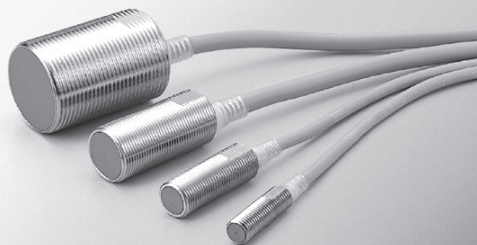


# DC3-Wire Cylindrical Proximity Switches



## Model FL7M

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)

- PHOTOELECTRIC SENSORS & SWITCHES
- MEASUREMENT SENSORS
- PROXIMITY SWITCHES
- LIMIT SWITCHES
- SAFETY KEY SWITCHES
- CYLINDRICAL
- SQUARE
- TECHNICAL GUIDE

FL7M (DC2)  
Regular

FL7M (DC2)  
Long Distance No-Polarity

FL7M (DC2)  
Spatter-Guarded

FL7S

FL7M-C (DC2)  
Environment-Resistant

FL7M-A (DC2)  
Aluminum-Chip Resistant


FL7M (DC2)  
Unshielded

FL7M (AC/DC2)




FL7M (DC3)

## 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
			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	<b>FL-PA112</b>
		For M18	<b>FL-PA118</b>
		For M30	<b>FL-PA130</b>
Protective cover		For M12	<b>FL-PA12</b>
		For M18	<b>FL-PA18</b>
		For M30	<b>FL-PA30</b>
Spatter-guarded protective cover		For M8	<b>FL-PA08W</b>
		For M12	<b>FL-PA12W</b>
		For M18	<b>FL-PA18W</b>
		For M30	<b>FL-PA30W</b>

PHOTOELECTRIC  
SENSORS &  
SWITCHES

MEASUREMENT  
SENSORS

PROXIMITY  
SWITCHES

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SAFETY  
KEY SWITCHES

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**FL7M** (DC2)  
Unshielded

**FL7M** (AC/DC2)

**FL7M** (DC3)

Connector  
with cable



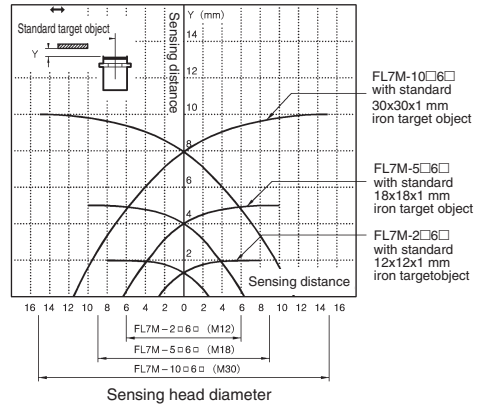
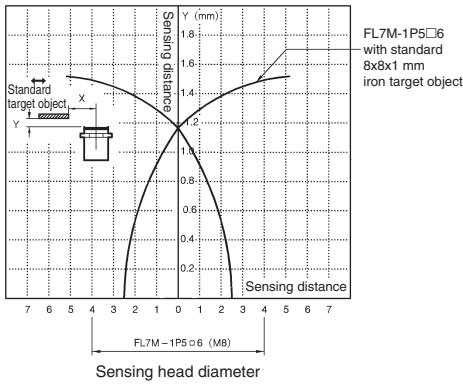
See page  
**F-001**

**C-066**

**SPECIFICATIONS**

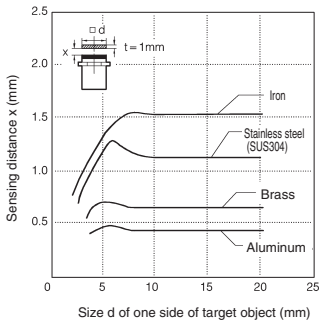
Catalog listing	FL7M-1P5□6	FL7M-2□6	FL7M-5□6	FL7M-10□6
Actuation method	High-frequency oscillation(shielded)			
Rated sensing distance	1.5 ±0.15 mm	2 ±0.2 mm	5 ±0.5 mm	10 ±1 mm
Usable sensing distance	0 to 1.05 mm	0 to 1.4 mm	0 to 3.5 mm	0 to 7 mm
Standard target object	8 x 8 x 1 mm iron	12 x 12 x 1 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	12/24 Vdc			
Operating voltage range	10 to 30 Vdc			
Current consumption	13 mA max.			
Control output	Switching current	100 mA max.		
	Voltage drop	2V max. (at 100 mA switching current with 2 m cable)		
	Output dielectric strength	30 Vdc.		
Operating frequency	2 kHz	1.5 kHz	600 kHz	400 kHz
Temperature drift	±10% max. of sensing distance for the -25 to +70°C range, taking +25°C as standard temperature			±10% max. of sensing distance for the -10 to +60°C range, taking +25°C as standard temperature
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	50 MΩ min. (by 500V megger)			
Dielectric strength	1000 Vac, 50/60 Hz for 1 minute between case and electrically live metal			
Vibration resistance	10 to 55 Hz, 1.5 mm peak-to-peak amplitude, 2 hrs each in X, Y and Z directions			
Shock resistance	980 m/s <sup>2</sup> 10 times each in X, Y and Z directions			
Protective structure	IP67 (IEC standard), IP67G (JEM standard)			
Weight (main unit + 2 m preleaded cable)	Approx. 55 g	Approx. 65 g	Approx. 140 g	Approx. 190 g
Circuit protection	Surge absorption, load short-circuit protection, reverse connection protection			
Wiring method	Preleaded (2 m cable is standard)			
Material	Switch	Case	Ni-plated brass	
		Sensing face	PBT resin	

## SENSING AREA (typical)

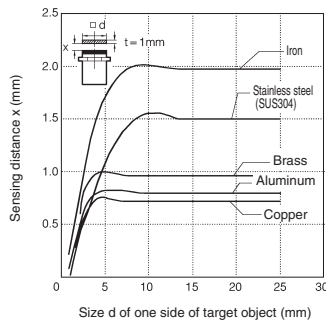


## SENSING DISTANCE ACCORDING TO MATERIAL AND SIZE OF OBJECT (typical)

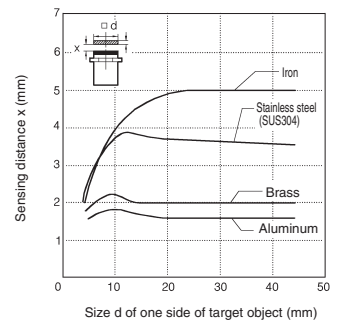
### ●FL7M-1P5□6



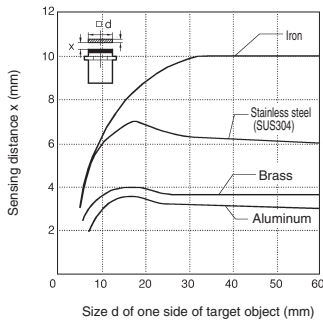
### ●FL7M-2□6



### ●FL7M-5□6



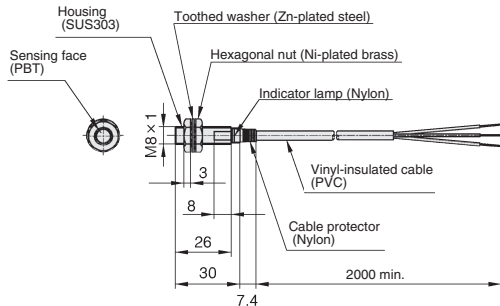
### ●FL7M-10□6



## EXTERNAL DIMENSIONS

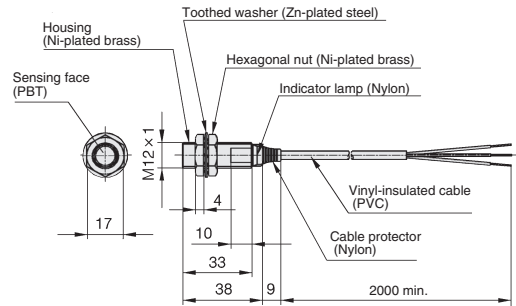
(unit: mm)

### FL7M-1P5□6



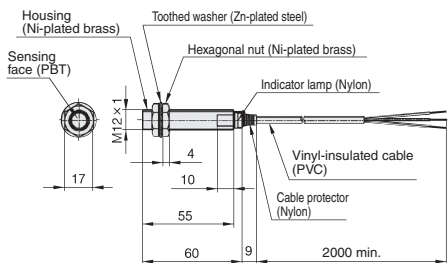
Vinyl-insulated cable (oil-resistant: 0.3 mm<sup>2</sup>, 60/0.08 dia., 3-core), dia. 4. Cap color: blue.

### FL7M-2□6



Vinyl-insulated cable (oil-resistant: 0.3 mm<sup>2</sup>, 60/0.08 dia., 3-core), dia. 4. Cap color: blue.

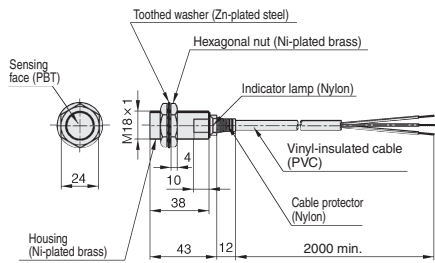
### FL7M-2□6G ..... long body type



Vinyl-insulated cable (oil-resistant: 0.3 mm<sup>2</sup>, 60/0.08 dia., 3-core), dia. 4. Cap color: blue.

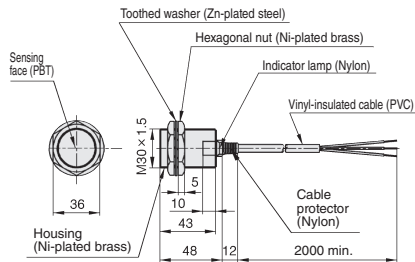
### FL7M-5□6

(unit: mm)



Vinyl-insulated cable (oil-resistant: 0.5 mm<sup>2</sup>, 45/0.12 dia., 3-core), dia. 6. Cap color: blue.

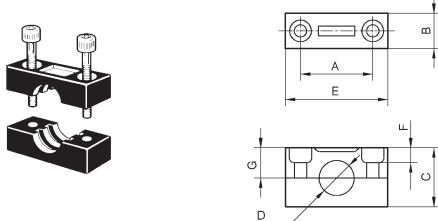
### FL7M-10□6



Vinyl-insulated cable (oil-resistant: 0.5 mm<sup>2</sup>, 45/0.12 dia., 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.



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

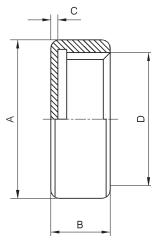
Catalog listing	Dimensions (mm)							Screw size	
	A	B	C	D	E	F	G	Dia.	Neck
FL-PA112	25	12	20	12dia	36	6	9.5	M4	25
FL-PA118	30/32	15	30	18dia.	45	7.5	14.5	M5	35
FL-PA130	40/45	15	50	30dia.	60	10	24.5	M5	55

Allowable tightening torque of bracket screws

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

## PROTECTIVE COVER (sold separately)

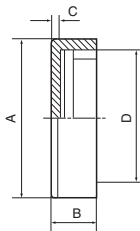
Protective covers made of polyacetal resin are available for shielded models. Select a model according to the switch's external dimensions



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

## SPATTER-GUARDED PROTECTIVE COVER (sold separately)

Spatter-guarded protective covers made of fluorine resin and designed especially for shielded switches are available. Select a model according to the switch'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

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FL7M (DC2)  
Unshielded

FL7M (AC/DC2)

FL7M (DC3)

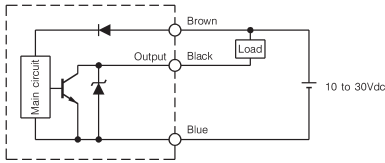
Connector with cable



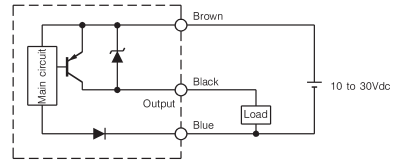
See page F-001

## WIRING DIAGRAMS

### NPN type



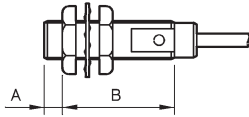
### PNP type



## PRECAUTIONS FOR USE

### 1. Mounting

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



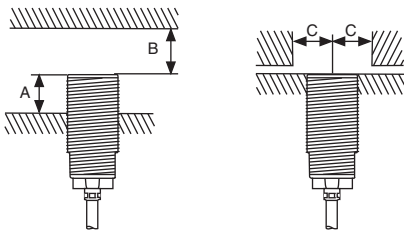
Catalog listing	Length of A (mm)	Max. tightening torque (N·m)	
		A	B
FL7M-1P5□6	9	9	12
FL7M-2□6□	0	—	20
FL7M-5□6□	0	—	70
FL7M-10□6□	0	—	180

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

The allowable tightening torque varies depending on the materials and surface conditions of the mounting plates, mounting housings, nuts, washers and other parts used for the switch. Check that the torque is appropriate for the actual combination of parts used before putting the switch into operation.

### 2. Influence of surrounding metal

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



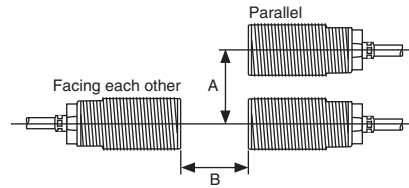
Shaded areas indicate surrounding metal other than the target object.

- A: Distance from sensing face of proximity switch to mounting surface
- B: Distance from surface of iron plate to sensing face of proximity switch.
- 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

### 3. Mutual interference prevention

When mounting proximity switches either parallel to or facing each other, mutual interference may cause the switch 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

### 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.

Before use, thoroughly read the "Precautions for use" and "Precautions for handling" in the Technical Guide on pages C-095 to C-101 as well as the instruction manual and product specification for this switch.

Please read "Terms and Conditions" from the following URL before ordering and use.

<https://www.azbil.com/products/factory/order.html>

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## Azbil Corporation

Advanced Automation Company

*Yamatake Corporation changed its name to Azbil Corporation on April 1, 2012.*

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