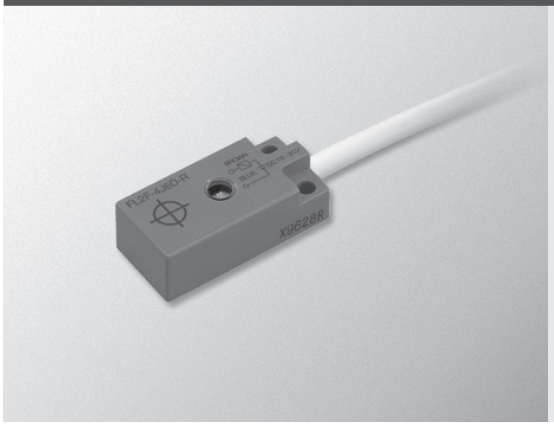
DC2-wire Compact Square Proximity Switches

FL2F Series

This DC2-wire Type Compact Proximity Switch Takes up Little Mounting Space and can be Directly Connected to Programmable Controllers and N.C. Units.



- **Reduced wiring costs**
- **Stable sensing area displayed by setting indicator**
  (on N.O. output type only)
- **High-speed response**
  (1.5 kHz)
- **High seal capabilities**
  (IP67)
- **Enhanced circuit protection**
  (surge absorption, load short-circuit, reverseconnection)

ORDER GUIDE

● Standard (pre-leaded) model (cord length 1m)

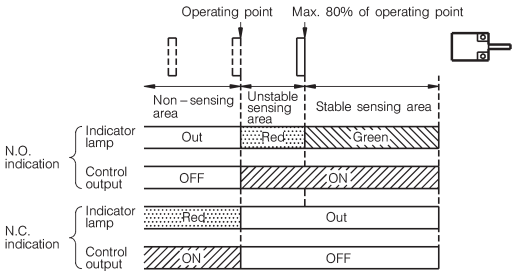
Actuation method	Appearance		Sensing distance	Sensing face	Operation mode	Setting indication	Catalog listing
	Switch package style	Dimensions					
High-frequency oscillating type (unshielded)		15 × 10 × 32	4mm	Side	N.O.	○	**FL2F-4J6D-R**
					N.C.	–	**FL2F-4K6-R**

SPECIFICATIONS

Item \ Catalog listing	FL2F-4□6□-R
Actuation method	High-frequency oscillating type (unshielded)
Rated supply voltage	12/24Vdc
Rated sensing distance	4±0.4mm
Usable setting distance	0 to 2.8mm
Standard target object	18×18mm, 1mm thick iron
Differential travel	15% max. of sensing distance
Operating voltage range	10 to 30Vdc
Leakage current	1mA max.
Control output	Switching current: 4 to 100mA max., voltage drop: 3.3V max., Output, dielectric strength: 30Vdc
Response frequency	1.5kHz
Hysteresis	0.05mm max.
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	−25 to +70°C
Storage humidity range	35 to 95% RH
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/s² 10 times in X, Y and Z directions
Protection	IP67 (IEC standard)
Weight	Approx. 40g
Circuit protection	Surge absorption, load short-circuit protection, reverse connection protection
Wiring method	Pre-leaded
Case material	ABS resin

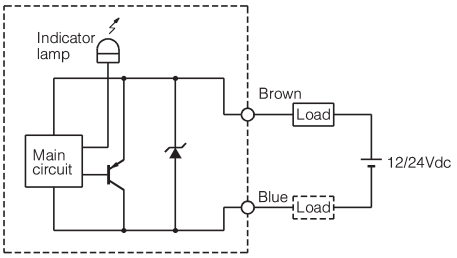
ABOUT SETTING INDICATION

The proximity switch can detect objects reliably by bringing the proximity switch close to the target object and setting the switch at the position where the indicator lamp changes from red to green.



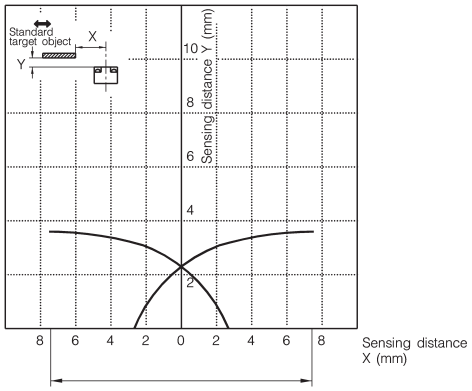
Note:
When the target object is made of a different material such as aluminum, copper and stainless steel to the standard target object (iron), the setup point where the indicator lamp changes color is shorter than 80% maximum.

WIRING DIAGRAM

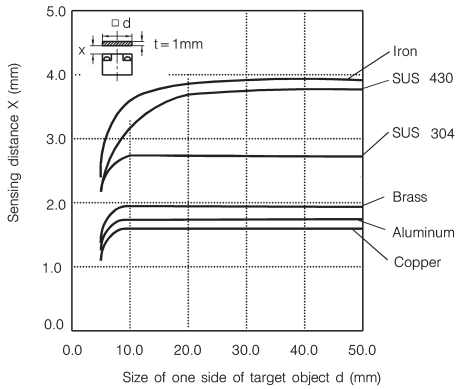


The load can be connected to either of the power supplies.

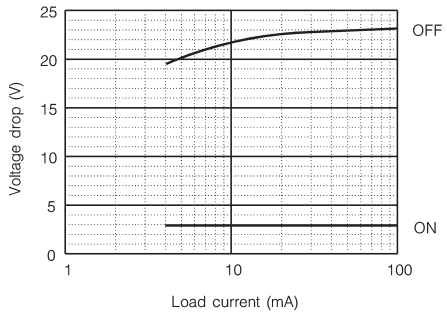
SENSING AREA DIAGRAM (typical example)



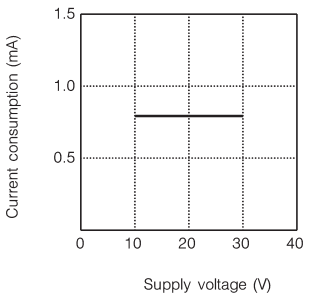
SENSING DISTANCE ACCORDING TO MATERIAL & SIZE OF OBJECT (typical example)



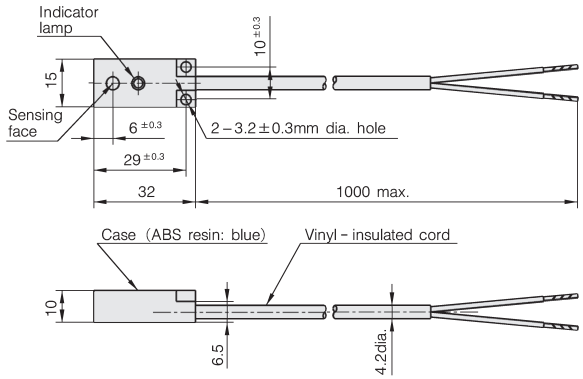
VOLTAGE DROP CHARACTERISTICS (typical example)



LEAKAGE CURRENT CHARACTERISTICS (typical example)



EXTERNAL DIMENSIONS



Vinyl-insulated cord (oil-resistant, bend-resistant type: 0.3mm², 60/0.08 dia., 2-core) 4.2mm dia

PRECAUTIONS

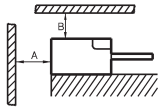
1. Mounting

Tighten the screws to the torque shown below.

Catalog listing	Allowable tightening torque (N-m)	Recommended screw diameter
FL2F-4□6□-R	0.5	M3

2. Influence of surrounding metal

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

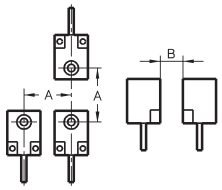


Note:
Shaded areas indicate surrounding metal other than the target object.

Catalog listing	A (mm)	B (mm)
FL2F-4□6□-R	10	20

3. Mutual interference prevention

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



Catalog listing	A (mm)	B (mm)
FL2F-4□6□-R	30	40

4. Cautions for series or parallel connection

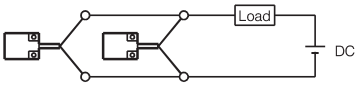
4.1 Series connection (AND switching circuit)

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

Operation lag = 40ms × (number of series connections − 1)
Voltage drop = voltage drop of single switch × number of series connected switches

4.2 Parallel connection (OR switching circuit)

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



5. Relay loads

The voltage drop of the **FL2F** Series is 3.3V. Pay attention to this voltage drop when using a relay load. (With 12Vdc relays, switching is not possible.)

6. Operation upon power ON

After the power is turned ON, it takes 40ms or less until the proximity switch is ready for sensing.
When the load and the proximity switch use different power supplies, be sure to turn the proximity switch ON before turning the load ON.

7. Influence of leakage current

Minimal current flows as leakage current for operating the circuits even when the proximity switch is OFF.
Take sufficient care when restoring connected loads.

8. Minimum cable bend 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.