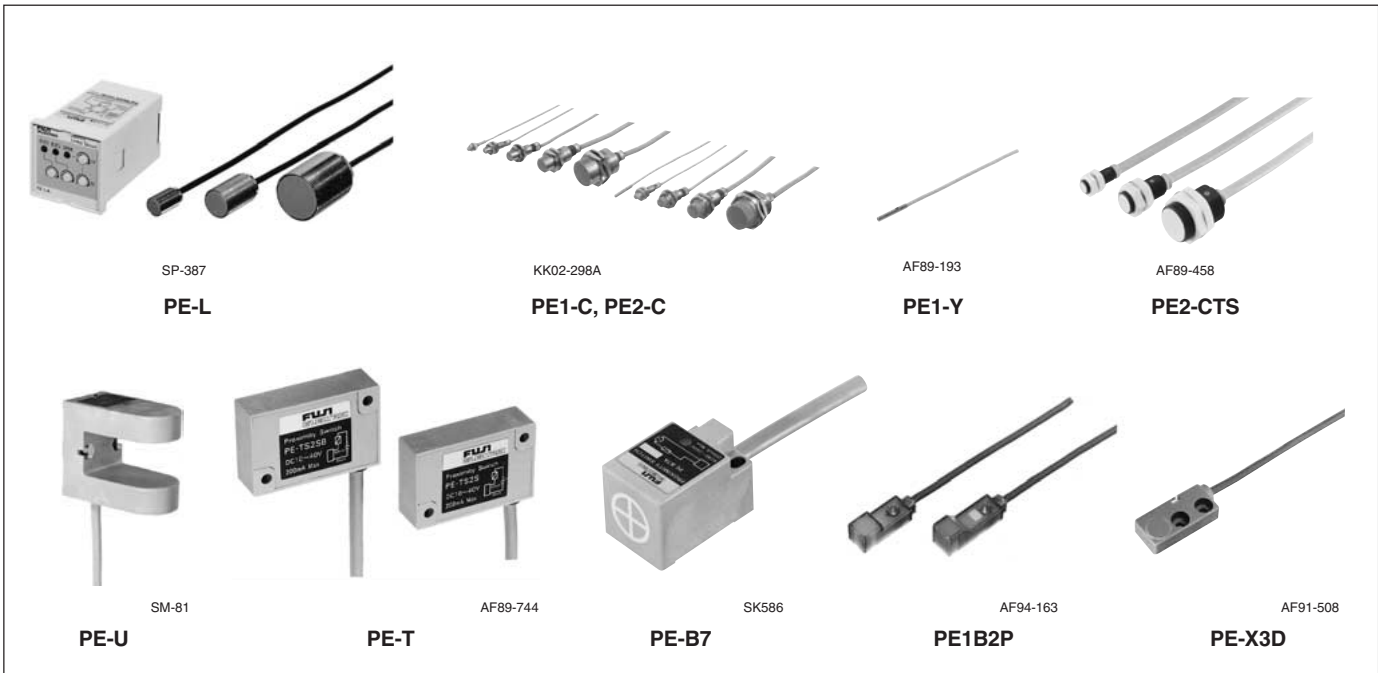


Proximity Switches

General information



Proximity switches, PE series

■ Description

These proximity switches have many advantages over conventional limit switches, enabling their use where other switches will not do. FUJI offers two types – inductive and magnetic. Sensors and switching components are completely enclosed for protection against oil mist, metal filling, dust, and moisture.

Inductive types use a solid-state switching device; magnetic types use a reed switch.

PE series proximity switches

Inductive type

Inductive proximity switches are available in AC or DC versions.

The PE-U series is slot type.

The PE1-C and PE1-Y series are cylindrical. The detecting surface of PE-B series is square. The PE-T series switches are slim types. The PE1B2P is compact square type. The PE-L series has analog outputs with the sensor and amplifier separated. The PE2-C series is cylindrical and with stable operating indicator. The PE-X3D is flat type, and PE-4BS2 series is multiple type.

The PE-G4D is space-saving square type.

■ Features

PE-U series (See page 05/125)

- Operating distance: 7mm and 10mm
- Operating voltage range: 10 to 30V DC
- Suitable for detecting of ferromagnetic materials

PE1-C and PE1-Y series (See page 05/126)

- Short length achieved with IC
- 6 shielded and 4 non-shielded types
- AC 2-wire, DC 2-wire, and DC 3-wire systems
- Stable operating indicator provided as standard (mounting diameter M12 or more, and NO contact type).

PE-B series (See page 05/130)

- 4mm to 50mm operating distance
- Types with operating distance exceeding 20mm conform to the CENELEC Standard.
- Operating voltage range: 80 to 250V AC or 10 to 30V DC

PE-X15D series (See page 05/133)

- Square-flat type
- DC supply/3-wire, 12/24V DC
- Operating distance: 15mm

PE-T series (See page 05/134)

- Unique “Magnetic Shield Method” permits side-by-side mounting
- Only 12mm thick – achieved with IC
- Built-in reverse polarity and surge voltage protection

PE1B2P series (See page 05/136)

- Operating distance: 2.5mm
- DC supply/3-wire, 12/24V DC

PE-L series (See page 05/138)

- Output voltage proportional to distance
- Linearity: $\pm 1.5\%$ of full scale
- Resolution: $\pm 0.05\%$ of full scale
- Operating frequency: Up to 10kHz
- Operating distance: 2 to 10mm

PE2-C series (See page 05/142)

- 4 shielded and 3 non-shielded types
- Stable operating level indicating lamp facilitates adjustment
- DC 2-wire, DC 3-wire and AC/DC 2-wire operating systems
- 40 to 250V AC/20 to 250V DC (AC/DC 2-wire system)

PE-X3D series (See page 05/146)

- Only 7mm thick
- Operating voltage range: 10 to 30V DC

PE-G4D (See page 05/147)

- Requires about half the mounting space of PE-B4 type.



AES, AER and PM type proximity switches (Magnetically-operated reed switches)

In the standard type PM the reed switch element and the sensing magnet are separate elements. The AES type is also a separate type but is a miniaturized version. In the AER type the sensing magnet element and the reed switch are integrated in one housing.

■ Features

- Since these proximity switches make use of a permanent magnet no external power source is required to operate the reed switch.
- The dry reed contact switch is dependable in operation and has an extended service life.
- The unit strongly resists vibration and is both water-and dust-tight (except for AES type).
- Either an AC or DC power source can be used for the reed switch output.
- Compact in design and easy to install anywhere.
- Can be mounted on a steel frame (In this case the effective operating distance is reduced by one-half).

■ For further information

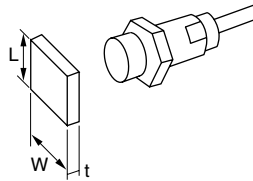
See pages 05/148, 149, 151, 152.

Inductive type

■ Description

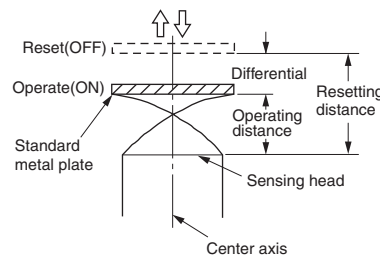
● Standard metal plate (object)

Standard metal plate (object) is a standard sensing target to measure the basic performance. Its shape, size, and material are stipulated. Iron is usually used as material.

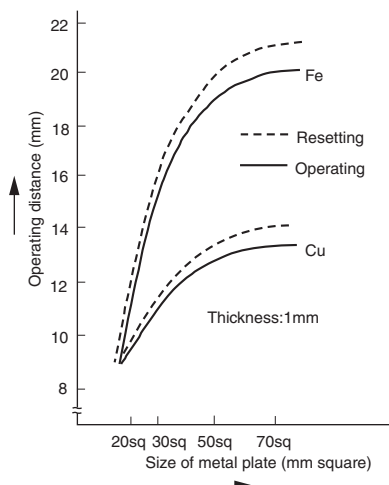


● Operating distance

The operating distance is the distance along the center axis of the head from the sensing head to the point where a metal plate traveling along the path actuates the switch. Normally the operating distance means this distance in vertical direction.



The following curves indicate typical operating distances. Values for aluminum or copper will be less than 1/2 those indicated for iron. In order for an object to be detected, its dimensions must be no smaller than 30 × 30mm, or no larger than 70 × 70mm. Objects smaller or larger will not be detected, regardless of material.



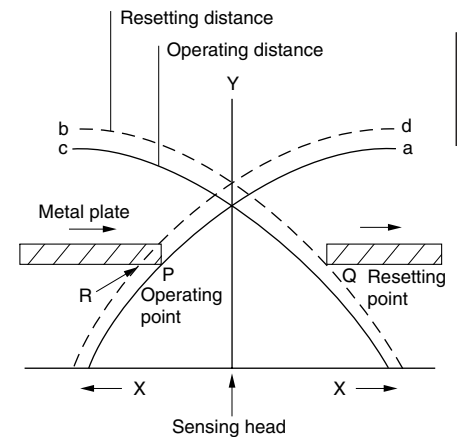
● Differential distance

This is the distance between the actuating point where the switch is actuated and the reset point where the switch resets after the metal plate is withdrawn from the sensing head.

● Response curve

This curve shows the detect-to-reset range with object distance from the head. The switch operates when the object approaching from the left reaches point P on curve 'a', and resets when the trailing edge of the object reaches point Q on curve 'b'.

The switch also resets when the object is withdrawn from point P to R on curve 'd'.



Proximity Switches

General information

Magnetically operated type

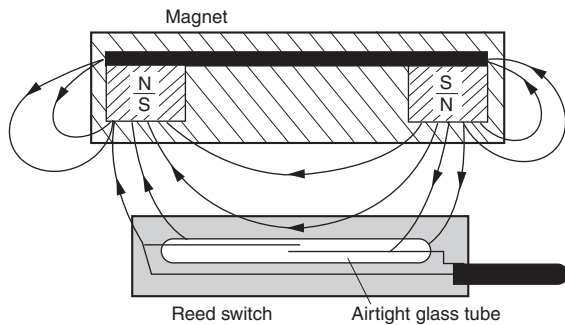
■ Operating

These switches comprise a sensor and a reed switch element, which closes when a magnetic object approaches.

■ Reed switch

The constructions of the reed switch and its magnetic element are shown in the diagram. The reed switch is made up of two magnetic reeds in an airtight glass tube. The 2 reeds are magnetized when they come within the magnetic field of the magnetic element. In this case the tips of these 2 reeds have positive and negative charges respectively and are attracted to each other. When the magnetic field is removed the magnetic charge is lost and the reed switch opens.

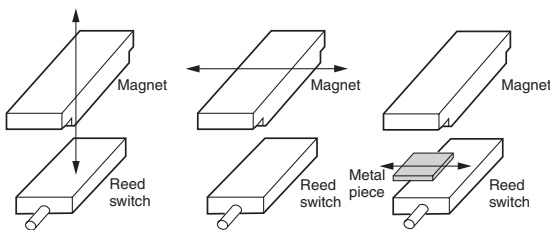
FUJI's reed switches are designed to operate in the same manner as the snap-action of conventional limit switches.



■ Mode of operation

The operation methods of the magnetic type proximity switches are as illustrated.

Separation type

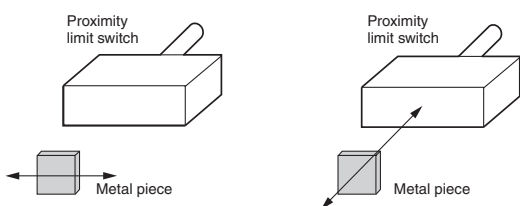


Reed switch is fixed but magnet moves in a vertical direction.

Reed switch is fixed but magnet moves in a horizontal direction.

Both the reed switch and magnet are fixed. And metal object passes between these two.

Integrated type



Proximity switch is fixed and the metal object moves in a horizontal direction.

Proximity switch is fixed and the metal piece moves forwards and backwards.

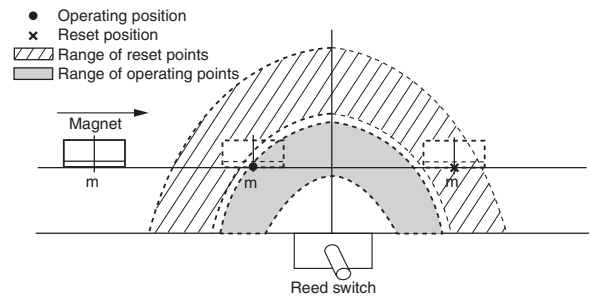
■ Operating characteristics

Short axis

Magnet: Travel

Reed switch: Fixed

The reed switch closes when 'm' the magnet center reaches '●' position. It resets at 'x' position.

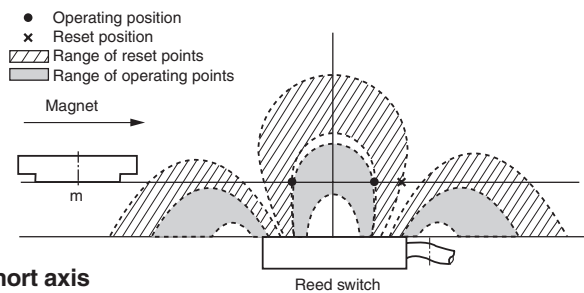


Long axis

Magnet: Travel

Reed switch: Fixed

This method is feasible but if the distance between the magnet and the reed switch is not correct the reed switch may switch 3 times when the magnet carries out only 1 travel. Try to avoid using this arrangement.



Short axis

Magnet: Fixed

Reed switch: Fixed

(In this case the reed switch operates as an NC contact.)

Reed switch closes when the metal piece is out of 'X' region between the magnet and the reed switch.

When the metal piece passes through the 'X' region the reed switch will open. Thus the reed switch opens as soon as 'c' the tip of the metal piece reaches 'X' region and closes as soon as 'd' the end leaves 'Y' region.

