA18W | 22dia. | 6 | 0.7 | M18x1 |
| FL-PA30W | 34dia. | 8 | 1.5 | M30x1.5 |

WIRING DIAGRAMS

NPN type



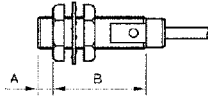
PNP type



PRECAUTIONS FOR USE

Mounting

The allowable tightening torque varies according to the distance from the sensing surface.

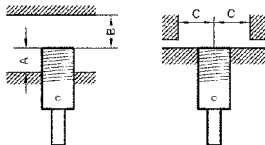


| Catalog listing | Length of A (mm) | Max. tightening torque (N·m) | |
|-----------------|------------------|------------------------------|-----|
| | | A | B |
| FL7M-1P5□6 | 9 | 9 | 12 |
| FL7M-2□6□ | 0 | — | 20 |
| FL7M-5□6□ | 0 | — | 70 |
| FL7M-10□6□ | 0 | — | 180 |

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

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.



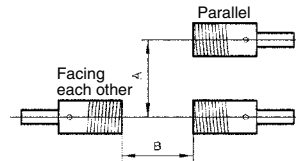
Shaded areas indicate surrounding metal other than the target object.

A: Distance from sensing face of proximity sensor to mounting surface
 B: Distance from surface of iron plate to sensing face of proximity sensor.
 C: Distance from surface of iron plate to center of proximity switch when A=0
 Catalog listing

| Catalog listing | A (mm) | B (mm) | C (mm) |
|-----------------|--------|--------|--------|
| FL7M-1P5□6 | 0 | 4.5 | 6 |
| FL7M-2□6□ | 0 | 8 | 9 |
| FL7M-5□6□ | 0 | 20 | 13.5 |
| FL7M-10□6□ | 0 | 40 | 22.5 |

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.



| Catalog listing | A (mm) | B (mm) |
|-----------------|--------|--------|
| FL7M-1P5□6 | 15 | 20 |
| FL7M-2□6□ | 20 | 30 |
| FL7M-5□6□ | 35 | 50 |
| FL7M-10□6□ | 70 | 100 |

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 30mm of the cable lead-in port.