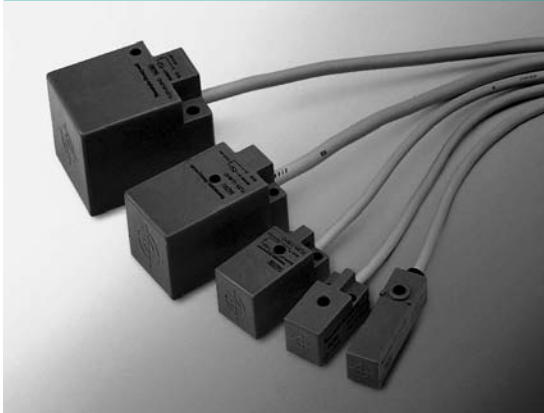


DC 3-wire Square Proximity Sensors

FL2 Series

Relays and Solenoids Can be Switched Directly. (maximum switching current: 200mA)



- Wide range of models available (4, 7, 12, 20mm, top/side, and N.O./N.C.)
- Different-frequency types that are only slightly influenced by mutual interference available for all models
- High seal capabilities (IP67)
- Enhanced circuit protection (surge absorption, load short-circuit, reverse connection)
- Relays and solenoids can be switched directly (maximum switching current: 200mA)



CLICK

ORDER GUIDE

- Standard (pre-leaded) model (cord length 2m)

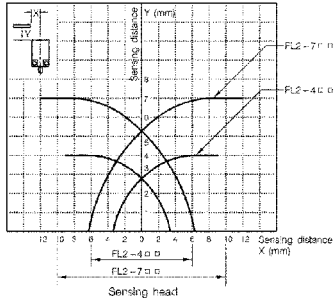
Actuation method	Appearance		Sensing distance	Sensing face	Output operation mode	Catalog listing				
	Sensor package style	Dimensions								
High-frequency oscillating type (unshielded)		12 × 12 × 45	4mm	Top	NPN	N.O.	FL2-4A6H			
						N.C.	FL2-4B6H			
					PNP	N.O.	FL2-4D6H			
						N.C.	FL2-4E6H			
					NPN	N.O.	FL2-4A6S			
						N.C.	FL2-4B6S			
	PNP	N.O.		FL2-4D6S						
		N.C.		FL2-4E6S						
		15 × 15 × 32		4mm	Top	NPN	N.O.	FL2-4A6QH		
							N.C.	FL2-4B6QH		
						PNP	N.O.	FL2-4D6QH		
							N.C.	FL2-4E6QH		
			NPN			N.O.	FL2-4A6QS			
						N.C.	FL2-4B6QS			
	PNP	N.O.	FL2-4D6QS							
		N.C.	FL2-4E6QS							
		20 × 20 × 38	7mm		Top	NPN	N.O.	FL2-7A6H		
							N.C.	FL2-7B6H		
						PNP	N.O.	FL2-7D6H		
							N.C.	FL2-7E6H		
NPN				N.O.		FL2-7A6S				
				N.C.		FL2-7B6S				
PNP	N.O.	FL2-7D6S								
	N.C.	FL2-7E6S								
	30 × 30 × 52.2	12mm		Top	NPN	N.O.	FL2-12A6H			
						N.C.	FL2-12B6H			
					NPN	N.O.	FL2-12A6S			
						N.C.	FL2-12B6S			
					40 × 40 × 53	20mm	Top	NPN	N.O.	FL2-20A6H
									N.C.	FL2-20B6H
NPN	N.O.			FL2-20A6S						
	N.C.			FL2-20B6S						
NPN	N.O.			FL2-20A6S						
	N.C.			FL2-20B6S						

SPECIFICATIONS

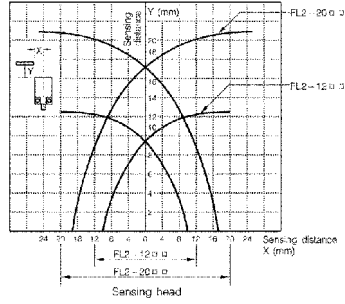
Item	Catalog listing	FL2-4□6□ FL2-4□6Q□	FL2-7□6□	FL2-12□6□	FL2-20□6□
Actuation method	High-frequency oscillating type (unshielded)				
Rated supply voltage	12/24Vdc				
Rated sensing distance	4±0.4mm	7±0.7mm	12±1.2mm	20±2mm	
Usable setting distance	0 to 2.8mm	0 to 4.9mm	0 to 8.4mm	0 to 14mm	
Standard target object	18×18mm, 1mm thick iron	25×25mm, 1mm thick iron	40×40mm, 1mm thick iron	50×50mm, 1mm thick iron	
Differential travel	10% max. of sensing distance				
Operating voltage range	10 to 30Vdc				
Current consumption (leakage)	15mA max. (24Vdc)				
Output operation mode	A: NPN N.O., B: NPN N.C., D: PNP N.O., E: PNP N.C.				
Control output	Switching current: 200mA max., voltage drop: 1V max., output dielectric strength: 30Vdc				
Response frequency	200Hz	300Hz		50Hz	
Hysteresis	0.05mm max.			0.1mm max.	
Temperature characteristics	±10% max. for the range of -25 to +70°C when +25°C is taken as standard temperature in sensing distance ±10% max. for the range of -25 to +50°C for FL2-4□6□/4□6Q□				
Supply voltage characteristics	±1% max. with ±20% voltage fluctuation with rated supply voltage as standard voltage in sensing distance				
Indicator lamps	Lights (red) when object approaches				
Operating temperature range	-25 to +70°C				
Storage temperature range	-25 to +70°C				
Operating humidity range	35 to 95%RH max.				
Insulation resistance	50MΩ min. (by 500Vac megger)				
Dielectric strength	500Vac, 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	IP67 (IEC standard)				
Weight (pre-leaded model)	Approx. 40g	Approx. 50g	Approx. 110g	Approx. 160g	
Circuit protection	Surge absorption, load short-circuit protection, reverse connection protection				
Wiring method	Pre-leaded				
Case material	ABS resin				

SENSING AREA DIAGRAM (typical examples)

● FL2-4□□/FL2-7□□

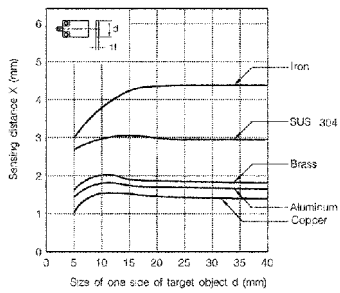


● FL2-12□□/FL2-20□□

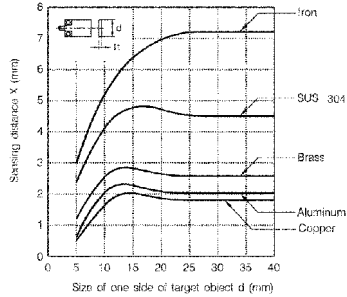


SENSING DISTANCE ACCORDING TO MATERIAL & SIZE OF OBJECT (typical examples)

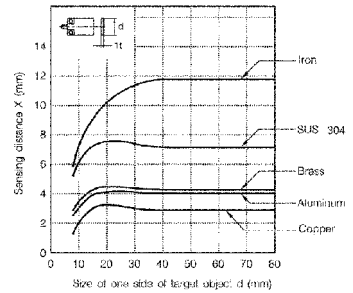
● FL2-4□□



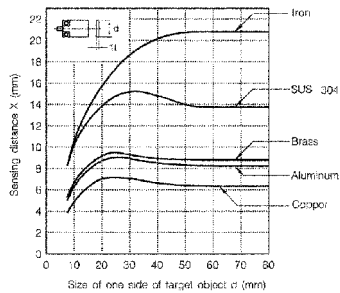
● FL2-7□□



● FL2-12□□



● FL2-20□□

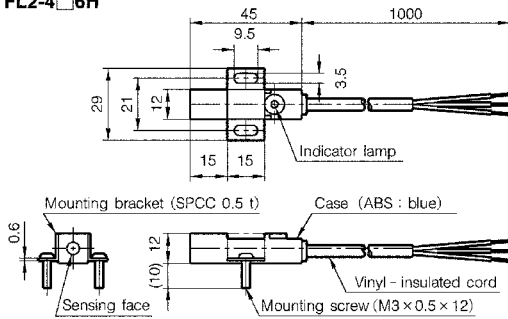


EXTERNAL DIMENSIONS

(unit: mm)

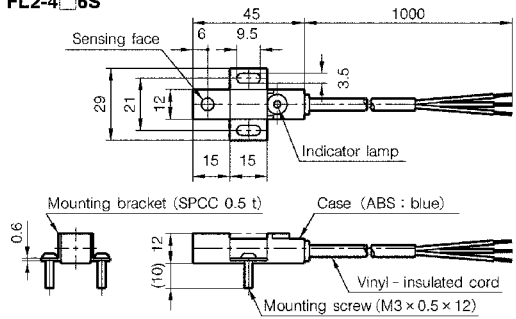
● Standard (pre-leaded) model

FL2-4□6H



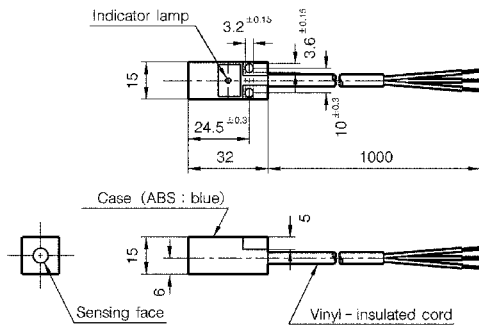
Note: A mounting bracket and two mounting screws are provided.
Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 3-core)
4.2mm dia.
The case color of different-frequency types "-F" is green.

FL2-4□6S



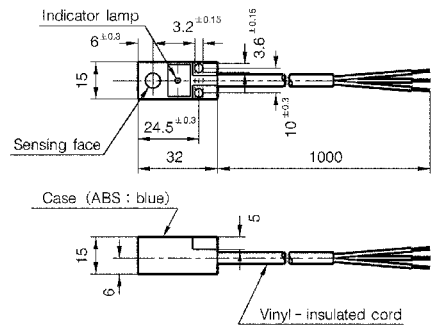
Note: A mounting bracket and two mounting screws are provided.
Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 3-core)
4.2mm dia.
The case color of different-frequency types "-F" is green.

FL2-4□6QH



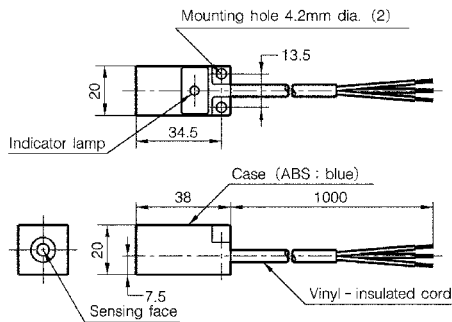
Note: Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 3-core)
4.2mm dia.
The case color of different-frequency types "-F" is green.

FL2-4□6QS



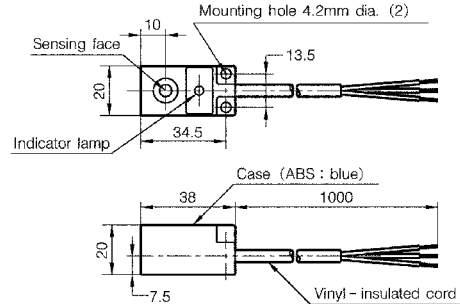
Note: Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 3-core)
4.2mm dia.
The case color of different-frequency types "-F" is green.

FL2-7□6H



Note: Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 3-core)
4.2mm dia.
The case color of different-frequency types "-F" is green.

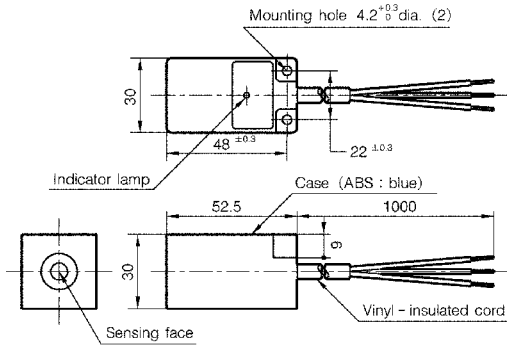
FL2-7□6S



Note: Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 3-core)
4.2mm dia.
The case color of different-frequency types "-F" is green.

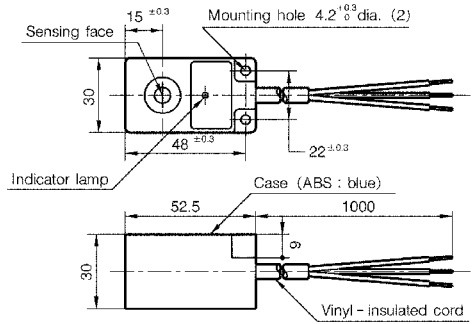
FL2-12□6H

(unit: mm)



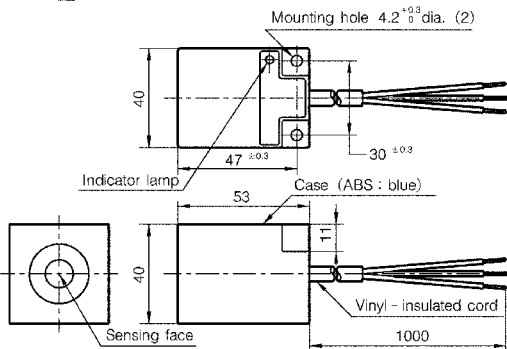
Note; Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 3-core) 5.7mm dia.
The case color of different-frequency types "-F" is green.

FL2-12□6S



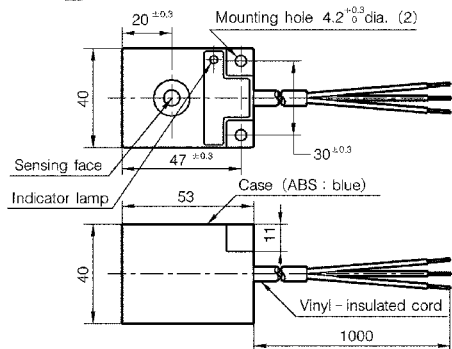
Note; Vinyl-insulated cord (oil-resistant: 0.3mm², 27/0.12, 3-core) 5.7mm dia.
The case color of different-frequency types "-F" is green.

FL2-20□6H



Note; Vinyl-insulated cord (oil-resistant: 0.5mm², 20/0.18, 3-core) 5.7mm dia.
The case color of different-frequency types "-F" is green.

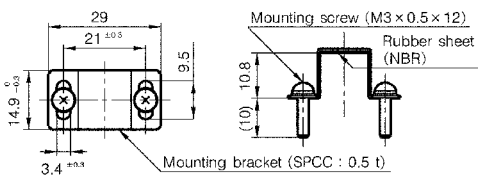
FL2-20□6S



Note; Vinyl-insulated cord (oil-resistant: 0.5mm², 20/0.18, 3-core) 5.7mm dia.
The case color of different-frequency types "-F" is green.

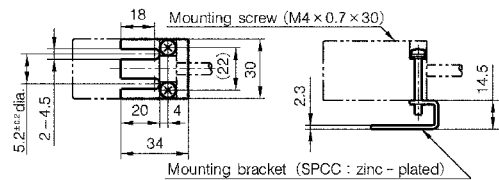
● Mounting bracket (sold separately)

FL2-PA5



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

FL2-PA12

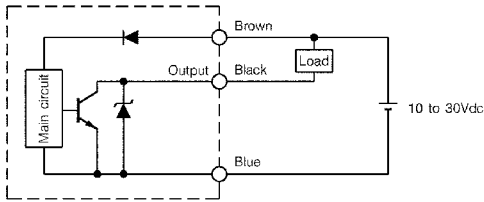


Catalog listing	Applicable models
FL2-PA5	FL2-4□6□
FL2-PA12	FL2-12□6□

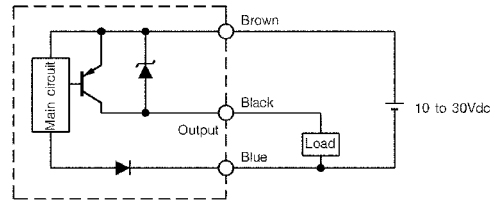
Note: FL2-PA5 is provided with the proximity sensor.

CIRCUIT AND WIRING DIAGRAMS

• DC NPN type



• DC PNP type



PRECAUTIONS

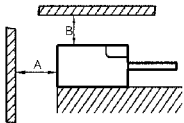
• Mounting

Tighten the screws to the torque shown below.

Catalog listing	Allowable tightening torque (N·m)	Recommended screw diameter
FL2-4□6□	0.5	Screw provided
FL2-4□6Q□	0.5	M3
FL2-7□□□	0.5	M4
FL2-12□□□	0.5	M4
FL2-20□□□	0.5	M5

• Influence of surrounding metal

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



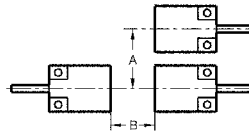
Note: Shaded areas indicate surrounding metal other than the target object.

Catalog listing	A (mm)	B (mm)
FL2-4□6H	20	10
FL2-4□6QH		
FL2-4□6S	10	20
FL2-4□6QS		
FL2-7□6H	30	15
FL2-7□6S	15	30
FL2-12□6H	50	25
FL2-12□6S	25	50
FL2-20□6H	80	40
FL2-20□6S	40	80

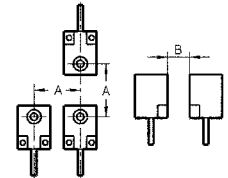
• Mutual interference prevention

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 above. When standard frequency types and different-frequency types “-F” are used alternately in a row, maintain at least the spaces indicated in parentheses “()” for dimensions A and B in the table below.

Side sensing type



Front sensing type



Catalog listing	A (mm)	B (mm)
FL2-4□6□	30 (15)	40 (20)
FL2-4□6Q□		
FL2-7□6□	80 (40)	80 (40)
FL2-12□6□	120 (60)	120 (60)
FL2-20□6□	200 (100)	200 (100)

• 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.

• 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.