

FL7N/M Series

DC 2-wire Type (shielded/unshielded) Cylindrical Proximity Sensors

FEATURES

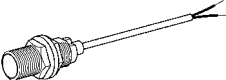
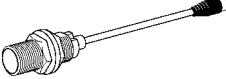
Rigid Structure, Highly Water-proof DC 2-wire Type with Improved Visibility Indicator Lamps.

- DC 2-wire reducing wiring costs.
- Stable sensing area displayed by setting indicator.
- Rigid housing allows higher tightening torque.
- Indicator lamp can be confirmed from any direction. (firefly-glow indicator)
- Lowest current consumption: 0.55mA. (shielded type with a firefly-glow indicator)
- High seal capability: IP67G, core leads shielded. (shielded type with a firefly-glow indicator)
- Highest response: 2kHz. (M8 shielded type with a firefly-glow indicator)
- Non-polar DC 2-wire long sensing distance model available.


[click](#)

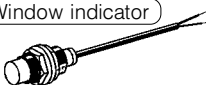
ORDER GUIDE

- Shielded
- General type (threaded)

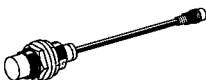
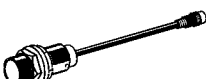
Appearance		Sensing distance		Operation mode	Setting indication	Cord characteristics	Catalog listing
Sensor package style	Dimensions (O.D.)					Oil resistance	
Fire-fly indicator Pre-leaded type (cord length 2m) 	M8	2mm		N.O.	○	○	FL7M-2J6HD
				N.C.		○	FL7M-2K6H
	M12	3mm		N.O.	○	○	FL7M-3J6HD
					○	○	FL7M-3J6HDG
				N.C.		○	FL7M-3K6H
						○	FL7M-3K6HG
	M18	7mm		N.O.	○	○	FL7M-7J6HD
				N.C.		○	FL7M-7K6H
Fire-fly indicator Pre-leaded connector type (cord length 30cm) 	M8	2mm		N.O.	○	○	FL7M-2J6HD-CN03
				N.C.		○	FL7M-2K6H-CN03
	M12	3mm		N.O.	○	○	FL7M-3J6HD-CN03
				N.C.		○	FL7M-3K6H-CN03
	M18	7mm		N.O.	○	○	FL7M-7J6HD-CN03
				N.C.		○	FL7M-7K6H-CN03
	M30	10mm		N.O.	○	○	FL7M-10J6D-CN03
				N.C.		○	FL7M-10K6-CN03
Window indicator Connector type 	M12	3mm		N.O.	○		FL7M-3J6HD-CN
				N.C.			FL7M-3K6H-CN
	M18	7mm		N.O.	○		FL7M-7J6HD-CN
				N.C.			FL7M-7K6H-CN
	M30	10mm		N.O.	○		FL7M-10J6D-CN
				N.C.			FL7M-10K6-CN

● General type (non-threaded)

Pre-leaded type

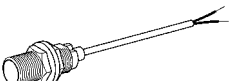
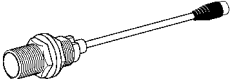
Appearance		Sensing distance	Operation mode	Setting indication	Cord characteristics Oil resistance	Catalog listing
Sensor package style	Dimensions (O.D.)					
Window indicator 	6.5dia.	2mm	N.O.	○	○	FL7N-2J6HD
			N.C.		○	FL7N-2K6H

● Spatter-guarded type (threaded, with a window indicator)

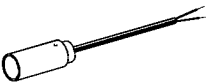
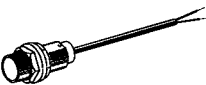
Appearance		Sensing distance	Operation mode	Setting indication	Spatter-guarded	Cord characteristics Oil resistance	Catalog listing
Sensor package style	Dimensions (O.D.)						
Window indicator Pre-leaded type 	M12	3mm	N.O.	○	○	○	FL7M-3J6HW
			N.C.		○	○	FL7M-3K6HWE
	M18	7mm	N.O.	○	○	○	FL7M-7J6HW
			N.C.		○	○	FL7M-7K6HWE
	M30	10mm	N.O.	○	○	○	FL7M-10J6W
			N.C.		○	○	FL7M-10K6WE
Window indicator Pre-leaded connector type 	M12	3mm	N.O.	○	○	○	FL7M-3J6HW-CN03
			N.C.		○	○	FL7M-3K6HWE-CN03
	M18	7mm	N.O.	○	○	○	FL7M-7J6HW-CN03
			N.C.		○	○	FL7M-7K6HWE-CN03
	M30	10mm	N.O.	○	○	○	FL7M-10J6W-CN03
			N.C.		○	○	FL7M-10K6WE-CN03

Note: Black cap for **FL7M-10K6WE-CN**

● Long sensing distance non-polar type (threaded)

Appearance		Sensing distance	Operation mode	Setting indication	Cord characteristics Oil resistance	Catalog listing
Sensor package style	Dimensions (O.D.)					
Fire-fly indicator Pre-leaded type (cord length 2m) 	M12	4mm	N.O.	○	○	FL7M-4W6
					○	FL7M-4Y6
	M18	8mm	N.O.	○	○	FL7M-8W6
					○	FL7M-8Y6
	M30	15mm	N.O.	○	○	FL7M-15W6
					○	FL7M-15Y6
Fire-fly indicator Pre-leaded type (cord length 30cm) 	M12	4mm	N.O.	○	○	FL7M-4W6-CN03
					○	FL7M-4Y6-CN03
	M18	8mm	N.O.	○	○	FL7M-8W6-CN03
					○	FL7M-8Y6-CN03
	M30	15mm	N.O.	○	○	FL7M-15JW6-CN03
					○	FL7M-15Y6-CN03

● Unshielded (threaded)

Appearance		Sensing distance	Operation mode	Setting indication	Cord characteristics	Catalog listing
Sensor package style	Dimensions (O.D.)				Oil resistance	
Fire-fly indicator Pre-leaded type (cord length 2m) 	M8	4mm	N.O.	○	○	FL7M-4J6ND
			N.C.		○	FL7M-4K6N
	M12	8mm	N.O.	○	○	FL7M-8J6ND
			N.C.		○	FL7M-8K6N
	M18	14mm	N.O.	○	○	FL7M-14J6ND
			N.C.		○	FL7M-14K6N
Fire-fly indicator Pre-leaded connector type (cord length 30cm) 	M8	4mm	N.O.	○	○	FL7M-4J6ND-CN03
			N.C.		○	FL7M-4K6N-CN03
	M12	8mm	N.O.	○	○	FL7M-8J6ND-CN03
			N.C.		○	FL7M-8K6N-CN03
	M18	14mm	N.O.	○	○	FL7M-14J6ND-CN03
			N.C.		○	FL7M-14K6N-CN03
Window indicator Connector type 	M12	8mm	N.O.	○		FL7M-8J6ND-CN
			N.C.			FL7M-8K6N-CN
	M18	14mm	N.O.	○		FL7M-14J6ND-CN
			N.C.			FL7M-14K6N-CN
	M30	24mm	N.O.	○		FL7M-24J6ND-CN
			N.C.			FL7M-24K6N-CN

SPECIFICATIONS

- Shielded
- General type

Catalog listing			FL7M-2□6H□	FL7M-3□6H□	FL7M-7□6H□	FL7M-10□6□
Actuation method			High-frequency oscillation type			
Rated sensing distance			2±0.2mm	3±0.3mm	7±0.7mm	10 ⁺² ₋₁ mm
Usable sensing distance			0 to 1.4mm	0 to 2.1mm	0 to 4.9mm	0 to 7.0mm
Standard target object			8×8mm, 1mm thick iron	12×12mm, 1mm thick iron	18×18mm, 1mm thick iron	30×30mm, 1mm thick iron
Differential travel			15% max. of sensing distance			
Rated supply voltage			12/24Vdc			
Operating voltage range			10 to 30Vdc			
Leakage current			0.55mA max.			
Control output			Switching current: 3 to 100mA, Voltage drop: 3V max., Output dielectric strength: 30Vdc			
Operating frequency			2kHz	1.5kHz	500Hz	
Temperature characteristics			±10% max. for the range of −25 to +70°C when +25°C is taken as standard temperature in sensing distance (±15% max. for the -2□6H□)			
Supply voltage characteristics			±1% max. with ±15% voltage fluctuation with rated supply voltage as standard voltage in sensing distance			
Indicator lamps			N.O. type: Operation indication: Lights (red or green) at output Setting indication: Lights (green) in stable sensing area N.C. type: Operation indication: Goes out (red) in sensing area			
Operating temperature range			−25 to +70°C			
Storage temperature range			−40 to +85°C			
Insulation resistance			50MΩ min. (by 500Vdc megger)			
Dielectric strength			1,000Vac, 50/60Hz for 1 minute			
Vibration resistance			10 to 55Hz, 1.5mm peak-to-peak amplitude, 2 hrs in X, Y and Z directions			
Shock resistance			490m/s ² 10 times in X, Y and Z directions			
Protection			IP67G			
Weight			Approx. 50g Main unit with 2m pre-leaded cable	Approx. 60g Main unit with 2m pre-leaded cable	Approx. 130g Main unit with 2m pre-leaded cable	Approx. 230g Main unit with 2m pre-leaded cable
Circuit protection			Surge absorption, load short-circuit protection, reverse connection protection circuit			
Wiring method			Pre-leaded connector, pre-leaded			
Material	Sensor	Case	SUS	Ni-plated brass		
		Sensing face	PBT			
	Connector	Housing	-CN03: polyester elastomer			
		Holder	Glass-lined polyester resin			
		Contact	Gold-plated brass			

- Installation Instructions No.: CP-UM-5110E

• Non-threaded type/spatter-guarded type

Catalog listing			FL7□-2□6H□	FL7M-3□6HW□	FL7M-7□6HW□	FL7M-10□6W□
Actuation method			High-frequency oscillation type			
Rated sensing distance			2±0.2mm	3±0.3mm	7±0.7mm	10±1mm
Usable sensing distance			0 to 1.4mm	0 to 2.1mm	0 to 4.9mm	0 to 7.0mm
Standard target object			8×8mm, 1mm thick iron	12×12mm, 1mm thick iron	18×18mm, 1mm thick iron	30×30mm, 1mm thick iron
Differential travel			15% max. of sensing distance			
Rated supply voltage			12/24Vdc			
Operating voltage range			10 to 30Vdc			
Leakage current			0.55mA max.			
Control output			Switching current: 3 to 100mA Voltage drop: 3.0V max. Output dielectric strength: 30Vdc			
Operating frequency			1kHz	1,500Hz	500Hz	500Hz
Temperature characteristics			±10% max. for the range of −25 to +70°C when +25°C is taken as standard temperature in sensing distance (±15% max. for the -2□6H□)			
Supply voltage characteristics			±1% max. with ±15% voltage fluctuation with rated supply voltage as standard voltage in sensing distance			
Indicator lamps			N.O. type: Operation indication: Lights (orange or green) at output Setting indication: Lights (green) in stable sensing area N.C. type: Operation indication: Goes out (orange) in sensing area			
Operating temperature range			−25 to +70°C			
Storage temperature range			−40 to +85°C			
Insulation resistance			50MΩ min. (by 500Vdc megger)			
Dielectric strength			1,000Vac, 50/60Hz for 1 minute			
Vibration resistance			10 to 55Hz, 1.5mm peak-to-peak amplitude, 2 hrs in X, Y and Z directions			
Shock resistance			980m/s² 10 times in X, Y and Z directions			
Protection			IP67 (IEC standard), IP67G (JAM standard)			
Weight			Approx. 50g Main unit with 2m pre-leaded cable	Approx. 60g Main unit with 2m pre-leaded cable	Approx. 130g Main unit with 2m pre-leaded cable	Approx. 230g Main unit with 2m pre-leaded cable
Circuit protection			Surge absorption, load short-circuit protection, reverse connection protection circuit			
Wiring method			Connector, pre-leaded connector, pre-leaded			
Material	Sensor	Case	SUS	Ni-plated brass, W type: Ni-plated brass, fluorine resin coated		
		Sensing face	PBT, W type: fluorine resin			
	Connector	Housing	-CN03: polyester elastomer			
		Holder	Glass-lined polyester resin			
		Contact	Gold-plated brass			

• Long sensing distance non-polar type

Catalog listing			FL7M-4□6	FL7M-8□6	FL7M-15□6
Actuation method			High-frequency oscillation type (shielded)		
Rated sensing distance			4±0.4mm	8±0.8mm	15±1.5mm
Usable sensing distance			0 to 3.2mm	0 to 6.4mm	0 to 12mm
Standard target object			12×12mm, 1mm thick iron	18×18mm, 1mm thick iron	30×30mm, 1mm thick iron
Differential travel			15% max. of sensing distance		
Rated supply voltage			12/24Vdc		
Operating voltage range			10 to 30Vdc		
Leakage current			0.55mA max.		
Output operational mode			DC 2-wire type, transistor output		
Control output			Switching current: 3 to 100mA, Voltage drop: 5.0V max. (swoting current: 100mA, cord length: 2mm) Output dielectric strength: 30Vdc		
Operating frequency			1,000Hz	500Hz	300Hz
Temperature characteristics			±10% max. for the range of –25 to +70°C when +25°C is taken as standard temperature in sensing distance		
Supply voltage characteristics			±1% max. with ±15% voltage fluctuation with rated supply voltage as standard voltage in sensing distance		
Indicator lamps			N.O. type: Operation indication: Lights (orange or green) at output Setting indication: Lights (green) in stable sensing area N.C. type: Operation indication: Goes out (orange) in sensing area		
Operating temperature range			–25 to +70°C		
Storage temperature range			–40 to +85°C		
Insulation resistance			50MΩ min. (by 500Vdc megger)		
Dielectric strength			1,000Vac, 50/60Hz for 1 minute		
Vibration resistance			10 to 55Hz, 1.5mm peak-to-peak amplitude, 2 hrs in X, Y and Z directions		
Shock resistance			980m/s ² 10 times in X, Y and Z directions		
Protection			IP67 (IEC standard), IP67G (JAM standard)		
Weight			Approx. 60g	Approx. 130g	Approx. 230g
Circuit protection			Surge absorption, load short-circuit protection, reverse connection protection circuit		
Wiring method			Pre-leaded connector, pre-leaded		
Material	Sensor	Case	Ni-plated brass		
		Sensing face	PBT		
		Bush	Nylon		
		Cord protector	Elastomer		
	Connector	Housing	Polyester elastomer		
		Holder	Glass-lined polyester resin		
		Contact	Gold-plated brass		

• Installation Instructions No.: CP-UM-5291E

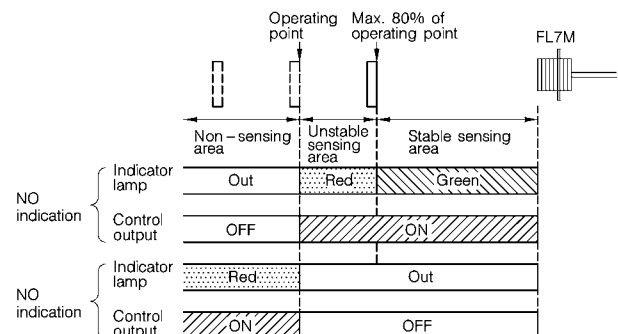
● Unshielded

Catalog listing			FL7M-4□6N□	FL7M-8□6N□	FL7M-14□6N□	FL7M-24□6N□	
Actuation method			High-frequency oscillation type (unshielded)				
Rated sensing distance			4±0.4mm	8±0.8mm	14±1.4mm	24±2.4mm	
Usable sensing distance			0 to 2.8mm	0 to 5.6mm	0 to 9.8mm	0 to 16.8mm	
Standard target object			20×20mm, 1mm thick iron	30×30mm, 1mm thick iron	30×30mm, 1mm thick iron	54×54mm, 1mm thick iron	
Differential travel			15% max. of sensing distance				
Rated supply voltage			12/24Vdc				
Operating voltage range			10 to 30Vdc				
Leakage current			1.0mA max.				
Control output			Switching current: 4 to 100mA, Voltage drop: 3.3V max., Output dielectric strength: 30Vdc				
Operating frequency			800Hz	600Hz	400Hz	100Hz	
Temperature characteristics			±10% max. for the range of −25 to +70°C when +25°C is taken as standard temperature in sensing distance				
Supply voltage characteristics			±1% max. with ±15% voltage fluctuation with rated supply voltage as standard voltage in sensing distance				
Indicator lamps			N.O. type: Operation indication: Lights (red or green) at output Setting indication: Lights (green) in stable sensing area N.C. type: Operation indication: Goes out (red) in sensing area				
Operating temperature range			−25 to +70°C				
Storage temperature range			−40 to +85°C				
Insulation resistance			50MΩ min. (by 500Vdc megger)				
Dielectric strength			1,000Vac, 50/60Hz for 1 minute				
Vibration resistance			10 to 55Hz, 1.5mm peak-to-peak amplitude, 2 hrs in X, Y and Z directions				
Shock resistance			490m/s² 10 times in X, Y and Z directions				
Protection			IP67 (IEC standard)				
Weight			Approx. 50g Main unit with 2m pre-leaded cable	Approx. 60g Main unit with 2m pre-leaded cable	Approx. 80g Main unit with 2m pre-leaded cable	Approx. 190g Main unit with 2m pre-leaded cable	
Circuit protection			Surge absorption, load short-circuit protection, reverse connection protection circuit				
Wiring method			Connector, pre-leaded connector, pre-leaded				
Material	Sensor	Case	SUS	Ni-plated brass			
		Sensing face	PBT				
	Connector	Housing	-CN: Ni-plated brass, -CN03: polyester elastomer				
		Holder	Glass-lined polyester resin				
		Contact	Gold-plated brass				

• Installation Instructions No.: CP-UM-3108E

ABOUT SETTING INDICATION

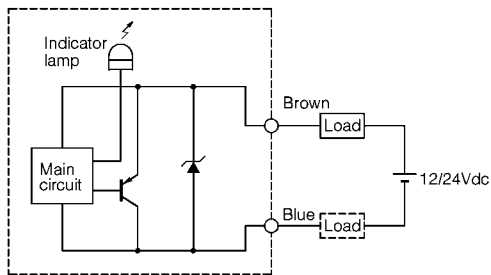
The proximity sensor can detect objects reliably by bringing the proximity sensor close to the target object and setting the sensor at the position (N.O. indication) where the indicator lamp changes from red to green.



Note: When the target object is made of a different material such as aluminum, copper and stainless steel to the standard target object (iron), the setup point where the indicator lamp changes color is shorter than 80% maximum.

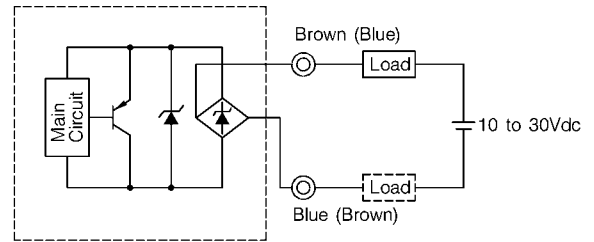
WIRING DIAGRAM

• General/spatter-guarded/unshielded types



Note: The load can be connected to either of the power supplies.

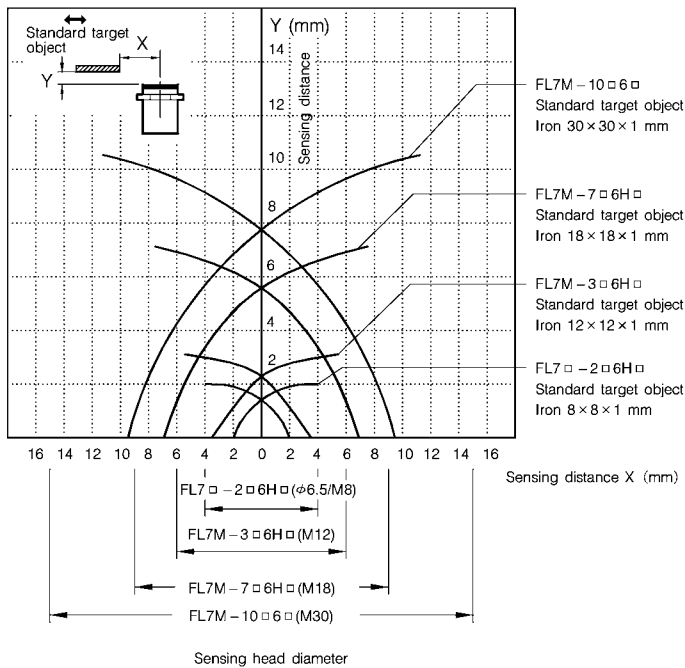
• Long sensing distance non-polar type



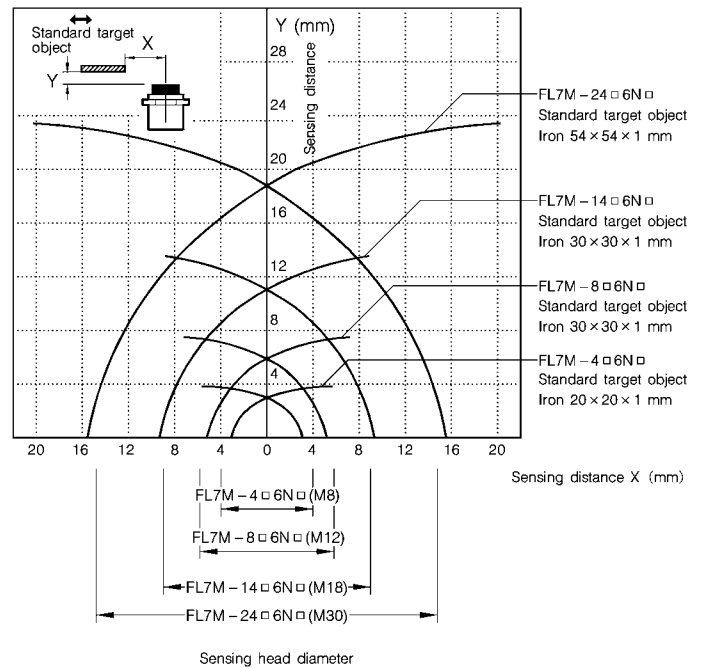
Note: The load can be connected to either of the power supplies.

SENSING AREA DIAGRAMS (typical examples)

• Shielded



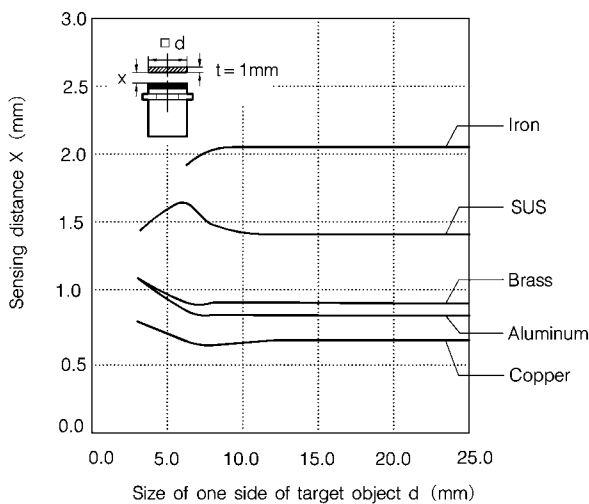
• Unshielded



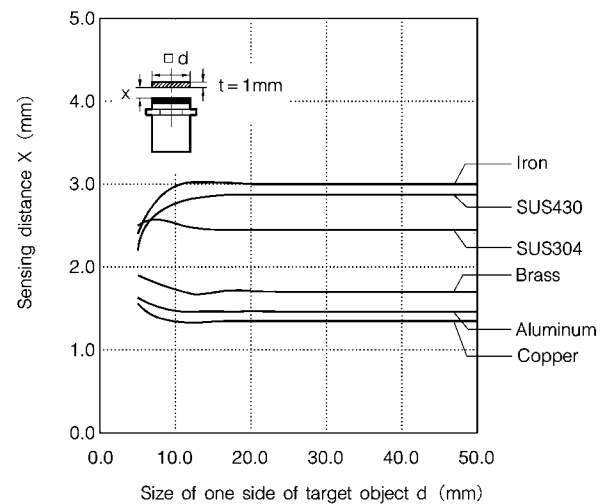
SENSING DISTANCE ACCORDING TO MATERIAL & SIZE OF OBJECT (typical examples)

• Shielded

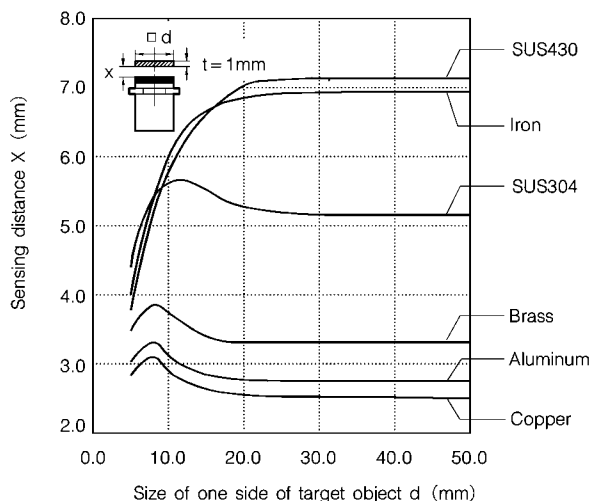
FL7□-2□6H□



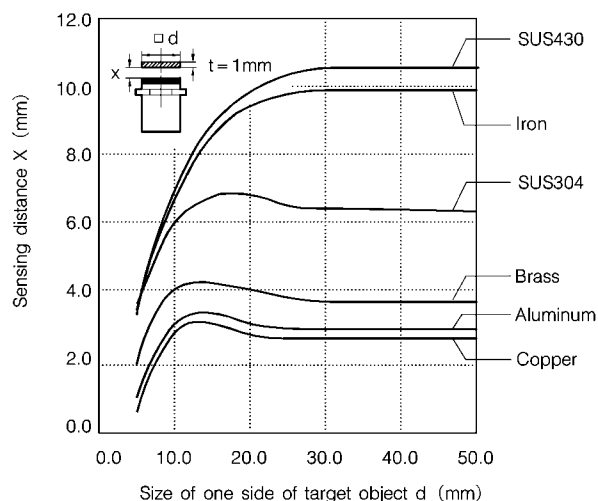
FL7M-3□6H□



FL7M-7□6H□

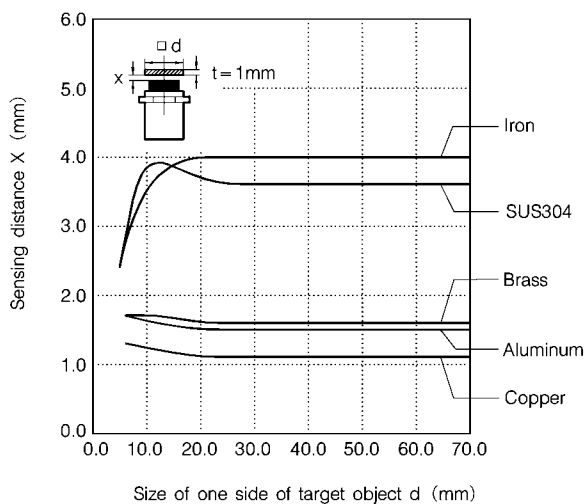


FL7M-10□6□

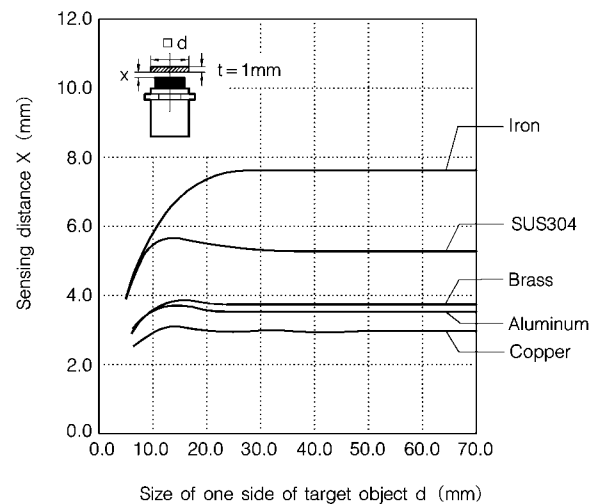


● Unshielded

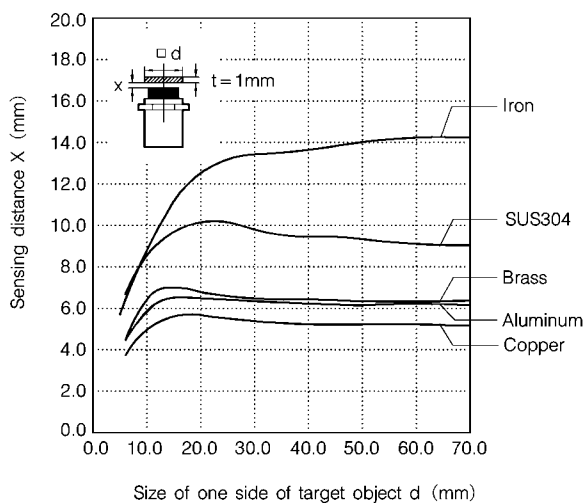
FL7M-4□6N□



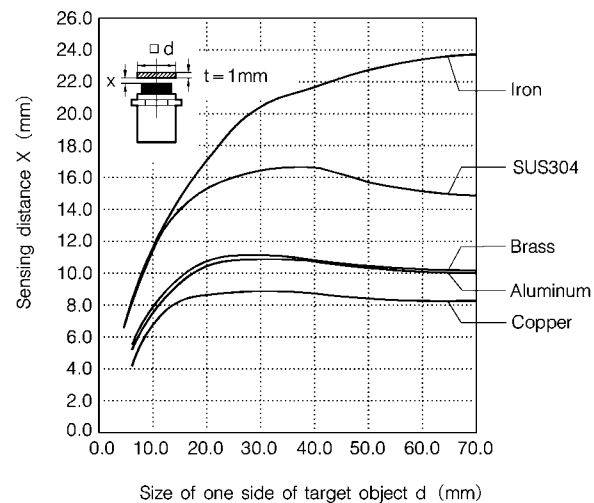
FL7M-8□6N□



FL7M-14□6N□

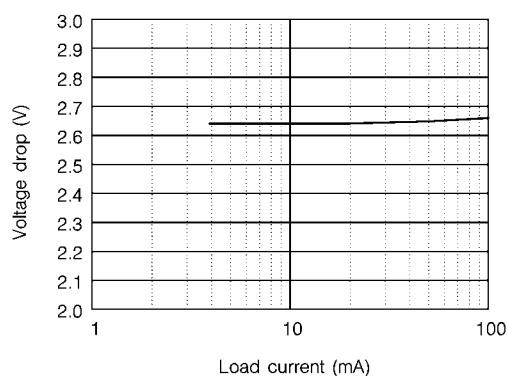


FL7M-24□6N□

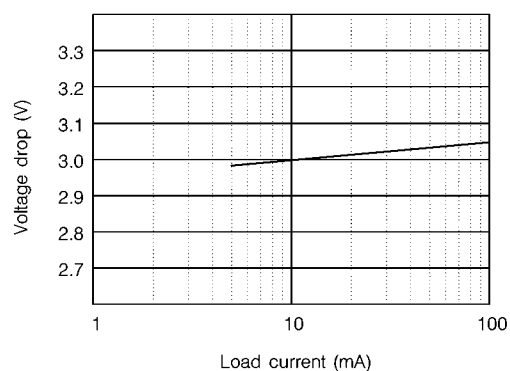


VOLTAGE DROP CHARACTERISTICS (typical examples)

- (With a firefly-glow indicator) shielded
(in 10 to 30Vdc)

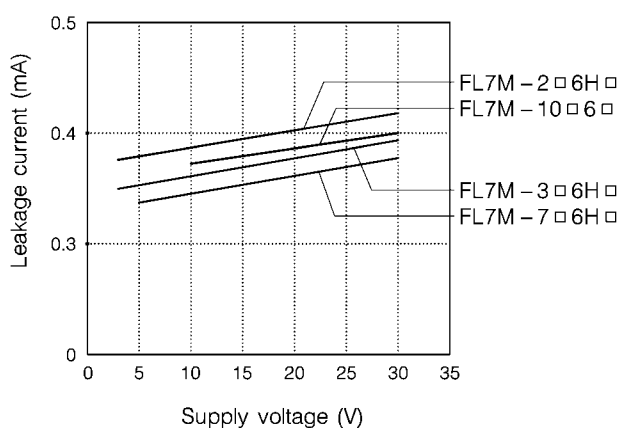


- (With a window indication) shielded/unshielded
(at 24Vdc)

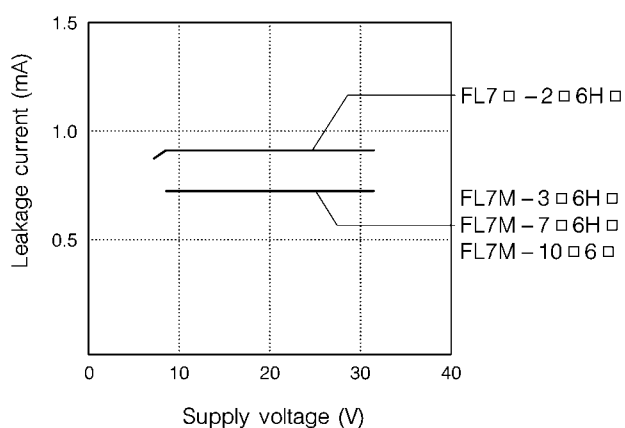


LEAKAGE CURRENT CHARACTERISTICS (typical examples)

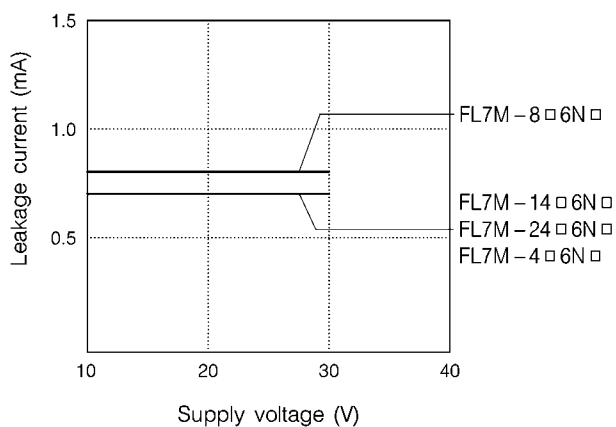
- (With a firefly-glow indicator) shielded and spatter-guarded types



- (With a window indicator) shielded

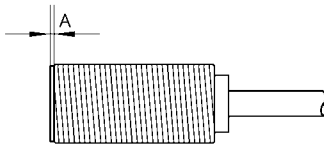


- Unshielded



EXTERNAL DIMENSIONS

Long sensing distance non-polar type sensor has the projection of resin as shown below.



Catalog listing	"A" distance (mm)
FL7M-4 □6	0.6
FL7M-8 □6	0.6
FL7M-15 □6	1.0

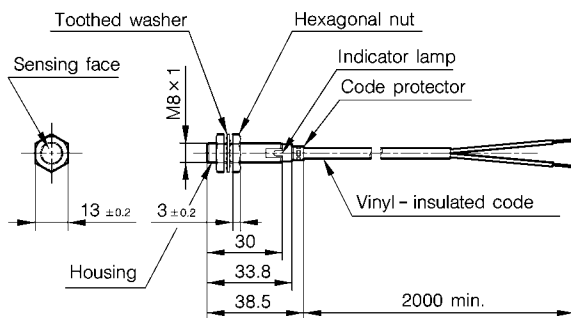
• Shielded

• General type/long sensing distance non-polar type (threaded)

Pre-leaded type

FL7M-2□6H□

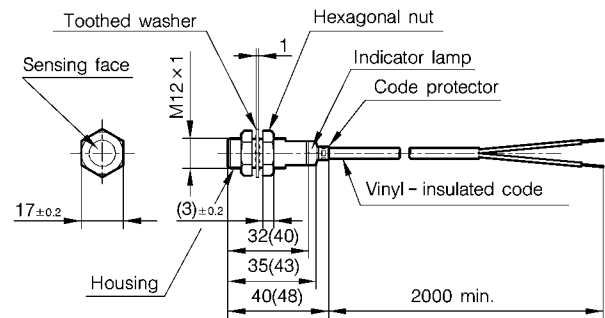
(unit: mm)



Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 2-core) 4.1mm dia.

Cap color: blue

FL7M-4□6, **FL7M-3**□6H□

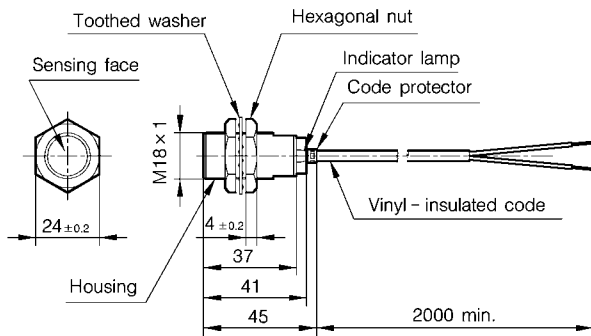


The **FL7M-4**□6 has a 0.6mm projection of resin at the sensing face. (The total length is same.) Refer to the previous item.

Numbers in parentheses indicate dimensions for G type. Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 2-core) 4.1mm dia.

Cap color: blue

FL7M-8□6, **FL7M-7**□6H□

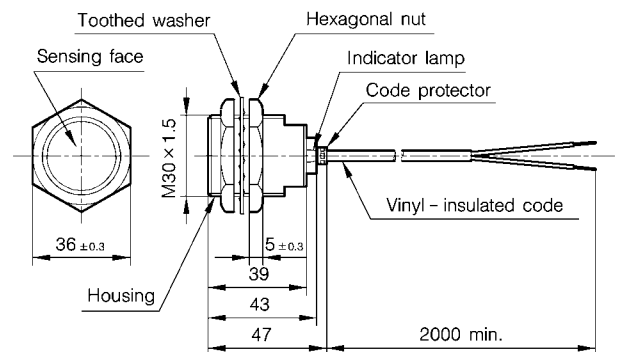


The **FL7M-8**□6 has a 0.6mm projection of resin at the sensing face. (The total length is same.) Refer to the previous item.

Vinyl-insulated cord (oil-resistant: 0.5mm², 20/0.18, 2-core) 5.7dia.

Cap color: blue

FL7M-15□6, **FL7M-10**□6□



The **FL7M-15**□6 has a 1.0mm projection of resin at the sensing face. (The total length is same.) Refer to the previous item.

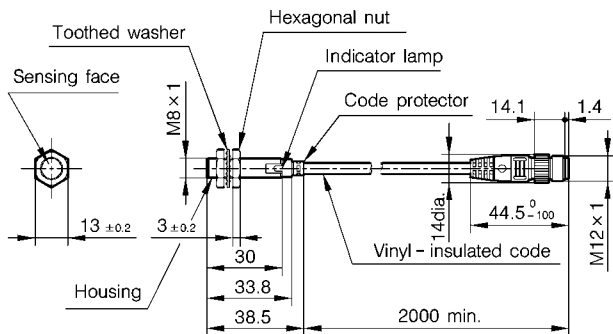
Vinyl-insulated cord (oil-resistant: 0.5mm², 20/0.18, 2-core) 5.7dia.

Cap color: blue

Pre-loaded connector type

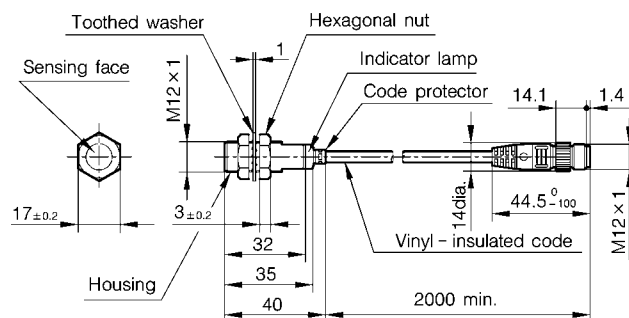
FL7M-2□6H□-CN03

(unit: mm)



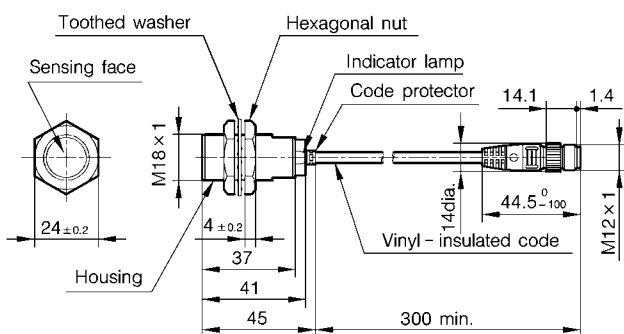
Vinyl-insulated cord (Vibration-resistant, oil-resistant: 0.3mm², 27/0.12, 2-core) 4.1dia.
Cap color: blue

FL7M-4□6-CN03, FL7M-3□6H□-CN03



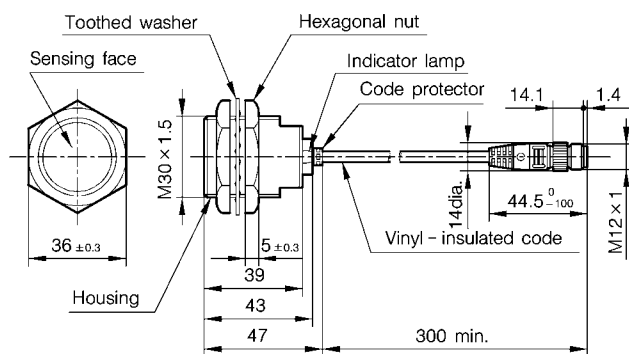
The **FL7M-4□6-CN03** has a 0.6mm projection of resin at the sensing face. (The total length is same.) Refer to the previous item.
Vinyl-insulated cord (Vibration-resistant, oil-resistant: 0.3mm², 27/0.12, 2-core) 4.1dia.
Cap color: blue

FL7M-8□6□-CN03, FL7M-7□6H□-CN03



The **FL7M-8□6□-CN03** has a 0.6mm projection of resin at the sensing face. (The total length is same.) Refer to the previous item.
Vinyl-insulated cord (Vibration-resistant, oil-resistant: 0.5mm², 20/0.18, 2-core) 5.7dia.
Cap color: blue

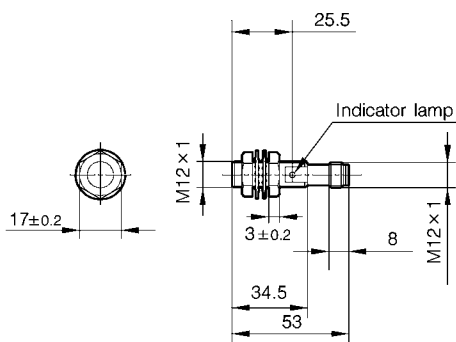
FL7M-15□6□-CN03, FL7M-10□6□-CN03



The **FL7M-15□6□-CN03** has a 1.0mm projection of resin at the sensing face. (The total length is same.) Refer to the previous item.
Vinyl-insulated cord (Vibration-resistant, oil-resistant: 0.5mm², 20/0.18, 2-core) 5.7dia.
Cap color: blue

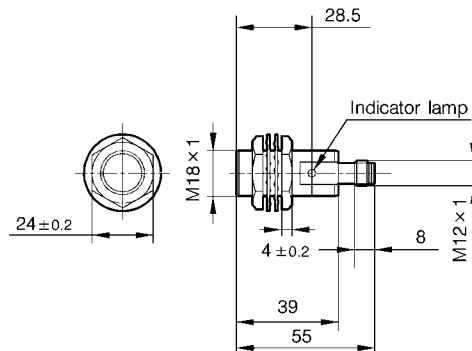
Connectot type (general type only)

FL7M-3□6H□-CN



Cap color: blue

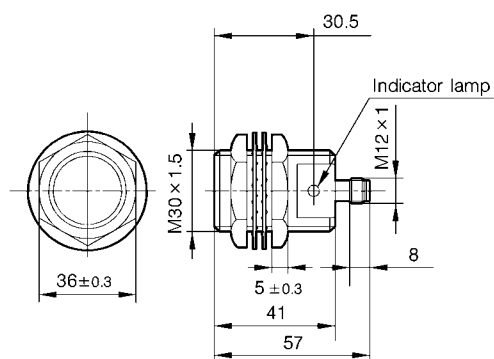
FL7M-7□6H□-CN



Cap color: blue

FL7M-10□6□-CN

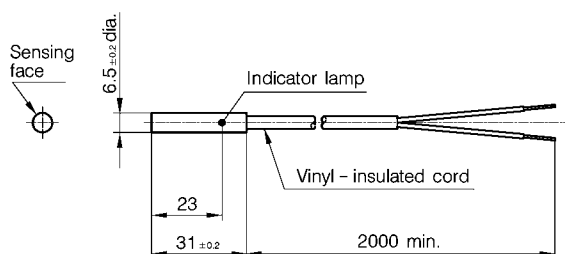
(unit: mm)



Cap color: blue

General type (Non-threaded)

FL7M-2□6H□



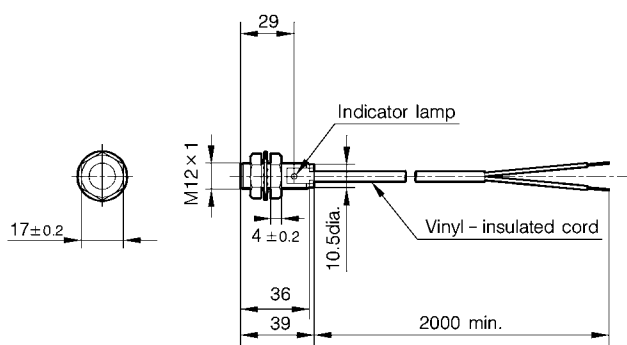
Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 2-core) 4.2mm dia.

Cap color: blue

● Spatter-guarded

Pre-leaded type

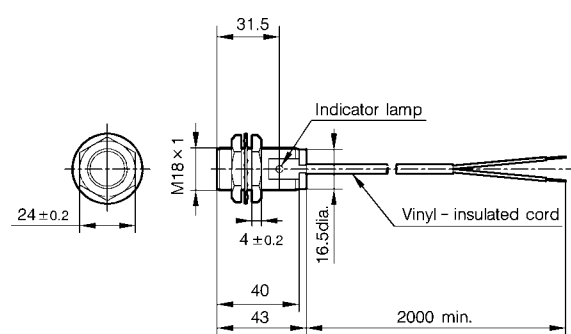
FL7M-3□6HW□-R



Vinyl-insulated cord (flame-resistant, oil-resistant, bend-resistant: 0.5 mm², 21/0.18, 2-core) 5.7dia.

Cap color: white

FL7M-7□6HW□-R

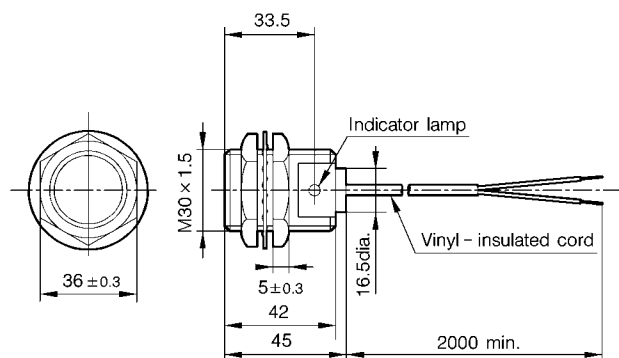


Vinyl-insulated cord (flame-resistant, oil-resistant, bend-resistant: 0.5 mm², 21/0.18, 2-core) 5.7dia.

Cap color: white

FL7M-10□6W□-R

(unit: mm)

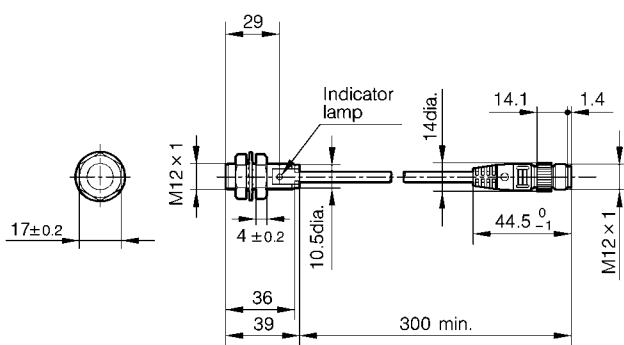


Vinyl-insulated cord (flame-resistant, oil-resistant, bend-resistant: 0.5 mm², 21/0.18, 2-core) 5.7dia.

Cap color: white

Pre-leaded connector type

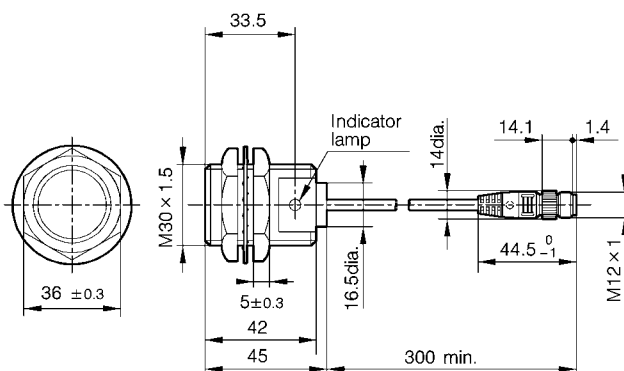
FL7M-3□6HW□-CN03



Vinyl-insulated cord (flame-resistant, oil-resistant, bend-resistant: 0.5 mm², 21/0.18, 2-core) 5.7dia.

Cap color: white

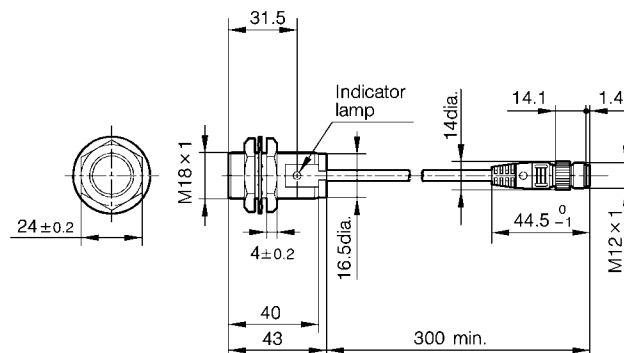
FL7M-10□6W□-CN03



Vinyl-insulated cord (flame-resistant, oil-resistant, bend-resistant: 0.5 mm², 21/0.18, 2-core) 5.7dia.

Cap color: white

FL7M-7□6HW□-CN03



Vinyl-insulated cord (flame-resistant, oil-resistant, bend-resistant: 0.5 mm², 21/0.18, 2-core) 5.7dia.

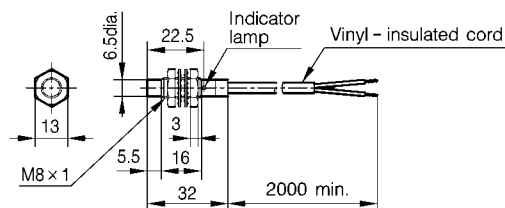
Cap color: white

● Unshielded (threaded)

Pre-leaded type

FL7M-4□6N□

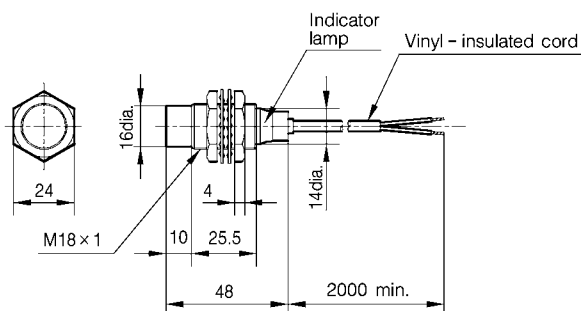
(unit: mm)



Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 2-core) 4.2mm dia.

Cap color: blue

FL7M-14□6N□

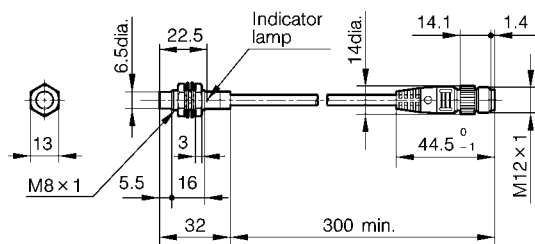


Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 2-core) 4.2mm dia.

Cap color: blue

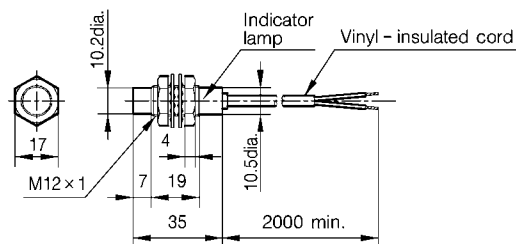
Pre-leaded connector type

FL7M-4□6N□-CN□□



Cap color: blue

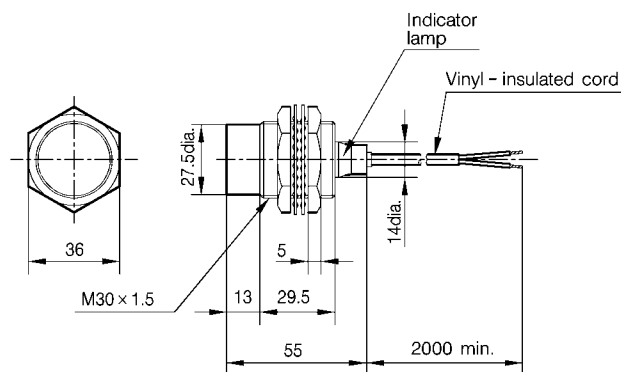
FL7M-8□6N□



Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 2-core) 4.2mm dia.

Cap color: blue

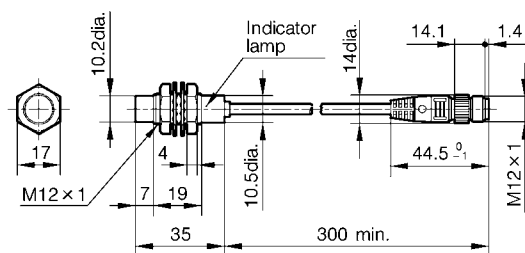
FL7M-24□6N□



Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 2-core) 4.2mm dia.

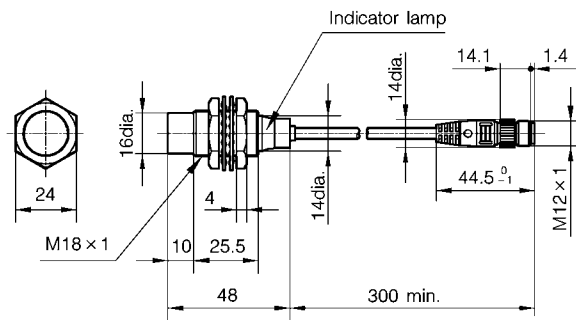
Cap color: blue

FL7M-8□6N□-CN□□



Cap color: blue

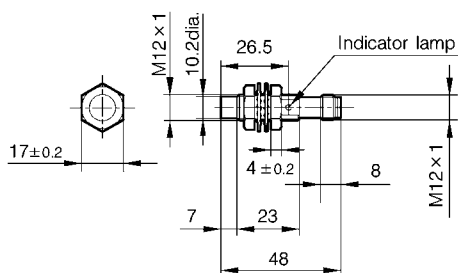
FL7M-14□6N□-CN□□



Cap color: blue

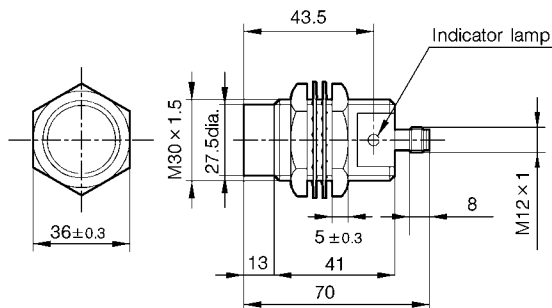
Connector type

FL7M-8□6N□-CN



Cap color: blue

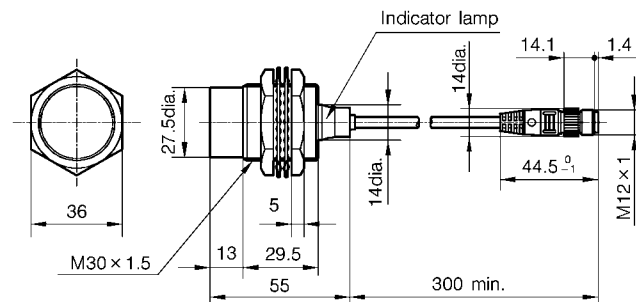
FL7M-24□6N□-CN



Cap color: blue

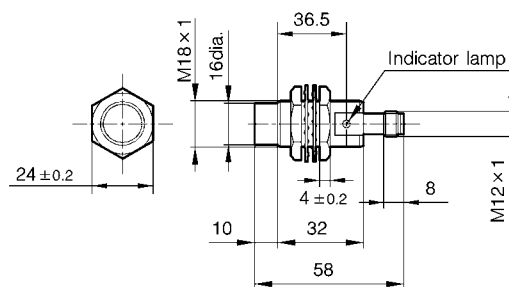
FL7M-24□6N□-CN□□

(unit: mm)



Cap color: blue

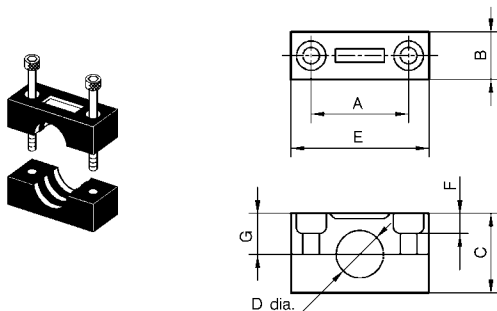
FL7M-14□6N□-CN



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.

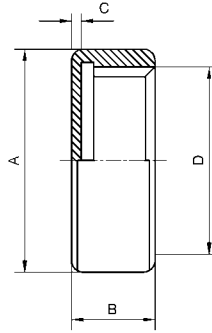
Catalog listing	Dimensions (mm)							Screw dimensions	
	A	B	C	D	E	F	G	Diameter	Neck
FL-PA112	25	12	20	12	36	6	9.5	M4	25
FL-PA118	30/32	15	30	18	45	7.5	14.5	M5	35
FL-PA130	40/45	15	50	30	60	10	24.5	M5	55

Allowable tightening strength of bracket

Catalog listing	Allowable tightening strength (N·m)	Remarks
FL-PA112	0.98	M4 screw used
FL-PA118	1.5	M5 screw used
FL-PA130	1.5	M5 screw used

PROTECTIVE COVER (sold separately)

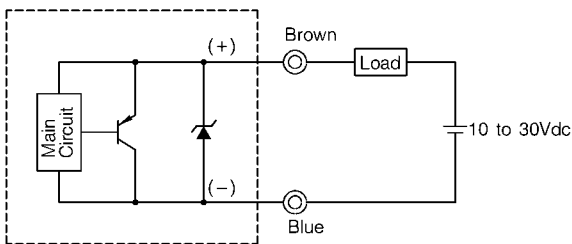
Protective covers (material: poly-acetal resin) are available for shielded models. Select a model according to the sensor's external dimensions.



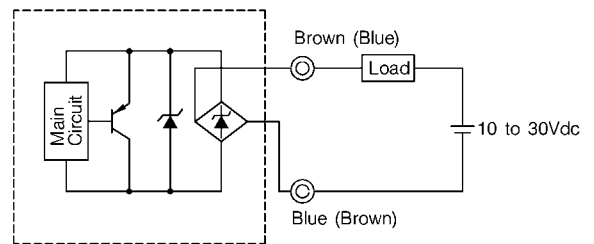
Catalog listing	Dimensions (mm)			
	A	B	C	D
FL-PA12	14dia.	5	$0.5^{+0.2}_{-0.1}$	M12 × 1
FL-PA18	21dia.	6	$0.5^{+0.2}_{-0.1}$	M18 × 1
FL-PA30	33dia.	8	$1.5^{+0.2}_{-0.1}$	M30 × 1.5

WIRING

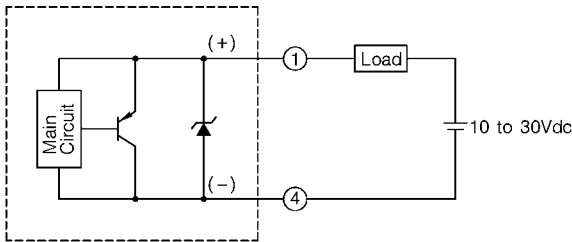
- General type/spatter-guarded type/unshielded type
- Pre-leaded type



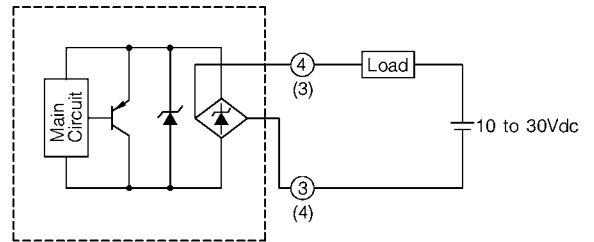
- Long sensing distance non-polar type
- Pre-leaded type



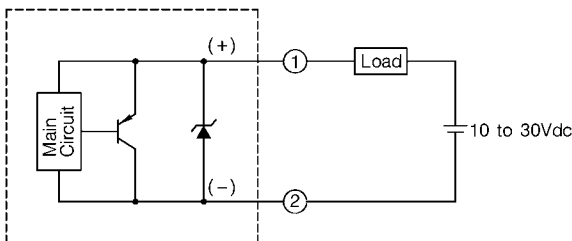
- Pre-leaded connector type (N.O. type)



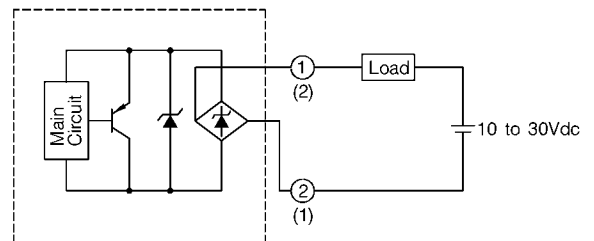
- Pre-leaded connector type (N.O. type)



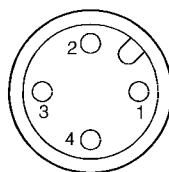
- Preleaded connector type (N.C. type)



- Preleaded connector type (N.C. type)

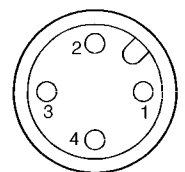


- The load be connected at both poles.
- The load must be used when power is applied to sensors. Combination of short circuit and wrong wiring will cause permanent damage, regardless of short circuit protection.
- LED operates normally during a load short circuit, therefore check the wiring when output is wrong.
- When connecting a connector, fasten tightly by hand.



Connector pin assignment

- The load be connected at both poles.
- LED operates normally during a load short circuit, therefore check the wiring when output is wrong.
- When connecting a connector, fasten tightly by hand.



Connector pin assignment

CONNECTOR SPECIFICATIONS Note 1

Item	Specifications
Operating voltage/current	5Vac/dc 5mA min., 125Vac/dc, 3A max.
Insulation resistance	100M Ω min. (by 500Vdc megger)
Dielectric strength	1,500Vdc for 1 minute (across contacts, and contacts and connector housing)
Initial contact resistance	40m Ω max. (excluding code conductor-intrinsic when energized by 3A on a male-female contact combination)
Connector withstand stress	0.4 to 4.0N (per contact)
Number of connector insertions	50 times
Connector tightening strength	0.8N-m min. (Note 2)
Cord pullout strength	100N min.
Vibration resistance	10 to 55Hz, 1.5mm peak-to-peak amplitude, 2 hrs in X, Y and Z directions
Shock resistance	300m/s ² , 3 times in X, Y and Z directions
Protection	IP67
Operating temperature range	-10 to +70°C
Storage temperature range	-20 to +80°C
Operating humidity range	95%RH max.
Material	Contact: gold-plated brass Contact holder: glass-lined polyester resin Housing: polyester elastomer Coupling: Ni-plated brass O-ring: NBR

Note 1: Specifications assume Yamatake male/female connectors.

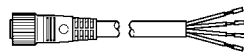
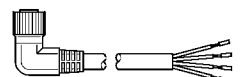
Note 2: The recommended torque is 0.4 to 0.6N-m.

If fastened poorly, the IP67 protection is lost, or looseness occurs.
Fasten the connector securely by hand.

CONNECTION CORD WITH CONNECTOR

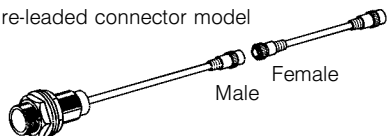
Be sure to use **PA5** Series cord with **VA** connector when connecting a pre-leaded connector or connector sensors.

● PA5 Series cord with VA connector

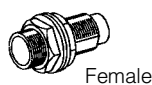
Shape	Power supply	Cord length	Catalog listing	Lead color
	dc	2m	PA5-4ISX2HK	1-brown, 2-white, 3-blue, 4-black
		5m	PA5-4ISX5HK	
		2m	PA5-4ILX2HK	
		5m	PA5-4ILX5HK	

PA5 Series cord
with **VA** connector

Pre-leaded connector model

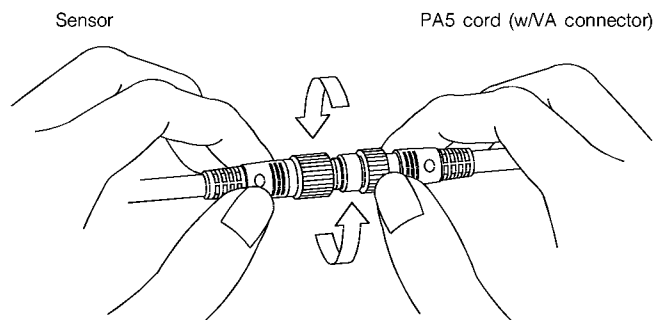


Connector model



● Fastening the connector

Align the grooves of the connectors and turn the fastening screw of the **VA** connector of the **PA5** cord by hand until it fits tightly with the screw on the sensor side.



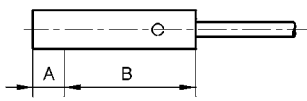
PRECAUTIONS

• Mounting

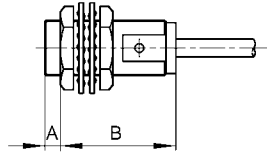
The allowable tightening torque varies according to the distance from the tip of the sensing head.

• Shielded

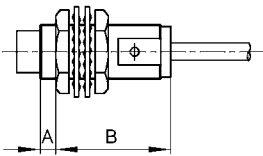
FL7N



FL7M



• Unshielded



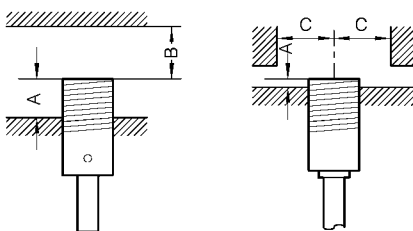
Catalog listing		A dimensions (mm)	Allowable tightening torque (N·m)	
			A	B
Shielded (with a firefly-glow indicator)	FL7M-2□6□	10	9	12
	FL7M-3□6□	10	20	30
	FL7M-4□6□	10	20	30
	FL7M-7□6□	0	—	70
	FL7M-8□6□	0	—	70
	FL7M-10□6□	0	—	150
	FL7M-15□6□	0	—	150
Shielded	FL7N-2□6H□	8	Cannot be tightened	0.3
	FL7M-2□6H□	10	5.9	11.8
	FL7M-3□6H□	12	11.8	19.6
	FL7M-3□6H□	12	11.8	19.6
	FL7M-7□6H□	15	29.4	49
	FL7M-10□6□	17	49	147
Unshielded	FL7M-4□6N□	0	—	7.8
	FL7M-8□6N□	0	—	19.6
	FL7M-14□6N□	10	29.4	49
	FL7M-24□6N□	12	49	147

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

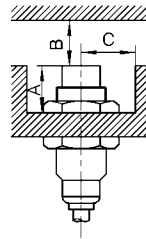
• Influence of surrounding metal

Metal other than the target object surrounding the sensor may influence operating characteristics. Maintain the following space between the sensor and surrounding metal:

• Shielded



• Unshielded



Shaded areas indicate surrounding metal other than the target object.

A: Dimension to tip (sensing face) of proximity sensor from mounting surface

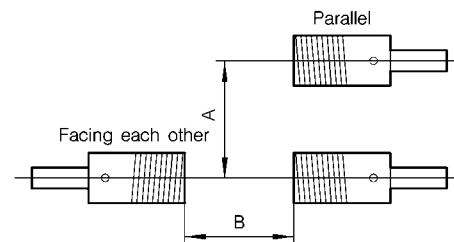
B: Dimension to front iron plate from tip (sensing face) of proximity sensor

C: Dimension to front iron plate of proximity switch when A=0

Catalog listing		A (mm)	B (mm)	C (mm)
Shielded	FL7□-2□6H□	0	8	8
	FL7M-3□6H□	0	8	9
	FL7M-4□6□	2.5	12	9
	FL7M-7□6H□	0	20	13.5
	FL7M-8□6□	3.5	24	13.5
	FL7M-10□6□	0	40	22.5
	FL7M-15□6□	6	45	22.5
Unshielded	FL7M-4□6N□	13	8	12
	FL7M-8□6N□	15	20	20
	FL7M-14□6N□	22	40	35
	FL7M-24□6N□	32	90	60

• Mutual interference prevention

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



Catalog listing		A (mm)	B (mm)
Shielded	FL7□-2□6H□	16	20
	FL7M-3□6H□	20	30
	FL7M-4□6□	25	25
	FL7M-7□6H□	35	50
	FL7M-8□6□	40	50
	FL7M-10□6□	70	100
	FL7M-15□6□	90	110
Unshielded	FL7M-4□6N□	60	80
	FL7M-8□6N□	100	120
	FL7M-14□6N□	110(60)	200(100)
	FL7M-24□6N□	300(100)	350(130)

Numbers in parentheses “()” indicate the distance when different-frequency types are combined.

● Cautions during series or parallel connection

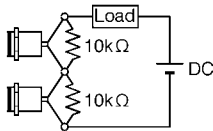
(1) Series connection (AND connection)

- When connecting two or more proximity sensors in series, erroneous output (1 to 3ms) may occur without the rated current being supplied to each of the sensors. For this reason, series connection of proximity sensors is not recommended. However, if proximity sensors must be connected in series, a resistor of 10kΩ must be provided in parallel to each of the sensors. However, note that the maximum leakage current in a series connection will be 3.5mA.

Operation lag also will occur, resulting in increased voltage drop, and the operation indicator lamp will not light.

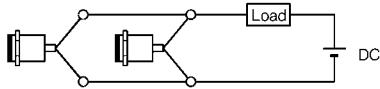
$$\text{Operation lag} = 40\text{ms} \times (\text{number of series connections} - 1)$$

$$\text{Voltage drop} = \text{voltage drop of single sensor} \times \text{number of series connected sensors}$$



(2) Parallel connection (OR connection)

- When connecting two or more proximity sensors in parallel, leakage current increases as follows, and may result in faulty load restore.
(Leakage current = Leakage current of single sensor × number of series connected sensors)
- When two or more sensors turn ON in a parallel connection, one (or some) of the sensors may not indicate operation. This is not an abnormality.



● Relay loads

The voltage drop of the **FL7M** Series is 3.3V (shielded T type: 3.5V).

Pay attention to this voltage drop when using a relay load. (With 12Vdc relays, switching is not possible.)

● Operation at power ON

After the power is turned ON, it takes 40ms or less until the proximity sensor is ready for sensing.

When the load and the proximity sensor use different power supplies, be sure to turn the proximity sensor ON before turning the load ON.

● Influence of leakage current

Minimal current flows as leakage current for operating the circuits even when the proximity sensor is OFF.

Take sufficient care when restoring connected loads.

● Minimum cord bending radius (R)

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



RESTRICIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment. Accordingly, when used in applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

YAMATAKE

Specifications are subject to change without notice.

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