

### 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 05/28)

- 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 05/29)

- 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 05/33)

- 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 05/36)

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

##### PE-T series (See page 05/36)

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

##### PE-L series (See page 05/39)

- 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 05/43)

- 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 05/47)

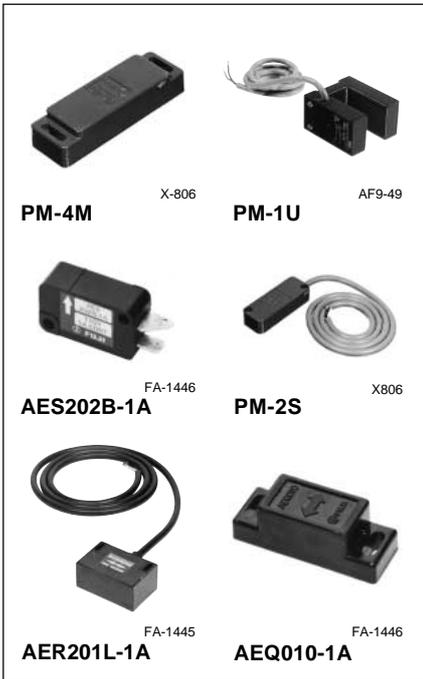
- Only 7mm thick
- Operating voltage range: 10 to 30V DC

##### PE-G4D (See page 05/49)

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

# Proximity Switches

## General information



### 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

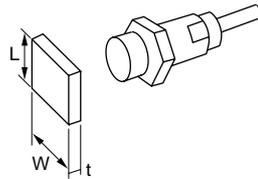
See pages 05/51, 52, 54, 55.

### Inductive type

#### ■ Description

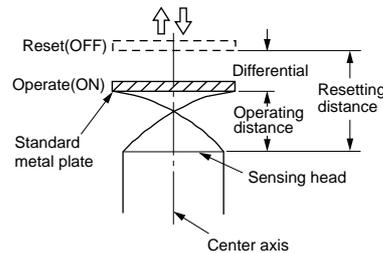
##### ● Standard metal plate (object)

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.

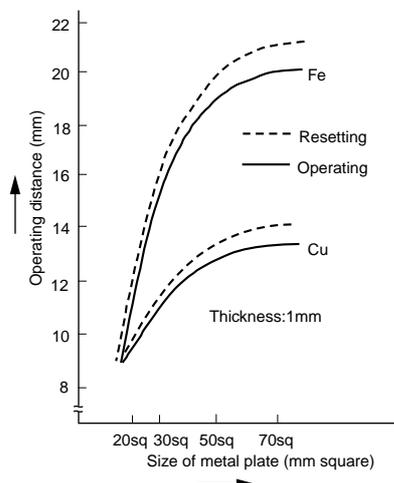


##### ● Operating distance

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.



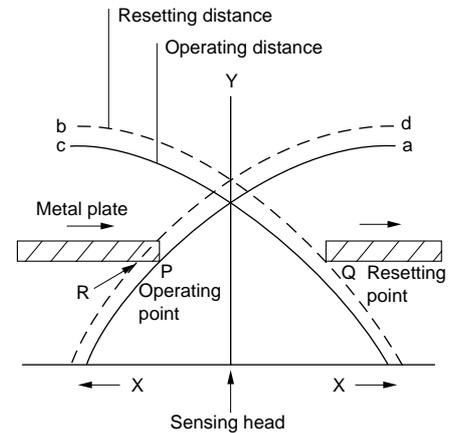
##### ● Differential distance

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'.



### Magnetically operated type

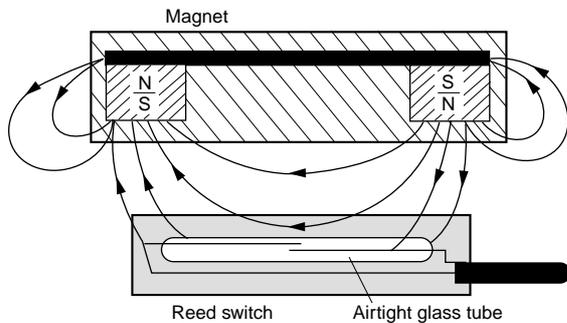
#### Operating

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.

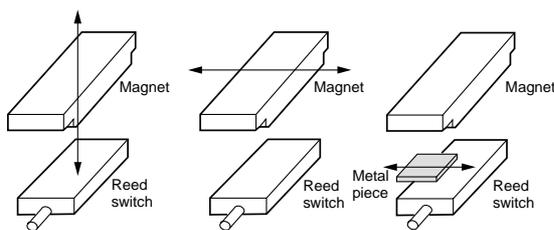
FUJI's reed switches are designed to operate in the same manner as the snap-action of conventional limit switches.



#### Mode of operation

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

#### Separation type

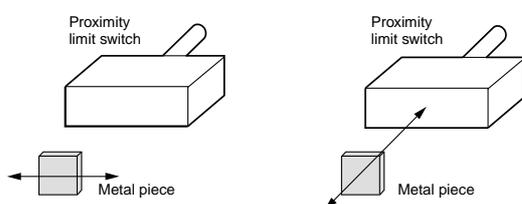


Reed switch is fixed but magnet moves in a vertical direction.

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.

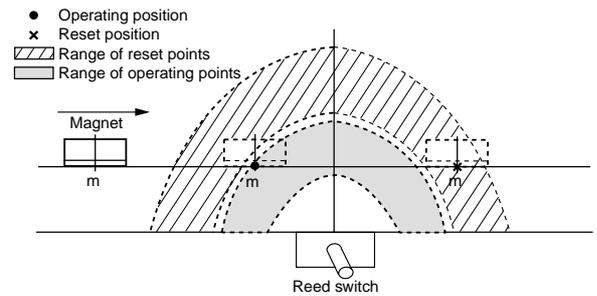
### Operating characteristics

#### Short axis

Magnet: Travel

Reed switch: Fixed

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



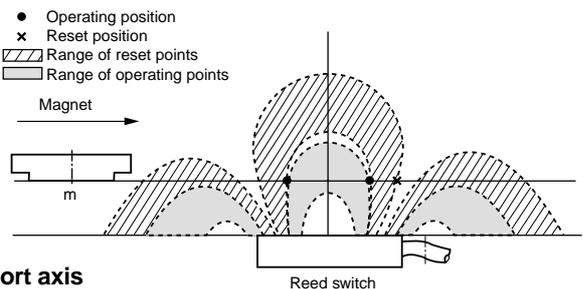
#### Long axis

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

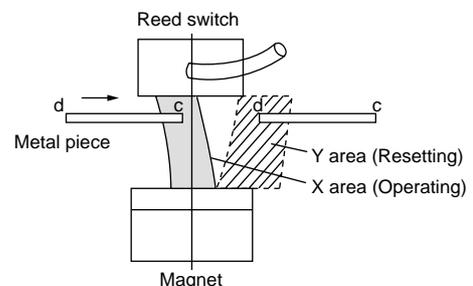
Magnet: Fixed

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.



# Proximity Switches

## PE-U12D and PE-U25NT

### Inductive proximity switches—Slot type, PE-U

Supply voltage: 12/24V DC  
 Output: Transistor 50, 100mA max.  
 Operating distance: 7, 10mm

#### ■ Features

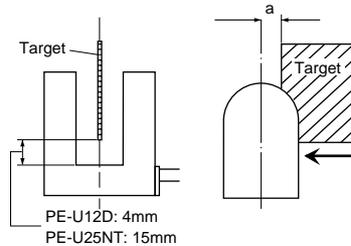
- The slot type detecting surfaces of 12 and 25mm are available. Stable detection characteristics can be obtained when a metal plate passes through the slot ON or OFF-center.
- Best suited for detection of magnetic metal plates passing through the slot.

- Provided with built-in reverse polarity and surge voltage protection circuits.
- LED indicator lamps are provided, thus facilitating operational checks.
- Degree of protection meets the requirement of IP67 (IEC), thus permitting operation in unfavorable environments.
- NPN transistor voltage/current outputs are provided, thus permitting a wide range of applications.

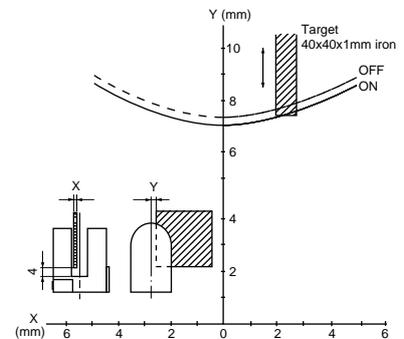
#### ■ Specifications

| Type (Ordering code)        | PE-U25NT (PE1U25-ND)  | PE-U12D (PE1U12-D)             |
|-----------------------------|-----------------------|--------------------------------|
| Operating distance          | 10mm ± 2*             | 7mm ± 1*                       |
| Standard target size (iron) | 50 × 50 × 2.3mm       | 40 × 40 × 1mm                  |
| Supply voltage              | 12/24V DC             |                                |
| Operating voltage range     | 10 to 30V DC          |                                |
| Power consumption           | Max. 20mA at 24V DC   | Max. 15mA at 24V DC            |
| Output capacity             | Max. 100mA            | Max. 50mA                      |
| Response time or frequency  | Max. 3ms. (ON time)   | Min. 50Hz                      |
| Differential                | 0.3 to 2mm            | Max. 15% of operating distance |
| Ambient temperature         | -25 to +70°C          |                                |
| Degree of protection        | IP67 (IEC)            |                                |
| Insulation resistance       | Over 50MΩ at 500V DC  |                                |
| Dielectric strength         | 2000V AC rms. 1minute | 1000V AC rms. 1minute          |
| Mass                        | 210g                  | 120g                           |

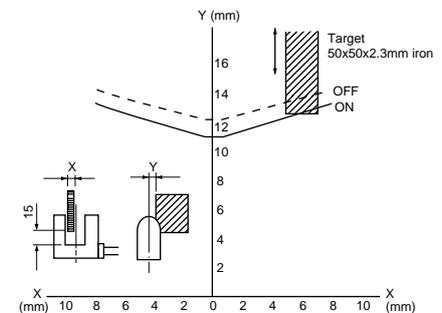
Note: \* This indicates the distance "a" shown in figure at right.



#### ■ Response curve PE-U12D

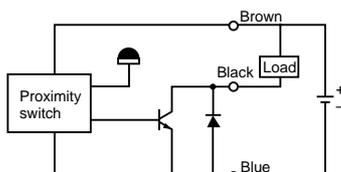


#### PE-U25NT



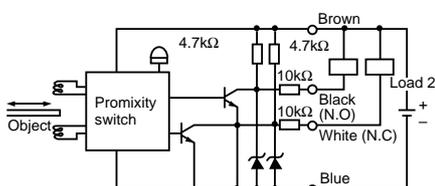
#### ■ Wiring diagrams

##### PE-U12D



NPN transistor current output, 1NO

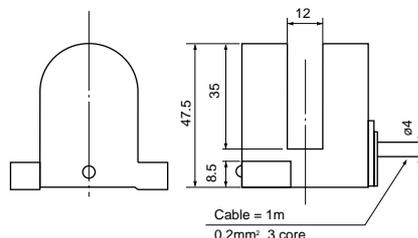
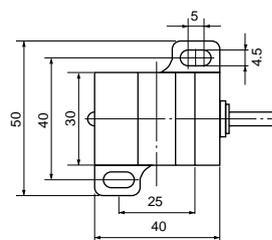
##### PE-U25NT



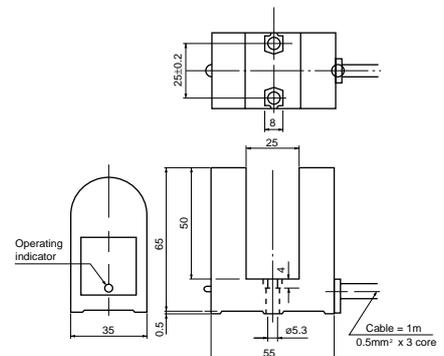
NPN transistor voltage/current output, SPDT

#### ■ Dimensions, mm

##### PE-U12D



##### PE-U25NT



#### ■ Ordering information

Specify the following:  
 1. Type number or ordering code

### Inductive proximity switches— Cylindrical type, PE1-C, PE1-Y

#### Operating system

DC supply/3-wire and 2-wire system  
AC supply/2-wire system

Operating distance: 0.8 to 20mm

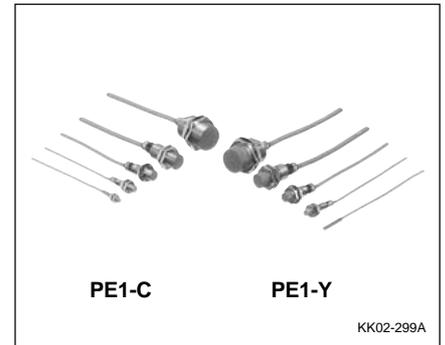
This proximity switch has a cylindrical shape. The sensor is fitted to an end of the cylinder and the body is provided with a built-in control circuit.

This type conforms to the requirements of the CENELEC (Europe) Standards and as the dimensions, ratings and performance comply with the

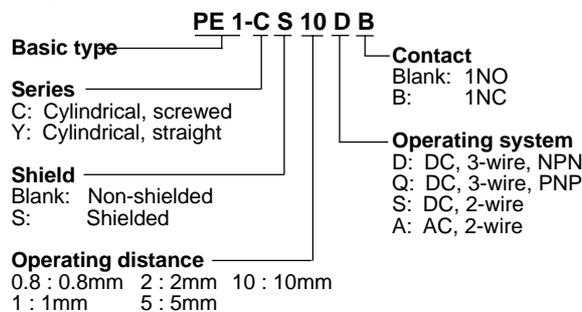
requirements of these Standards, this type can be used as replacement units.

#### ■ Features

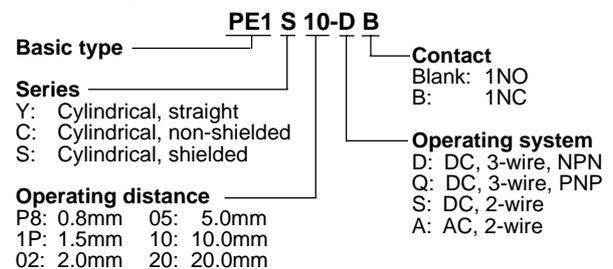
- Short length because of the use of IC circuit.
- Shielded and non-shielded type are available.
- Red and green LED is provided for a stable operating indication and easy setting, mounting diameter M12 or more and NO contact type only.
- Provided with reverse polarity and surge voltage protection circuits.
- Degree of protection: IEC IP67



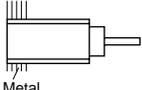
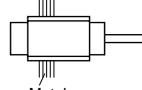
#### ■ Type number nomenclature



#### ■ Ordering code



#### ■ Specifications

| Description  | Operating system                        | Operating distance (mm)           | Mounting diameter                         | Supply voltage (Operating voltage range) | 1NO Type  | Ordering code  | 1NC Type  | Ordering code  |
|--|---|-----------------------------------|---|--|---|--|---|--|
| <br>Metal | DC supply 3-wire, NPN transistor output | 0.8<br>0.8<br>1.5<br>2<br>5<br>10 | 4mm-dia.<br>M5<br>M8<br>M12<br>M18<br>M30 | 12/24V DC (10 to 30V DC)                 | PE1-YS08D<br>PE1-CS08D<br>PE1-CS1R5D<br>PE1-CS2D<br>PE1-CS5D<br>PE1-CS10D | PE1YP8-D<br>PE1SP8-D<br>PE1S1P-D<br>PE1S02-D<br>PE1S05-D<br>PE1S10-D | PE1-YS08DB<br>PE1-CS08DB<br>PE1-CS1R5DB<br>PE1-CS2DB<br>PE1-CS5DB<br>PE1-CS10DB | PE1YP8-DB<br>PE1SP8-DB<br>PE1S1P-DB<br>PE1S02-DB<br>PE1S05-DB<br>PE1S10-DB |
|  | DC supply 3-wire, PNP transistor output | 0.8<br>0.8<br>1.5<br>2<br>5<br>10 | 4mm-dia.<br>M5<br>M8<br>M12<br>M18<br>M30 | 12/24V DC (10 to 30V DC)                 | PE1-YS08Q<br>PE1-CS08Q<br>PE1-CS1R5Q<br>PE1-CS2Q<br>PE1-CS5Q<br>PE1-CS10Q | PE1YP8-Q<br>PE1SP8-Q<br>PE1S1P-Q<br>PE1S02-Q<br>PE1S05-Q<br>PE1S10-Q | PE1-YS08QB<br>PE1-CS08QB<br>PE1-CS1R5QB<br>PE1-CS2QB<br>PE1-CS5QB<br>PE1-CS10QB | PE1YP8-QB<br>PE1SP8-QB<br>PE1S1P-QB<br>PE1S02-QB<br>PE1S05-QB<br>PE1S10-QB |
|  | DC supply 2-wire                        | 2<br>5<br>10                      | M12<br>M18<br>M30                         | 12/24V DC (10 to 30V DC)                 | PE1-CS2S<br>PE1-CS5S<br>PE1-CS10S   | PE1S02-S<br>PE1S05-S<br>PE1S10-S                                     | PE1-CS2SB<br>PE1-CS5SB<br>PE1-CS10SB  | PE1S02-SB<br>PE1S05-SB<br>PE1S10-SB  |
|  | AC supply 2-wire                        | 2<br>5<br>10                      | M12<br>M18<br>M30                         | 120/240V AC (45 to 260V AC)              | PE1-CS2A<br>PE1-CS5A<br>PE1-CS10A   | PE1S02-A<br>PE1S05-A<br>PE1S10-A                                     | PE1-CS2AB<br>PE1-CS5AB<br>PE1-CS10AB  | PE1S02-AB<br>PE1S05-AB<br>PE1S10-AB  |
| <br>Metal | DC supply 3-wire, NPN transistor output | 2<br>5<br>10<br>20                | M8<br>M12<br>M18<br>M30                   | 12/24V DC (10 to 30V DC)                 | PE1-C2D<br>PE1-C5D<br>PE1-C10D<br>PE1-C20D                                | PE1C02-D<br>PE1C05-D<br>PE1C10-D<br>PE1C20-D                         | PE1-C2DB<br>PE1-C5DB<br>PE1-C10DB<br>PE1-C20DB                                  | PE1C02-DB<br>PE1C05-DB<br>PE1C10-DB<br>PE1C20-DB                           |
|  | DC supply 3-wire, PNP transistor output | 2<br>5<br>10<br>20                | M8<br>M12<br>M18<br>M30                   | 12/24V DC (10 to 30V DC)                 | PE1-C2Q<br>PE1-C5Q<br>PE1-C10Q<br>PE1-C20Q                                | PE1C02-Q<br>PE1C05-Q<br>PE1C10-Q<br>PE1C20-Q                         | PE1-C2QB<br>PE1-C5QB<br>PE1-C10QB<br>PE1-C20QB                                  | PE1C02-QB<br>PE1C05-QB<br>PE1C10-QB<br>PE1C20-QB                           |
|  | DC supply 2-wire                        | 5<br>10<br>20                     | M12<br>M18<br>M30                         | 12/24V DC (10 to 30V DC)                 | PE1-C5S<br>PE1-C10S<br>PE1-C20S   | PE1C05-S<br>PE1C10-S<br>PE1C20-S                                     | PE1-C5SB<br>PE1-C10SB<br>PE1-C20SB  | PE1C05-SB<br>PE1C10-SB<br>PE1C20-SB  |
|  | AC supply 2-wire                        | 5<br>10<br>20                     | M12<br>M18<br>M30                         | 120/240V AC (45 to 260V AC)              | PE1-C5A<br>PE1-C10A<br>PE1-C20A   | PE1C05-A<br>PE1C10-A<br>PE1C20-A                                     | PE1-C5AB<br>PE1-C10AB<br>PE1-C20AB  | PE1C05-AB<br>PE1C10-AB<br>PE1C20-AB  |

# Proximity Switches

## PE1-C, PE1-Y

### ■ Specifications

| Type                  | PE1-YS08D, DB<br>PE1-CS08D, DB  | PE1-YS08Q, QB<br>PE1-CS08Q, QB | PE1-CS□D, DB<br>PE1-C□D, DB                       | PE-CS□Q, QB<br>PE1-C□Q, QB | PE1-CS□S, SB<br>PE1-C□S, SB | PE1-CS□A, AB<br>PE1-C□A, AB |
|-----------------------|---|--------------------------------|---|----------------------------|-----------------------------|-----------------------------|
| Output                | NPN transistor, open collector output   |                                | PNP transistor, open collector output             |                            | Transistor output           | Thyristor output            |
| Current consumption   | 10mA or less at 24V DC  |                                | 15mA or less at 24V DC                            |                            | –                           | –                           |
| Leakage current       | –   |                                | –   |                            | 0.8mA or less at 24V DC     | 1.5mA or less at 200V AC    |
| Ambient temperature   | –25 to 70°C   |                                | –25 to 80°C                                       |                            | –25 to 80°C                 | –25 to 80°C                 |
| Dielectric strength   | 250V AC 1 min.  |                                | 1000V AC 1 min.                                   |                            | 1000V AC 1 min.             | 2000V AC 1 min.             |
| Insulation resistance | 50MΩ or more at 250V DC megger  |                                | 50MΩ or more at 500V DC megger                    |                            |                             |                             |
| Degree of protection  | IP67 (IEC Standard)   |                                |   |                            |                             |                             |
| Vibration             | 10-55Hz, 1.5mm double amplitude (in X, Y, Z directions, respectively for 2 hours) |                                |   |                            |                             |                             |
| Shock                 | 500m/s <sup>2</sup>   |                                | –   |                            |                             |                             |
| Protection circuit    | Reverse polarity and surge voltage  |                                | Reverse polarity, short-circuit and surge voltage |                            |                             | Surge voltage               |

### ■ Response frequency

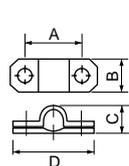
| Type  | Frequency (Hz) |
|---|----------------|
| PE1-CS1R5D, 5DB, 5Q, 5QB  | 2000           |
| PE1-CS2D, 2DB, 2Q, 2QB  | 1500           |
| PE1-YS08D, 08DB, 08Q, 08QB<br>PE1-CS08D, 08DB, 08Q, 08QB<br>PE1-CS2S, 2SB | 1000           |
| PE1-C2D, 2DB, 2Q, 2QB<br>PE1-C5S, 5SB                                     | 800            |
| PE1-CS5D, 5DB, 5Q, 5QB  | 600            |
| PE1-CS5S, 5SB   | 500            |
| PE1-CS10D, 10DB, 10Q, 10QB, 10S, 10SB<br>PE1-C5D, 5DB, 5Q, 5QB, 10S, 10SB | 400            |
| PE1-C10D, 10DB, 10Q, 10QB   | 200            |
| PE1-C20D, 20DB, 20Q, 20QB   | 100            |
| PE1-CS2A, 2AB, 5A, 5AB, 10A, 10AB<br>PE1-C5A, 5AB, 10A, 10AB, 20A, 20AB   | 25             |

### ■ Accessories (optional)

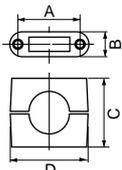
#### ● Mounting brackets

| Type           | Ordering code | Dimensions, mm |      |    |    | Screw (supplied) | Used with           |
|----------------|---------------|----------------|------|----|----|------------------|---------------------|
|                |               | A              | B    | C  | D  |                  |                     |
| <b>PX1-P4</b>  | PE1Z0036      | 13             | 7.5  | 6  | 20 | M3 × 10          | PE1-YS08            |
| <b>PX1-P8</b>  | PE1Z0037      | 18             | 10   | 18 | 28 | M4 × 20          | PE1-CS1R5<br>PE1-C2 |
| <b>PX1-P12</b> | PE1Z0033      | 24             | 12.5 | 20 | 37 | M4 × 25          | PE1-CS2<br>PE1-C5   |
| <b>PX1-P18</b> | PE1Z0034      | 32             | 17   | 30 | 47 | M5 × 32          | PE1-CS5<br>PE1-C10  |
| <b>PX1-P30</b> | PE1Z0035      | 45             | 17   | 50 | 60 | M5 × 50          | PE1-CS10<br>PE1-C20 |

#### PX1-P4



#### PX1-P8 to P30



### ■ Output capacity

| Type   | Output                      |
|--|-----------------------------|
| PE1-YS08D, 08DB, 08Q, 08QB<br>PE1-CS08D, 08DB, 08Q, 08QB   | Current output*1 100mA max. |
| PE1-CS1R5D, 5DB, 5Q, 5QB<br>PE1-CS2D, 2DB, 2Q, 2QB<br>PE1-CS5D, 5DB, 5Q, 5QB<br>PE1-CS10D, 10DB, 10Q, 10QB<br>PE1-C2D, 2DB, 2Q, 2QB<br>PE1-C5D, 5DB, 5Q, 5QB<br>PE1-C10D, 10DB, 10Q, 10QB<br>PE1-C20D, 20DB, 20Q, 20QB | Current output*1 200mA max. |
| PE1-CS2S, 2SB, 5S, 5SB, 10S, 10SB<br>PE1-C5S, 5SB, 10S, 10SB, 20S, 20SB  | Current output 3 to 200mA   |
| PE1-CS2A, 2AB, 5A, 5AB, 10A, 10AB<br>PE1-C5A, 5AB, 10A, 10AB, 20A, 20AB  | Current output*2 5 to 200mA |

\*1 Transistor, open collector output

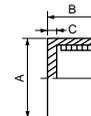
\*2 Refer to output capacity derating curve, see page 05/128

### ● Surface protection covers

| Type            | Ordering code | Dimensions, mm |    |     | Used with |
|-----------------|---------------|----------------|----|-----|-----------|
|                 |               | A              | B  | C   |           |
| <b>PX1-C12S</b> | PE1Z0030      | ∅15            | 5  | 0.6 | PE1-CS2   |
| <b>PX1-C18S</b> | PE1Z0031      | ∅22.5          | 8  | 1.1 | PE1-CS5   |
| <b>PX1-C30S</b> | PE1Z0032      | ∅35            | 12 | 1.6 | PE1-CS10  |

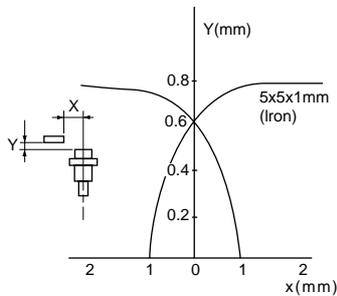


KK02-301A

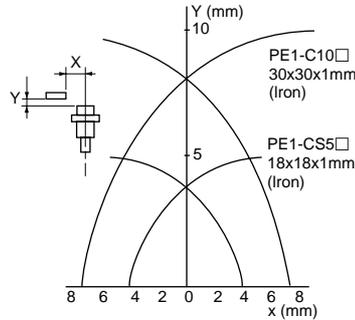


## ■ Response curve for iron (Typical)

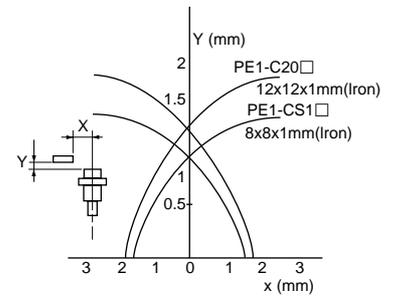
PE1-YS08  
PE1-CS08



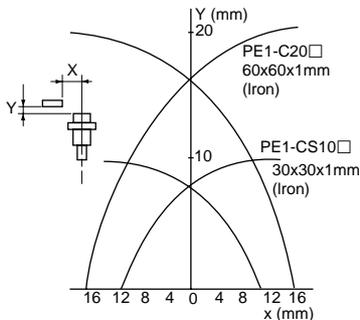
PE1-CS5□  
PE1-C10□



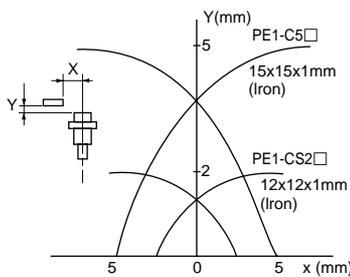
PE1-CS1R5  
PE1-C2□



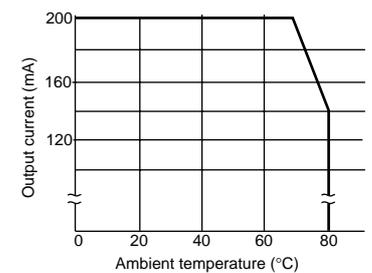
PE1-CS10□  
PE1-C20□



PE1-CS2□  
PE1-C5□

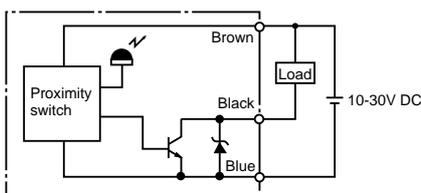


Output capacity derating  
PE1-C□A

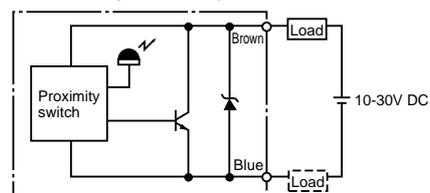


## ■ Wiring diagrams

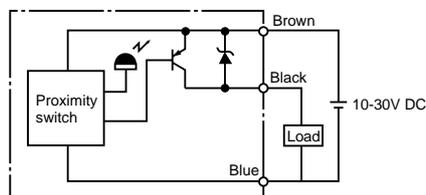
### ● DC supply/3-wire system, NPN transistor output



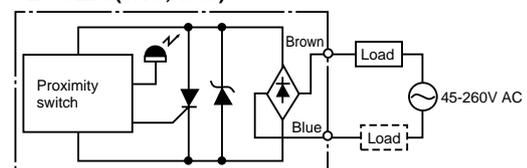
### ● DC supply/2-wire system PE1-C□S (1NO, 1NC)



### ● DC supply/3-wire system, PNP transistor output

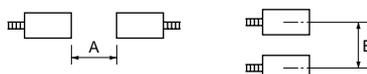


### ● AC supply/2-wire system PE1-C□A (1NO, 1NC)



## ■ Mutual interference

Be sure to space two switches at a distance greater than that shown in the table at right to prevent mutual interference.



| Type       | A (mm)    | B (mm)    |
|------------|-----------|-----------|
| PE1-YS08□  | 10        | 5         |
| PE1-CS08□  | 10        | 5         |
| PE1-CS1R5□ | 20        | 15        |
| PE1-CS2□   | 30 (15)   | 20 (12)   |
| PE1-CS5□   | 50 (25)   | 30 (18)   |
| PE1-CS10□  | 100 (50)  | 70 (35)   |
| PE1-C2□    | 30        | 30        |
| PE1-C5□    | 80 (40)   | 80 (40)   |
| PE1-C10□   | 200 (100) | 120 (60)  |
| PE1-C20□   | 300 (150) | 200 (100) |

Note: The values in parentheses are applicable when using two switches with oscillation frequencies different from each other.

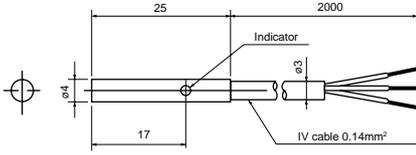
# Proximity Switches

## PE1-C, PE1-Y

### ■ Dimensions, mm

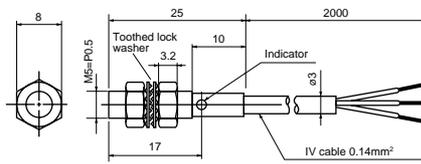
#### ● Shielded

##### PE1-YS08□



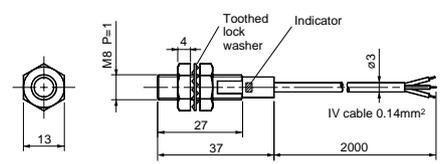
Mass: 30g

##### PE1-CS08□



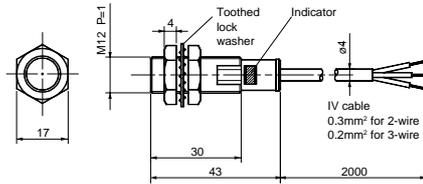
Mass: 30g

##### PE1-CS1R5□



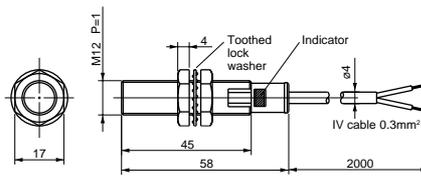
Mass: 40g

##### PE1-CS2□



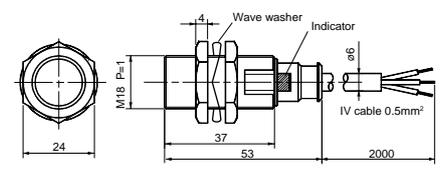
Mass: 70g

##### PE1-CS2A



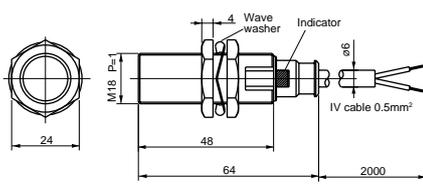
Mass: 100g

##### PE1-CS5□



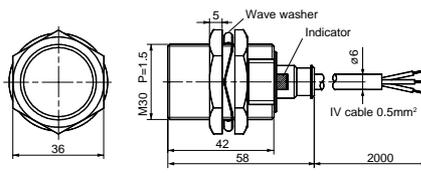
Mass: 160g

##### PE1-CS5A



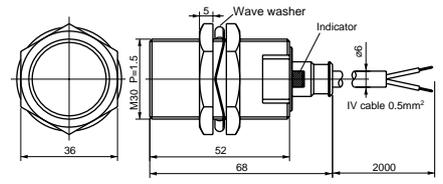
Mass: 170g

##### PE1-CS10□



Mass: 280g

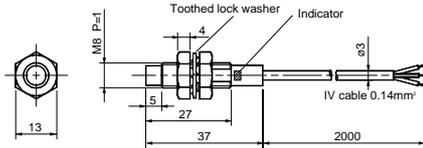
##### PE1-CS10A



Mass: 340g

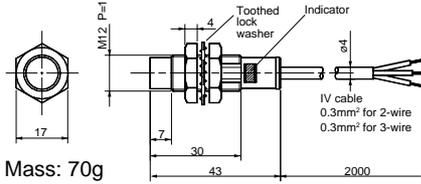
#### ● Non-shielded

##### PE1-C2□



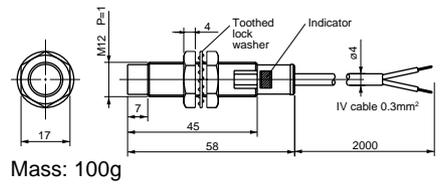
Mass: 40g

##### PE1-C5□



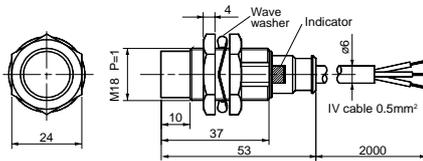
Mass: 70g

##### PE1-C5A



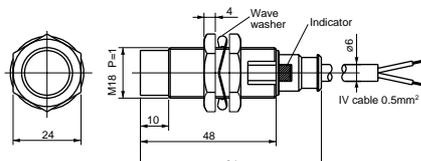
Mass: 100g

##### PE1-C10□



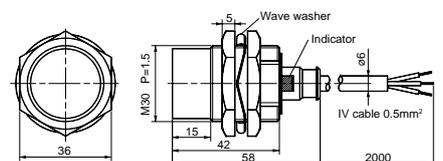
Mass: 160g

##### PE1-C10A



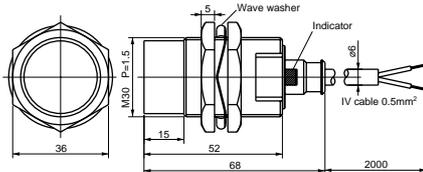
Mass: 170g

##### PE1-C20□



Mass: 280g

##### PE1-C20A



Mass: 340g

**Inductive proximity switches—  
Square type, PE-B**

Supply voltage:  
10-30V DC  
80-250V AC, 50/60Hz  
Operating distance: 4 to 50mm

**■ Features**

- Operating distance from 4mm to 50mm permits a variety of applications.
- LED's for operating indication lamp are provided for all types thus facilitating operation checks.

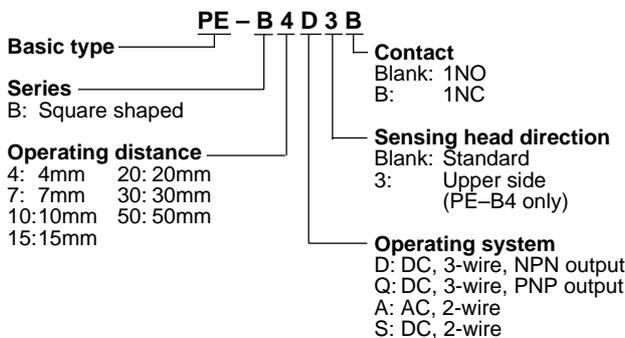
- Ones with an operating distance of over 20mm meet the requirements of the CENELEC Standards.
- Wide operating voltage range  
Operating range of supply voltage is from 80 to 250V AC or from 10 to 30V DC.
- Provided with built-in reverse polarity and surge voltage protection circuits.
- PNP output types are also available thus permitting application to machine tools in Europe.



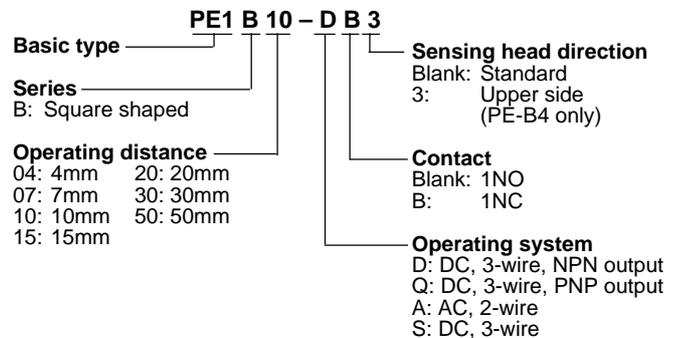
PE-B

SK-588

**■ Type number nomenclature**



**■ Ordering code**



05

**■ Versions**

| Operating system | Target size (mm) | Operating distance (mm) | Output * 1NO |               |          |               | Output * 1NC |               |          |               |
|------------------|------------------|-------------------------|--------------|---------------|----------|---------------|--------------|---------------|----------|---------------|
|                  |                  |                         | Type         | Ordering code | Type     | Ordering code | Type         | Ordering code | Type     | Ordering code |
| DC supply 3-wire | 20 × 20 × 1      | 4                       | PE-B4D       | PE1B04-D      | PE-B4DB  | PE1B04-DB     | PE-B4Q       | PE1B04-Q      | PE-B4QB  | PE1B04-QB     |
|                  | 20 × 20 × 1      | 4                       | PE-B4D3      | PE1B04-D3     | PE-B4D3B | PE1B04-DB3    | PE-B4Q3      | PE1B04-Q3     | PE-B4QB3 | PE1B04-QB3    |
|                  | 30 × 30 × 1      | 7                       | PE-B7D       | PE1B07-D      | PE-B7DB  | PE1B07-DB     | PE-B7Q       | PE1B07-Q      | PE-B7QB  | PE1B07-QB     |
|                  | 40 × 40 × 1      | 10                      | PE-B10D      | PE1B10-D      | PE-B10DB | PE1B10-DB     | PE-B10Q      | PE1B10-Q      | PE-B10QB | PE1B10-QB     |
|                  | 50 × 50 × 1      | 15                      | PE-B15D      | PE1B15-D      | PE-B15DB | PE1B15-DB     | —            | —             | —        | —             |
|                  | 50 × 50 × 1      | 20                      | PE-B20D      | PE1B20-D      | PE-B20DB | PE1B20-DB     | PE-B20Q      | PE1B20-Q      | PE-B20QB | PE1B20-QB     |
|                  | 90 × 90 × 1      | 30                      | PE-B30D      | PE1B30-D      | PE-B30DB | PE1B30-DB     | PE-B30Q      | PE1B30-Q      | PE-B30QB | PE1B30-QB     |
|                  | 150 × 150 × 1    | 50                      | PE-B50D      | PE1B50-D      | PE-B50DB | PE1B50-DB     | PE-B50Q      | PE1B50-Q      | PE-B50QB | PE1B50-QB     |
| AC supply 2-wire | 30 × 30 × 1      | 7                       | PE-B7A       | PE1B07-A      | —        | —             | —            | —             | —        | —             |
|                  | 40 × 40 × 1      | 10                      | PE-B10A      | PE1B10-A      | —        | —             | —            | —             | —        | —             |
|                  | 50 × 50 × 1      | 20                      | PE-B20A      | PE1B20-A      | —        | —             | —            | —             | —        | —             |
|                  | 90 × 90 × 1      | 30                      | PE-B30A      | PE1B30-A      | PE-B30AB | PE1B30-AB     | —            | —             | —        | —             |
|                  | 150 × 150 × 1    | 50                      | PE-B50A      | PE1B50-A      | PE-B50AB | PE1B50-AB     | —            | —             | —        | —             |
| DC supply 2-wire | 20 × 20 × 1      | 4                       | PE-B4S       | PE1B04-S      | PE-B4SB  | PE1B04-SB     | —            | —             | —        | —             |
|                  | 30 × 30 × 1      | 7                       | PE-B7S       | PE1B07-S      | PE-B7SB  | PE1B07-SB     | —            | —             | —        | —             |
|                  | 40 × 40 × 1      | 10                      | PE-B10S      | PE1B10-S      | PE-B10SB | PE1B10-SB     | —            | —             | —        | —             |
|                  | 50 × 50 × 1      | 20                      | PE-B20S      | PE1B20-S      | PE-B20SB | PE1B20-SB     | —            | —             | —        | —             |
|                  | 90 × 90 × 1      | 30                      | PE-B30S      | PE1B30-S      | PE-B30SB | PE1B30-SB     | —            | —             | —        | —             |
|                  | 150 × 150 × 1    | 50                      | PE-B50S      | PE1B50-S      | PE-B50SB | PE1B50-SB     | —            | —             | —        | —             |

Notes: \*PE-B□D: NPN transistor, open collector output  
PE-B□Q: PNP transistor, open collector output  
PE-B□A: Thyristor output  
PE-B□S: Transistor output

**■ Ordering information**

Specify the following:

1. Type number or ordering code

# Proximity Switches

## PE-B

### Specifications

| Type                  | PE-B□D, PE-B□DB  | PE-B□Q, PE-B□QB                       | PE-B□S, PE-B□SB                    | PE-B□A, PE-B□AB                     |
|-----------------------|--|---------------------------------------|------------------------------------|-------------------------------------|
| Output                | NPN transistor, open collector output  | PNP transistor, open collector output | Transistor, output                 | Thyristor, output                   |
| Supply voltage        | 12/24V DC *1   |                                       | 12/24V DC *1                       | 120/240V AC *2                      |
| Output capacity       | Max. 200mA at 12/24V DC<br>(PE-B4D□, PE-B4Q□: Max. 50mA at 12/24V DC)                    |                                       | Max. 100mA                         | 10 to 200mA                         |
| Current consumption   | Max. 15mA at 24V DC  |                                       | 0.8mA or less<br>(Leakage current) | 2mA at 200V AC<br>(Leakage current) |
| Ambient temperature   | -25 to +75°C   |                                       | -25 to +75°C                       | -25 to +75°C                        |
| Dielectric strength   | 2000V AC, 1 min.   |                                       | 2000V AC, 1 min.                   | 2000V AC, 1 min.                    |
| Insulation resistance | Over 50MΩ (500V DC megger)   |                                       |                                    |                                     |
| Degree of protection  | IP67 (IEC)   |                                       |                                    |                                     |
| Response frequency    | See table below  |                                       |                                    |                                     |
| Vibration             | 10 to 55Hz, 1.5mm double amplitude (in X, Y and Z direction, respectively for two hours) |                                       |                                    |                                     |
| Shock                 | 500m/s <sup>2</sup>  |                                       |                                    |                                     |
| Circuit protection    | Short-circuit (except PE-B□A and PE-B□AB), reverse polarity, surge voltage               |                                       |                                    |                                     |

Notes: \*1 Operational voltage range: 10 to 30V DC \*2 Operational voltage range: 80 to 250V AC.

### Response frequency

#### DC supply

|                           |       |
|---------------------------|-------|
| PE-B7D, PE-B7Q, PE-B7S    | 300Hz |
| PE-B4D, PE-B4Q, PE-B4S    | 200Hz |
| PE-B10D, PE-B10Q, PE-B10S |       |

|                                    |       |
|------------------------------------|-------|
| PE-B15D, PE-B20D, PE-B20Q, PE-B20S | 100Hz |
| PE-B30D, PE-B30Q, PE-B30S          | 50Hz  |
| PE-B50D, PE-B50Q, PE-B50S          | 10Hz  |

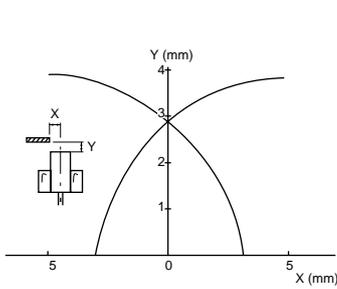
#### AC supply

|                          |      |
|--------------------------|------|
| PE-B7A, PE-B10A, PE-B20A | 20Hz |
| PE-B30A, PE-B50A         | 5Hz  |

### Response curve for iron (Typical)

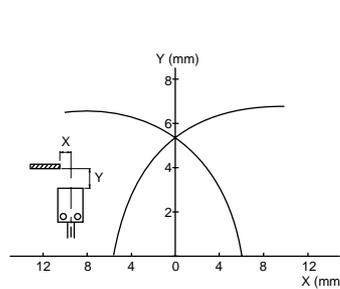
#### PE-B4□

Material: Iron  
20 × 20 × 1mm



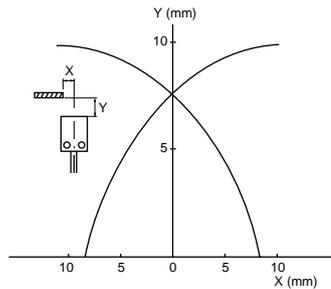
#### PE-B7□

Material: Iron  
30 × 30 × 1mm



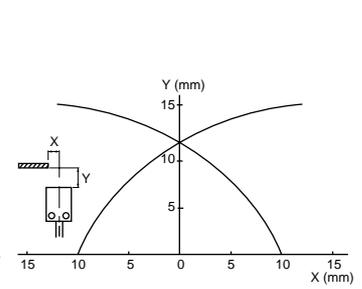
#### PE-B10□

Material: Iron  
40 × 40 × 1mm



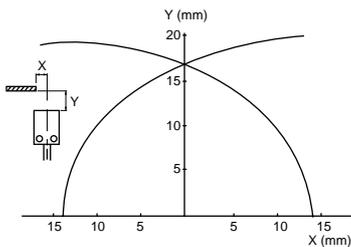
#### PE-B15□

Material: Iron  
50 × 50 × 1mm



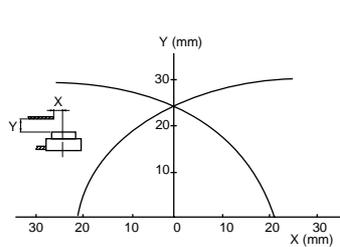
#### PE-B20□

Material: Iron  
50 × 50 × 1mm



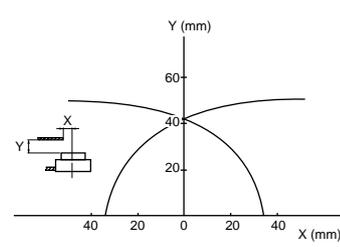
#### PE-B30□

Material: Iron  
90 × 90 × 1mm



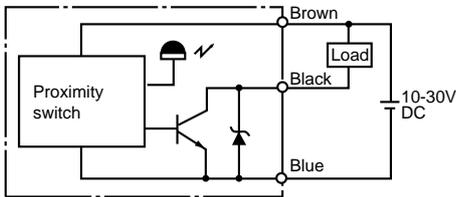
#### PE-B50□

Material: Iron  
150 × 150 × 1mm

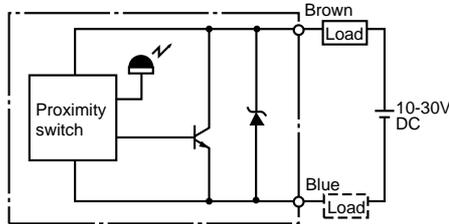


## ■ Wiring diagrams

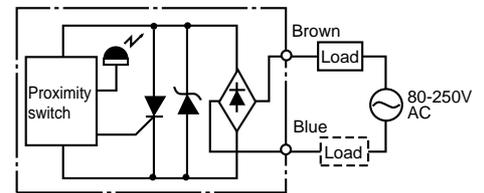
### ● DC supply/3-wire system PE-B□D



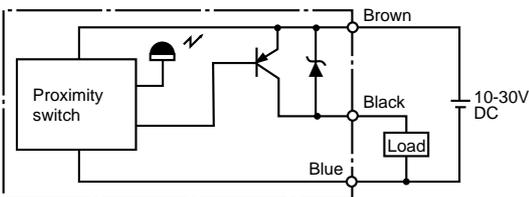
### ● DC supply/2-wire system PE-B□S



### ● AC supply/2-wire system PE-B□A

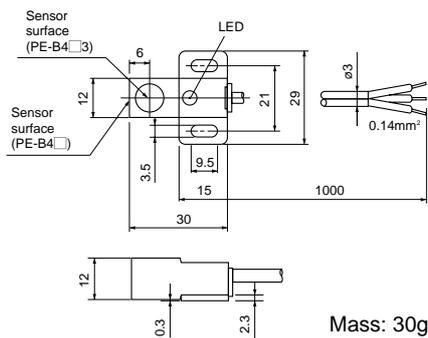


### PE-B□Q

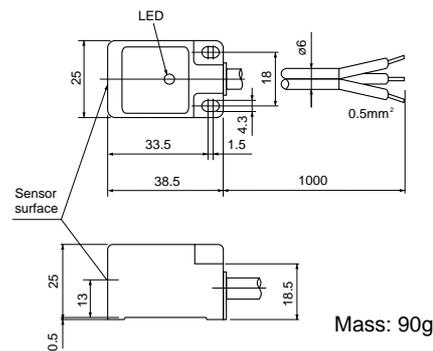


## ■ Dimensions, mm

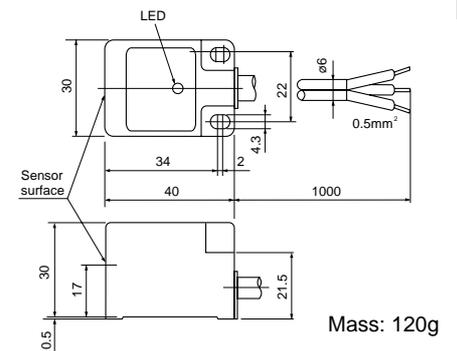
### PE-B4□, B4□3 PE-B4□B, B4□3B



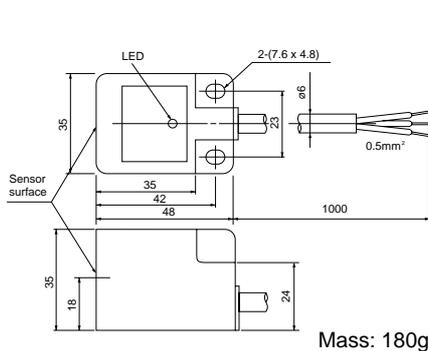
### PE-B7□, PE-B7□B



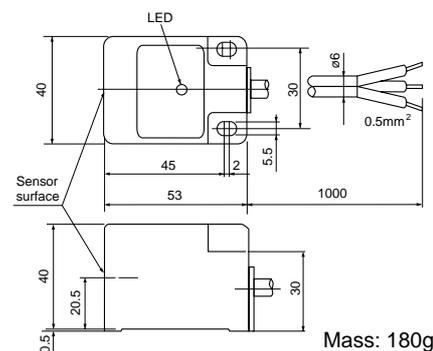
### PE-B10□, PE-B10□B



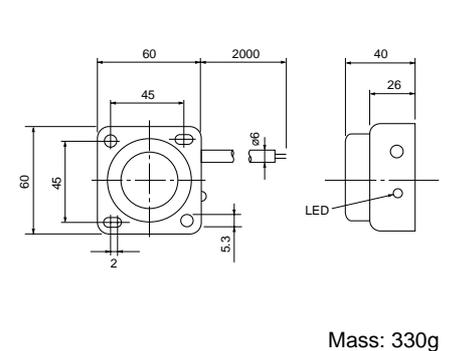
### PE-B15D, PE-B15DB



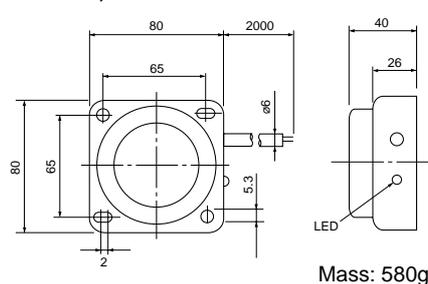
### PE-B20□, PE-B20□B



### PE-B30□, PE-B30□B

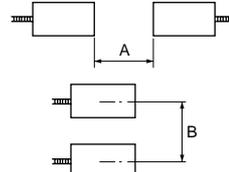


### PE-B50□, PE-B50□B



## ■ Mutual interference:

Be sure to space two switches at a distance greater than that shown in the table at right to prevent mutual interference.



| Type    | A (mm)    | B (mm)    |
|---------|-----------|-----------|
| PE-B4□  | 60 (30)   | 60 (30)   |
| BE-B7□  | 80 (40)   | 80 (40)   |
| PE-B10□ | 120 (60)  | 120 (60)  |
| PE-B15□ | 200 (100) | 120 (60)  |
| PE-B20□ | 200 (100) | 200 (100) |
| PE-B30□ | 300 (150) | 300 (150) |
| PE-B50□ | 500 (250) | 500 (250) |

Note: The values in parentheses are applicable when using two switches with oscillation frequencies different from each other.

# Proximity Switches

## PE-X15D

### Inductive proximity switches— Square flat type, PE-X15D

Operating system:  
DC supply/3-wire system  
Supply voltage range: 10 to 30V DC  
Operating distance: 15mm

#### ■ Features

- Degree of protection meets the requirements of IEC IP66, thus permitting operations in unfavorable environment.

- Only two screws are needed to affix each switch, eliminating the need for exclusive mounting brackets.
- Incorporates surge suppression circuits and protection circuits against reverse polarity and short-circuits.

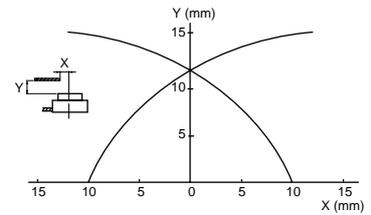


#### ■ Specifications

|  |  |
|--|--|
| Type (Ordering code)                     | <b>PE-X15D</b>   |
| Operating system                         | DC supply/3-wire   |
| Output                                   | NPN transistor, open collector, 1NO  |
| Operating distance                       | 15mm ±10%  |
| Target size (iron)                       | 50×50×1mm (iron)   |
| Differential distance                    | Max. ±10% of operating distance  |
| Rated voltage                            | 12/24V DC (10 to 30V DC)   |
| Switching capacity                       | 200mA max.   |
| Current consumption                      | 15mA max. at 24V DC  |
| Residual voltage                         | 1.5V max. at 24V DC, 200mA   |
| Response frequency                       | 100Hz  |
| Variation due to voltage fluctuation     | Max. ±1% of operating distance at 12/24V DC when operated within 10 to 30V DC    |
| Variation due to temperature fluctuation | Max. ±10% of operating distance at 20°C within temperature range of -25 to +70°C |
| Dielectric strength                      | 1000V AC, 1min.  |
| Insulation resistance                    | 50MΩ or more (500V DC)   |
| Degree of protection                     | IP66 (IEC)   |
| Ambient temperature                      | -25 to +70°C (avoid icing)   |
| Humidity                                 | 35 to 95% RH   |
| Vibration                                | 10–55Hz, 1.5mm double amplitude  |
| Shock                                    | 500m/s <sup>2</sup> (approx. 50G)  |

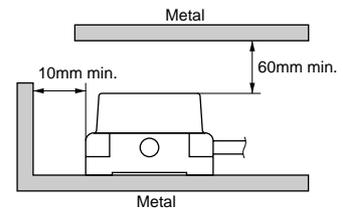
#### ■ Response curve for iron

Material: Iron  
50×50×1mm

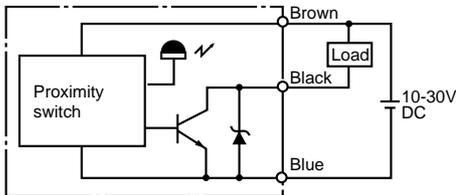


#### • Influence of surrounding metals:

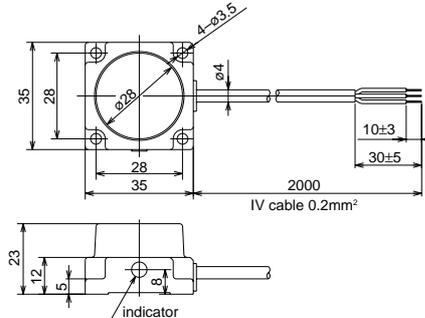
When mounting a proximity switch surrounded by metals, be sure to provide a minimum distance as shown below.



#### ■ Wiring diagrams



#### ■ Dimensions, mm



Mass: 80g

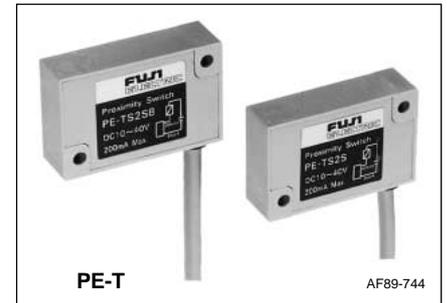
## Inductive proximity switches— Slim type, PE-T

Supply voltage: 12/24V DC  
120/240V AC  
Output capacity: Max. 200mA

### ■ Features

- Unusual “Magnetic Shield Method” permits to mount these units side by side, touching each other. (Shielded type PE-TS2)
- Only 12mm in thickness because of the use of IC.

- Wide operating voltage range  
Operating range of supply voltage is from 80 to 250V AC or from 10 to 30V DC.
- LED indicators are provided for all types thus facilitating operation checks.
- Provided with built-in reverse polarity and surge voltage protection circuits.
- Water and oil-tight  
Degree of protection meets the requirements of IEC IP67 thus permitting operations in unfavorable environment.



### ■ Ordering information

Specify the following:  
1. Type number or ordering code

### ■ Versions

| Description  | Operating system | Target size (mm) | Operating distance (mm) | Output 1NO Type                  | Ordering code        | 1NC Type                           | Ordering code          |
|--------------|------------------|------------------|-------------------------|----------------------------------|----------------------|------------------------------------|------------------------|
| Shielded     | DC supply/3-wire | 12 × 12 × 1      | 2                       | <b>PE-TS2D</b><br><b>PE-TS2Q</b> | PE1T02-D<br>PE1T02-Q | <b>PE-TS2DB</b><br><b>PE-TS2QB</b> | PE1T02-DB<br>PE1T02-QB |
|              | DC supply/2-wire | 12 × 12 × 1      | 2                       | <b>PE-TS2S</b>                   | PE1T02-S             | <b>PE-TS2SB</b>                    | PE1T02-SB              |
|              | AC supply/2-wire | 12 × 12 × 1      | 2                       | <b>PE-TS2A</b>                   | PE1T02-A             | —                                  | —                      |
| Non-shielded | DC supply/3-wire | 20 × 20 × 1      | 4                       | <b>PE-T4D</b><br><b>PE-T4Q</b>   | PE1N04-D<br>PE1N04-Q | <b>PE-T4DB</b><br><b>PE-T4QB</b>   | PE1N04-DB<br>PE1N04-QB |
|              | DC supply/2-wire | 20 × 20 × 1      | 4                       | <b>PE-T4S</b>                    | PE1N04-S             | <b>PE-T4SB</b>                     | PE1N04-SB              |
|              | AC supply/2-wire | 20 × 20 × 1      | 4                       | <b>PE-T4A</b>                    | PE1N04-A             | —                                  | —                      |

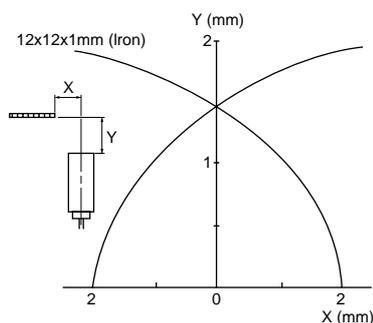
### ■ Specifications

| Type                  | PE-TS2D, PE-T4D                          | PE-TS2Q, PE-T4Q                          | PE-TS2S, PE-T4S                 | PE-TS2A, PE-T4A                          |
|-----------------------|--|--|---------------------------------|--|
| Output                | NPN transistor,<br>open collector output | PNP transistor,<br>open collector output | Transistor output               | Thyristor output                         |
| Supply voltage        | 12/24V DC*1                              |  | 120/240V AC*2                   |  |
| Output capacity       | Max. 200mA                               |  | 10 to 200mA                     |  |
| Current consumption   | Max. 15mA at 24V DC                      |  | Max. 0.8mA<br>(Leakage current) | Max. 2mA at 200V AC<br>(Leakage current) |
| Ambient temperature   | −25 to +70°C                             | −25 to +70°C                             | −25 to +70°C                    | −25 to +70°C                             |
| Dielectric strength   | 2000V AC, 1 min.                         | 2000V AC 1 min.                          | 2000V AC, 1 min.                | 2000V AC 1 min.                          |
| Insulation resistance | Over 50MΩ (500V DC)                      | Over 50MΩ at 500V DC                     | Over 50MΩ (at 500V DC)          | Over 50MΩ (at 500V DC)                   |
| Degree of protection  | IP67 (IEC)                               | IP67 (IEC)                               | IP67 (IEC)                      | IP67 (IEC)                               |
| Response frequency    | See table below                          |  |                                 |  |

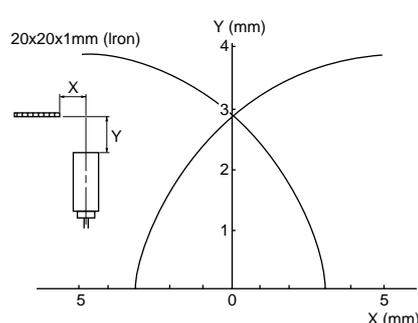
Notes: \*1 Operating voltage range: 10 to 30V DC \*2 Operating voltage range: 80 to 250V AC.

### ■ Response curve for iron

#### PE-TS2□



#### PE-T4□



### ■ Response frequency

#### DC supply types

|                  |       |
|------------------|-------|
| PE-TS2D, PE-TS2Q | 800Hz |
| PE-TS2S          |       |
| PE-T4D, PE-T4Q   | 250Hz |
| PE-T4S           |       |

#### AC supply types

|                 |      |
|-----------------|------|
| PE-TS2A, PE-T4A | 20Hz |
|-----------------|------|

# Proximity Switches

## PE-T

### ■ Type number nomenclature

PE - TS 2 - D B

#### Contact

Blank: 1NO  
B: 1NC

#### Operating system

D: DC, 3-wire, NPN output  
Q: DC, 3-wire, PNP output  
S: DC, 2-wire  
A: AC, 2-wire

#### Operating distance

2: 2mm  
4: 4mm

#### Series

TS: Shielded, slim type  
N: Non-shielded, slim type

#### Basic type

### ■ Ordering code

PE1 T 02 - D B

#### Contact

Blank: 1NO  
B: 1NC

#### Operating system

D: DC, 3-wire, NPN output  
Q: DC, 3-wire, PNP output  
S: DC, 2-wire  
A: AC, 2-wire

#### Operating distance

02: 2mm  
04: 4mm

#### Series

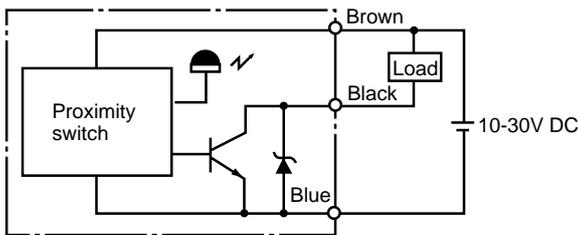
T: Shielded, slim type  
N: Non-shielded, slim type

#### Basic type

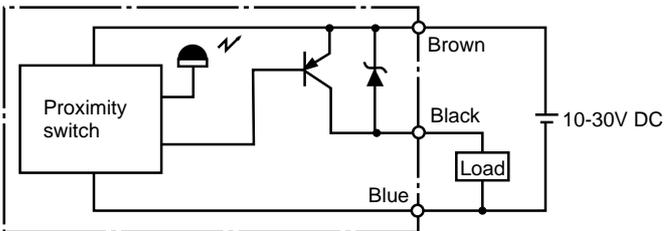
### ■ Wiring diagrams

#### ● DC supply/3-wire system

PE-T□D

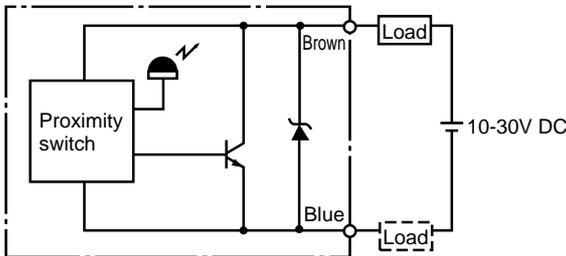


PE-T□Q



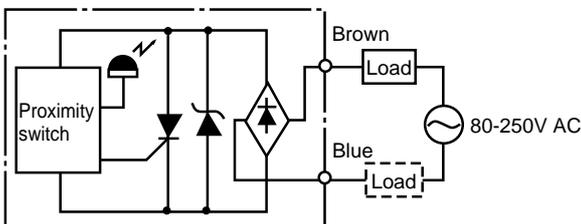
#### ● DC supply/2-wire system

PE-T□S

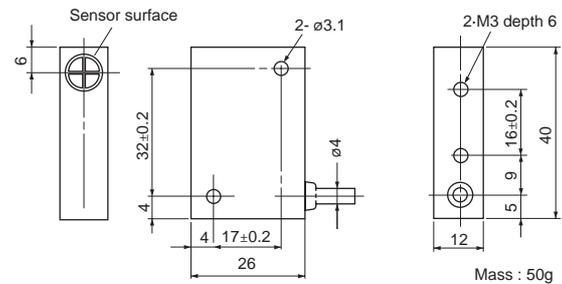


#### ● AC supply/2-wire system

PE-T□A

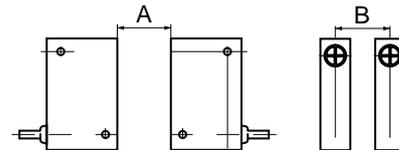


### ■ Dimensions, mm



### ■ Mutual interference:

Be sure to space two switches at a distance greater than that shown in the table below to prevent mutual interference.



| Type    | A (mm) | B (mm) |
|---------|--------|--------|
| PE-TS2□ | 24(12) | 24(12) |
| PE-T4□  | 60(30) | 60(30) |

Note: The values in parentheses are applicable when using two switches with oscillation frequencies different from each other.

## Inductive proximity switches- Analog output type, PE-L

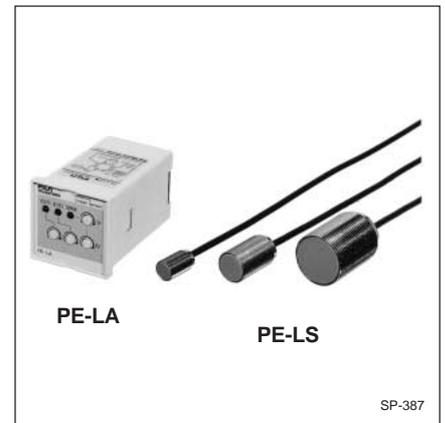
### ■ Description

These switches are ideally suited for deformation inspections, position controls of laser beam machines and similar displacement measurements and controls of a variety of machines.

### ■ Features

- Red LED indicator lamp
- Output voltage proportional to the distance from the object.

- The accuracy of linearity is  $\pm 1.5\%$  of full scale and the resolution accuracy  $\pm 0.05\%$  of full scale, thus permitting a highly accurate measurement and detection of minute displacement of distance.
- Provided with 2 switching output circuits so as to detect an arbitrary position within the detecting range by incorporating a built-in comparator circuit.
- Provided with a SPAN indicator lamp.



### ● Sensor

| External diameter | Type           | Ordering code |
|-------------------|----------------|---------------|
| M12               | <b>PE-LS2</b>  | PE1L02        |
| M18               | <b>PE-LS5</b>  | PE1L05        |
| M30               | <b>PE-LS10</b> | PE1L10        |

### ● Amplifier unit

| 12/24V DC Type  |               | 110V AC Type      |               | 220V AC Type      |               |
|-----------------|---------------|-------------------|---------------|-------------------|---------------|
| Type            | Ordering code | Type              | Ordering code | Type              | Ordering code |
| <b>PE-LA2D</b>  | PE1LA02-T     | <b>PE-LA2A/1</b>  | PE1LA02-H     | <b>PE-LA2A/2</b>  | PE1LA02-M     |
| <b>PE-LA5D</b>  | PE1LA05-T     | <b>PE-LA5A/1</b>  | PE1LA05-H     | <b>PE-LA5A/2</b>  | PE1LA05-M     |
| <b>PE-LA10D</b> | PE1LA10-T     | <b>PE-LA10A/1</b> | PE1LA10-H     | <b>PE-LA10A/2</b> | PE1LA10-M     |

### ■ Specifications

#### ● Sensor

| Type                                     | PE-LS2             | PE-LS5       | PE-LS10      |
|--|--------------------|--------------|--------------|
| Rated operating distance                 | 2mm                | 5mm          | 10mm         |
| Standard material of target              | Magnetic materials |              |              |
| Operating distance range                 | 0.4–2mm            | 1–5mm        | 2–10mm       |
| Standard target size (Iron) t: thickness | 12 x 12 x 1t       | 18 x 18 x 1t | 30 x 30 x 1t |
| Response frequency                       | 10kHz              | 5kHz         | 2kHz         |
| Ambient temperature                      | –25 to +70°C       |              |              |
| Degree of protection                     | IP67 (IEC)         |              |              |
| Mass (Includes a 3m prewired cable)      | 90g                | 120g         | 220g         |

#### ● Amplifier

| Description                     |  | DC supply  | AC supply  |
|---------------------------------|--|--|--|
| Supply voltage                  |  | 12/24V DC  | 110, 220V AC, 50/60 Hz*  |
| Power consumption               |  | 30mA max.  | 40mA max.  |
| Analog output characteristic    | Resolution Linearity                       | 0.05% of full scale<br>$\pm 1.5\%$ of full scale |  |
| Switching output characteristic | Differential                               | 1 to 5% of rated operating distance              |  |
| Adjustment function             | Analog output voltage adjustment           | 1 Volt adj.                                      | Adjustment for output voltage of 1 Volt at 20% of rated operating distance |
|                                 |  | 5 Volts adj.                                     | Adjustment for output voltage of 5 Volts at rated operating distance       |
|                                 | Switching output adjustment                | Output 1 adj.                                    | Adjustment for operating position of ON/OFF output                         |
| Output 2 adj.                   |  |  |  |
| Output                          | Analog output                              | 1 to 5 Volts                                     |  |
|                                 | Switching output                           | Output 1   | NPN transistor output 100mA max. (30V DC)                                  |
| Output 2                        |  |  |  |
| Indicator                       | SPAN indicator, Switching output indicator |  |  |
| Ambient temperature             | –10 to +55°C                               |  |  |
| Mass                            | 100g                                       | 180g   |  |
| Socket                          | TP28S, TP28X, ATX1NS (8-pin)               |  |  |

Note: \* Operating voltage range 100V: 85-121V AC  
200V: 170–242V AC

### ■ Application examples

#### Detecting of height and thickness of product

#### Position control for laser beam machine

#### Measuring of plate and welded joint thickness

#### Feed control for grinder wheel

### ■ Ordering information

Specify the following:  
1. Type number (ordering code)

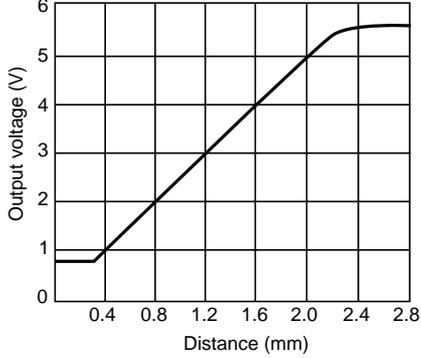
# Proximity Switches

## PE-L

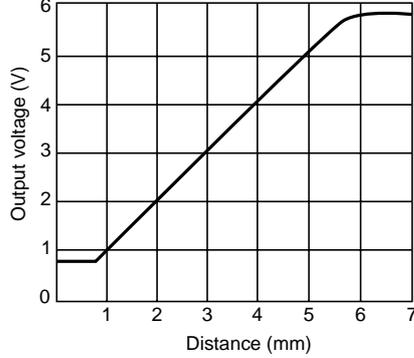
### Typical characteristic data

#### Distance-output voltage

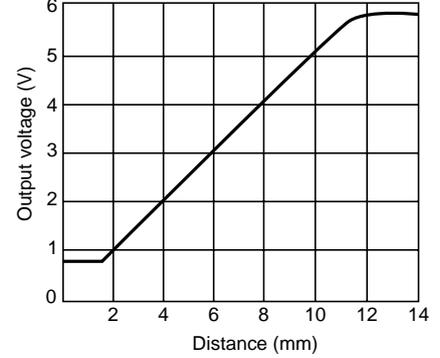
##### ● PE-LS2



##### ● PE-LS5

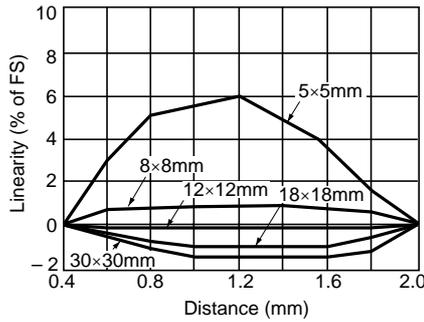


##### ● PE-LS10

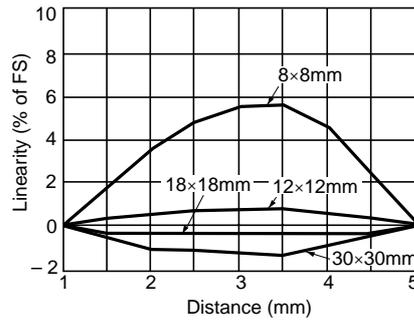


### Size of target-Linearity

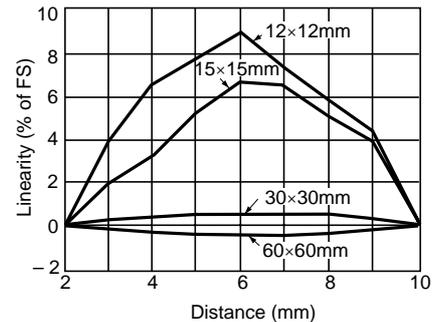
##### ● PE-LS2



##### ● PE-LS5

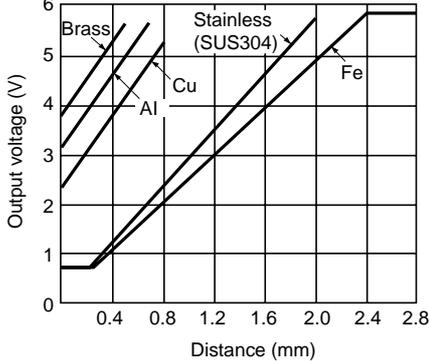


##### ● PE-LS10

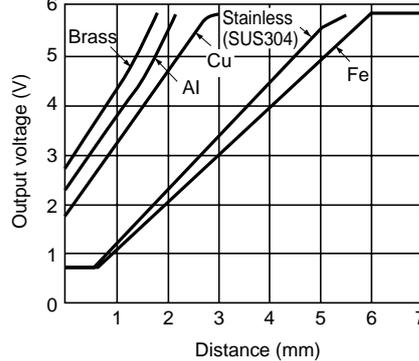


### Material of target-Output voltage

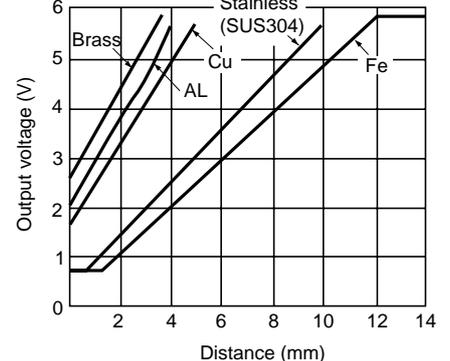
##### ● PE-LS2



##### ● PE-LS5

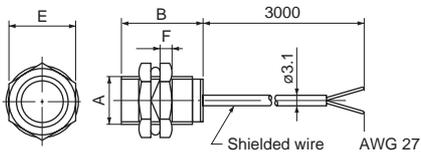


##### ● PE-LS10



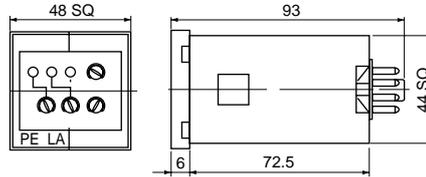
## ■ Dimensions, mm

### ● Sensor

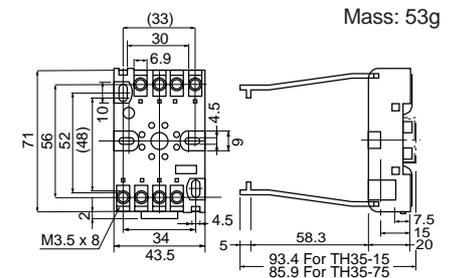


| Type    | A       | B  | E  | F |
|---------|---------|----|----|---|
| PE-LS2  | M12×1   | 20 | 17 | 4 |
| PE-LS5  | M18×1   | 30 | 24 | 4 |
| PE-LS10 | M30×1.5 | 40 | 36 | 5 |

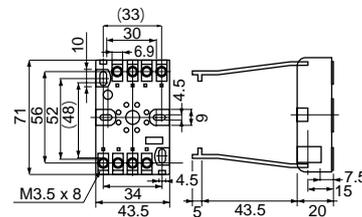
### ● Amplifier-unit



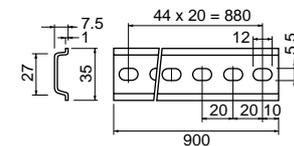
### ● Socket/Rail mounting TP28X



### ● Socket/Surface mounting TP28S

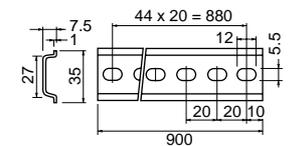


### ● Mounting rails TH35-7.5 (Steel)



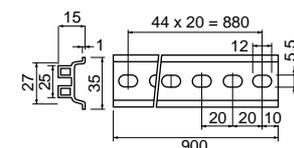
Mass: 290g

### TH35-7.5AL (Aluminum)



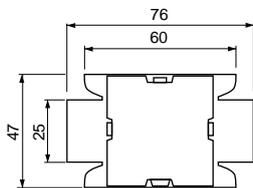
Mass: 140g

### TH35-15AL (Aluminum)

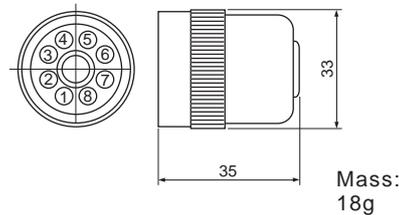


Mass: 220g

### ● Adaptor/Flush mounting

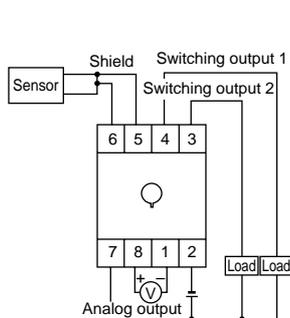


### ● Socket/Soldering terminal ATX1NS

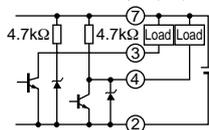


## ■ Wiring diagrams

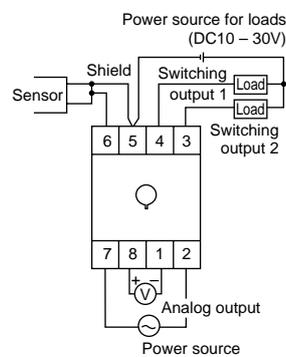
### ● DC



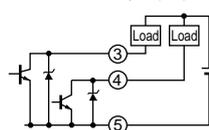
Internal circuit of output (DC)



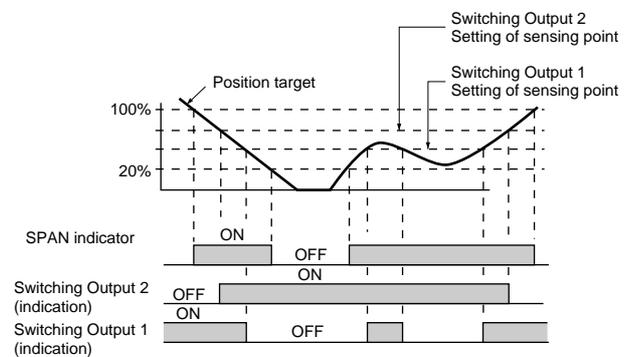
### ● AC



Internal circuit of output (AC)



## ■ Timing diagrams

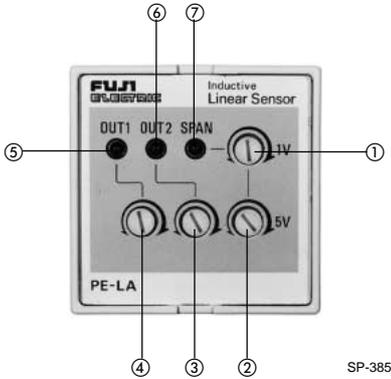


# Proximity Switches

## PE-L

### ■ Handling of the amplifier unit

#### ● Indicators and output adjusting dial PE-LA



#### ① 1V adjusting dial

Used to adjust the output voltage to 1V when the standard size target is positioned at a point 1/5th of the rated operating distance.

#### ② 5V adjusting dial

Used to adjust the output voltage 5V when the standard size target is positioned at the rated operating distance.

#### ③ Operating distance adjusting dial (For switching output 2)

#### ④ Operating distance adjusting dial (For switching output 1)

#### ⑤ Operating indicator (Red)

This lamp is used to indicate the operating state of output 1. (Lights up when the output is ON. Goes out when the output is OFF)

#### ⑥ Operating indicator (Red)

This lamp is used to indicate the operating state of output 2. (Lights up when the output is ON. Goes out when the output is OFF)

#### ⑦ SPAN indicator (Green)

Lights up when the linear output voltage is within the range from 1 to 5 Volts.

#### ● Adjustment of analog output

| Order               | 1                                     | 2  | 3   |
|---------------------|---------------------------------------|--|---|
| Position of target  | —                                     | 1/5th of rated operating distance<br>  | Rated operating distance<br>  |
| Adjusting dial      | —                                     | 1V   | 5V  |
| Method of adjusting | Connect voltmeter to terminal 1 and 8 | Position the standard size target to the position at a point 1/5th of the rated operating distance and turn the 1V adjusting dial clockwise slowly (to increase the output voltage) or counterclockwise so that the output voltage is 1V.          | Position the standard size target to the position at the rated operating distance and turn the 5V adjusting dial clockwise slowly (to increase the output voltage) or counterclockwise so that the output voltage is 5V.                          |
| Method I            |                                       |  |   |
| Method II           | —                                     | Position the standard size target at a point 1/5th of the rated operating distance and turn the 1V adjusting dial counterclockwise so that the SPAN indicator goes out, and then turn it clockwise slowly until the SPAN indicator lamp lights up. | Position the standard size target to the position at the rated operating distance and turn the 5V adjusting dial clockwise slowly so that the SPAN indicator goes out, and then turn it counterclockwise until the SPAN indicator lamp lights up. |

#### ● Adjustment of sensitivity

|                     |   |
|---------------------|---|
| Position of target  |   |
| Adjusting dial      |   |
| Method of adjusting | Position the standard size target in position and turn the detecting distance adjusting dial clockwise slowly until the operation indicator lights up. Move the standard size target so as to check that it operates at the specified position. |

## Inductive proximity switches— Cylindrical type, PE2-C

The lineup of PE2-C series proximity switches has been augmented by the addition DC 3-wire system switches with NPN and PNP transistor outputs and 2-wire system switches usable for both AC and DC applications.

These new switches are characterized by:

- A stable operating indicator composed of a two-color (red and green) LED that enables easy and reliable setting of detection range
- Smaller dimensions and longer detecting distance due to incorporation of new IC
- Four ways to configure DC 2-wire systems, DC 3-wire systems (which provide NPN and PNP transistor outputs) and two-wire systems usable for both AC and DC applications. This wide choice of configurations makes it possible to choose appropriate switch for the circuit.

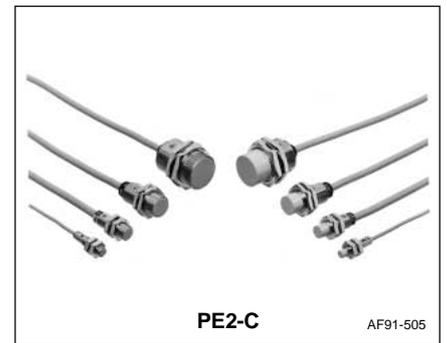
The DC 2-wire system

- Reduces wiring cost and labor
  - Can be connected to such high impedance load as small relays, PLC, and NC equipment without risk of reset failure due to leakage currents of not exceeding 0.8mA and a residual voltage of 3V.
  - Consumes very little current and places no burden on the power supply serving PLC.
- Make a power supply for the sensor unnecessary.

- Enables easy connection on site to load equipment having sink- and source-current input specifications.
- Has protective circuit to protect against short-circuit, reverse polarity, and surges.

The DC 3-wire system:

- Available in 16 types of units, shielded or unshielded, of varying diameter, and providing two types of output
- Also available with PNP output transistors for European machine tool applications.

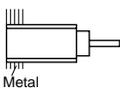
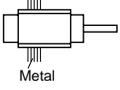


- Has the same external dimensions as the PE1 series which is not equipped with stable operating indicator.

The 2-wire system switch usable for both AC and DC applications:

- Can be operated from sources from 20 to 250V DC and 40 to 250V AC.
- Reduces wiring cost and labor.
- Is unpolarized, eliminating hazard of reverse polarity connection.

## ■ Specifications

| Description  | Operating system                        | Operating distance (mm) | Target size (mm) (iron) | External diameter | Response frequency (Hz) | Supply voltage                       | Output     | Type | Ordering code      |
|--|---|-------------------------|-------------------------|-------------------|-------------------------|--------------------------------------|------------|------|--------------------|
| <br>Metal | DC supply/2-wire, current output        | 2                       | 8×8×1                   | M8                | 1500                    | 12/24V DC                            | 3 to 100mA | 1NO  | PE2-CSN2S PE2S02-S |
|  |   | 3                       | 12×12×1                 | M12               | 1000                    |                                      |            |      | PE2-CS3S PE2S03-S  |
|  |   | 7                       | 18×18×1                 | M18               | 500                     |                                      |            |      | PE2-CS7S PE2S07-S  |
|  |   | 10                      | 30×30×1                 | M30               | 400                     |                                      |            |      | PE2-CS10S PE2S10-S |
|  | DC supply/3-wire, NPN transistor output | 2                       | 8×8×1                   | M8                | 1500                    | Operating voltage range 10 to 30V DC | 200mA max. | 1NO  | PE2-CS2D PE2S02-D  |
|  |   | 3                       | 12×12×1                 | M12               | 1000                    |                                      |            |      | PE2-CS3D PE2S03-D  |
|  |   | 7                       | 18×18×1                 | M18               | 500                     |                                      |            |      | PE2-CS7D PE2S07-D  |
|  |   | 10                      | 30×30×1                 | M30               | 400                     |                                      |            |      | PE2-CS10D PE2S10-D |
|  | DC supply/3-wire, PNP transistor output | 2                       | 8×8×1                   | M8                | 1500                    | Operating voltage range 10 to 30V DC | 200mA max. | 1NO  | PE2-CS2Q PE2S02-Q  |
|  |   | 3                       | 12×12×1                 | M12               | 1000                    |                                      |            |      | PE2-CS3Q PE2S03-Q  |
|  |   | 7                       | 18×18×1                 | M18               | 500                     |                                      |            |      | PE2-CS7Q PE2S07-Q  |
|  |   | 10                      | 30×30×1                 | M30               | 400                     |                                      |            |      | PE2-CS10Q PE2S10-Q |
| AC/DC supply/2-wire, thyristor output  | 3                                       | 7                       | 12×12×1                 | M12               | 1000 (DC) 25 (AC)       | 24/48/100/200V DC<br>48/100/200V AC  | 5 to 100mA | 1NO  | PE2-CS3W PE2S03-W  |
|  |   | 7                       | 18×18×1                 | M18               | 500 (DC) 25 (AC)        |                                      |            |      | PE2-CS7W PE2S07-W  |
|  |   | 10                      | 30×30×1                 | M30               | 400 (DC) 25 (AC)        |                                      |            |      | PE2-CS10W PE2S10-W |
| <br>Metal | DC supply/2-wire, current output        | 4                       | 20×20×1                 | M8                | 1000                    | 12/24V DC                            | 3 to 100mA | 1NO  | PE2-C4S PE2C04-S   |
|  |   | 8                       | 30×30×1                 | M12               | 800                     |                                      |            |      | PE2-C8S PE2C08-S   |
|  |   | 14                      | 30×30×1                 | M18               | 400                     |                                      |            |      | PE2-C14S PE2C14-S  |
|  |   | 24                      | 60×60×1                 | M30               | 100                     |                                      |            |      | PE2-C24S PE2C20-S  |
|  | DC supply/3-wire, NPN transistor output | 4                       | 20×20×1                 | M8                | 1000                    | Operating voltage range 10 to 30V DC | 200mA max. | 1NO  | PE2-C4D PE2C04-D   |
|  |   | 8                       | 30×30×1                 | M12               | 800                     |                                      |            |      | PE2-C8D PE2C08-D   |
|  |   | 14                      | 30×30×1                 | M18               | 400                     |                                      |            |      | PE2-C14D PE2C14-D  |
|  |   | 24                      | 60×60×1                 | M30               | 100                     |                                      |            |      | PE2-C24D PE2C24-D  |
|  | DC supply/3-wire, PNP transistor output | 4                       | 20×20×1                 | M8                | 1000                    | Operating voltage range 10 to 30V DC | 200mA max. | 1NO  | PE2-C4Q PE2C04-Q   |
|  |   | 8                       | 30×30×1                 | M12               | 800                     |                                      |            |      | PE2-C8Q PE2C08-Q   |
|  |   | 14                      | 30×30×1                 | M18               | 400                     |                                      |            |      | PE2-C14Q PE2C14-Q  |
|  |   | 24                      | 60×60×1                 | M30               | 100                     |                                      |            |      | PE2-C24Q PE2C24-Q  |

# Proximity Switches

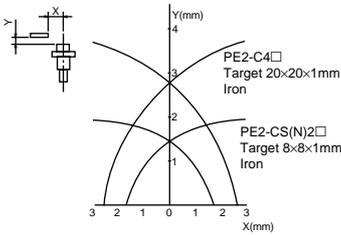
## PE2-C

### Specifications

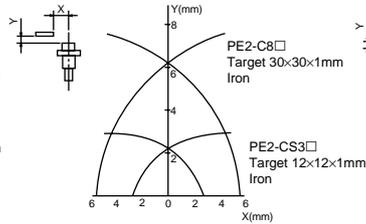
| Type                                     | PE2-C□S<br>(DC supply/2-wire)   | PE2-C□D<br>(DC supply/3-wire)               | PE2-C□Q                                     | PE2-C□W<br>(AC/DC supply/2-wire)                   |
|--|---|---|---|--|
| Output                                   | Transistor output   | NPN transistor,<br>open collector<br>output | PNP transistor,<br>open collector<br>output | Thyristor output                                   |
| Ambient temperature                      | -25 to 80°C (no icing)  |   |   |  |
| Differential distance                    | Max. ±10% of operating distance   |   |   |  |
| Variation due to temperature fluctuation | Max. ±10% of operating distance at 20°C within a temperature range of -25 to 70°C                 |   |   |  |
| Variation due to voltage fluctuation     | Max. ±2% of operating distance at rated voltage when operated within ±15% of power supply voltage |   |   |  |
| Current consumption                      | —   | 25mA max. (at 24V DC)                       | —   | —  |
| Leakage current                          | 0.8mA max. (at 24V DC)  | —   | —   | 0.8mA max. (at 24V DC),<br>1.3mA max. (at 240V AC) |
| Residual voltage                         | 3V max. (at 100mA)  | 1.5V max. (at 24V DC, 200mA)                | —   | 6V max. (DC), 10V max. (AC)                        |
| Dielectric strength                      | 1000V AC, 1 minute  |   |   |  |
| Insulation resistance                    | 50MΩ or more (500V DC megger)   |   |   |  |
| Degree of protection                     | IP67 (IEC Standards)  |   |   |  |
| Vibration                                | 10–55Hz, 1.5mm double amplitude (in X, Y, Z direction respectively for 2 hours)                   |   |   |  |
| Shock                                    | 500m/s <sup>2</sup>   |   |   |  |
| Circuit protection                       | Short-circuit, reverse polarity, surge voltage  |   |   | Surge voltage                                      |

### Response curve for iron (Typical)

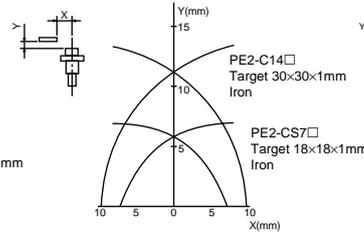
PE2-CS(N)2□  
PE2-C4□



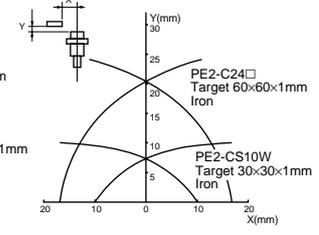
PE2-CS3□  
PE2-C8□



PE2-CS7□  
PE2-C14□

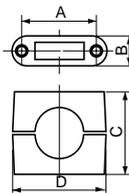


PE2-CS10W  
PE2-C24□

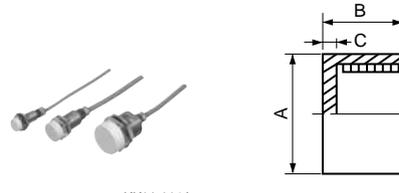


### Accessories (optional)

#### ● Mounting bracket



#### ● Sensor surface cover



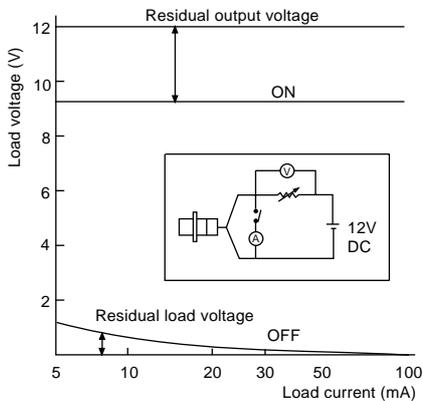
KK02-301A

| Type (Ordering code)         | A (mm) | B (mm) | C (mm) | D (mm) | Screw | Used with              |
|------------------------------|--------|--------|--------|--------|-------|------------------------|
| <b>PX1-P8</b><br>(PE1Z0037)  | 18     | 10     | 18     | 28     | M4×20 | PE2-CS(N)2□<br>PE2-C4□ |
| <b>PX1-P12</b><br>(PE1Z0033) | 24     | 12.5   | 20     | 37     | M4×25 | PE2-CS3□<br>PE2-C8□    |
| <b>PX1-P18</b><br>(PE1Z0034) | 32     | 17     | 30     | 47     | M5×32 | PE2-CS7□<br>PE2-C14□   |
| <b>PX1-P30</b><br>(PE1Z0035) | 45     | 17     | 50     | 60     | M5×50 | PE2-CS10W<br>PE2-C24□  |

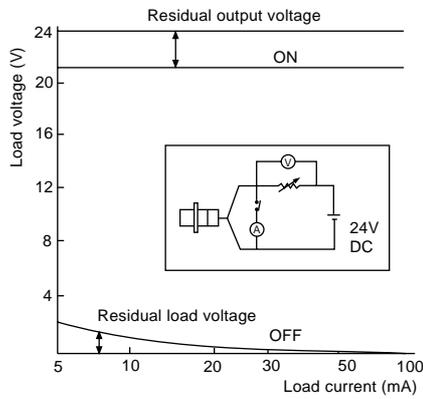
| Type (Ordering code)          | A (mm) | B (mm) | C (mm) | Used with |
|-------------------------------|--------|--------|--------|-----------|
| <b>PX1-C12S</b><br>(PE1Z0030) | φ15    | 5      | 0.6    | PE2-CS3□  |
| <b>PX1-C18S</b><br>(PE1Z0031) | φ22.5  | 8      | 1.1    | PE2-CS7□  |
| <b>PX1-C30S</b><br>(PE1Z0032) | φ35    | 12     | 1.6    | PE2-CS10W |

## ■ Residual voltage characteristics

PE2-CS□S, C□S, 12V DC

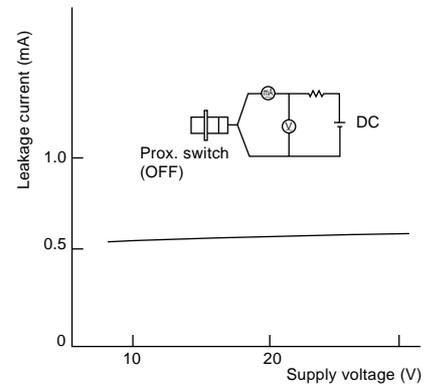


PE2-CS□S, C□S, 24V DC

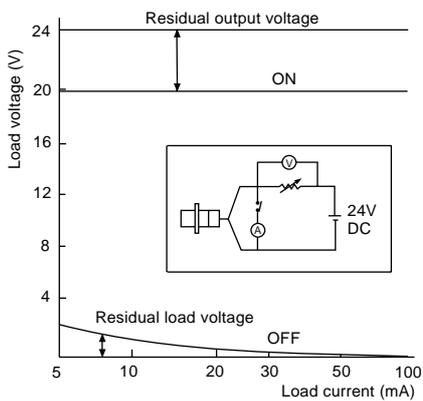


## ■ Leakage current characteristics

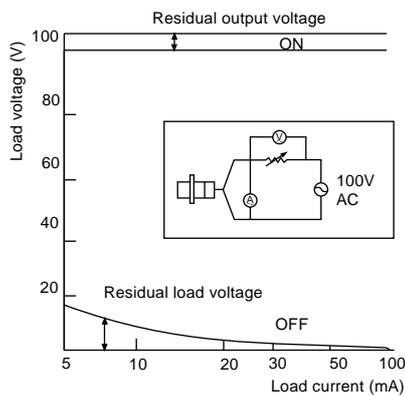
PE2-CS□S, C□S



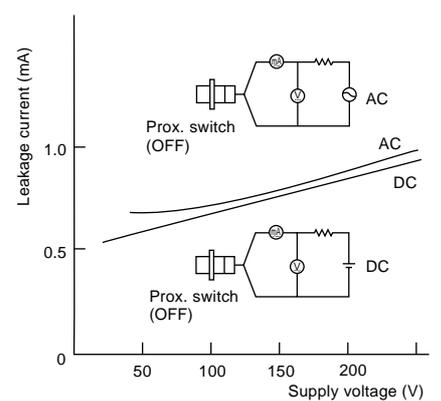
PE2-CS□W, 24V DC



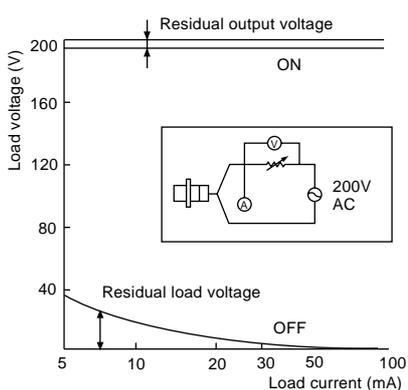
PE2-CS□W, 100V AC



PE2-CS□W



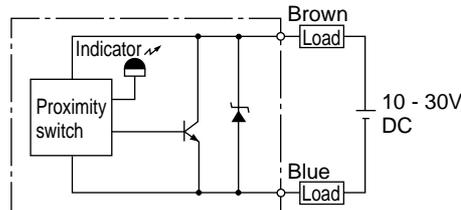
PE2-CS□W, 200V AC



## ■ Wiring diagrams

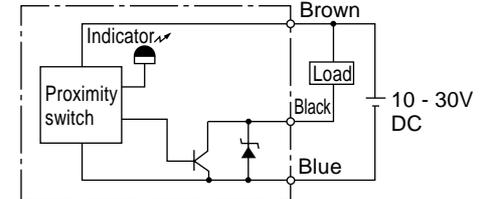
### ● DC supply/2-wire system

PE-C□S



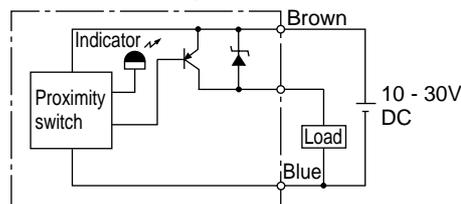
### ● DC supply/3-wire system

PE2-C□N NPN output



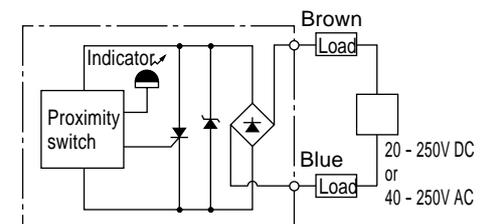
### ● DC supply/3-wire system

PE2-C□P PNP output



### ● AC/DC supply/2-wire system

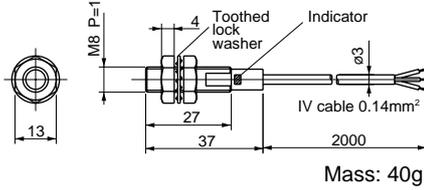
PE2-C□W



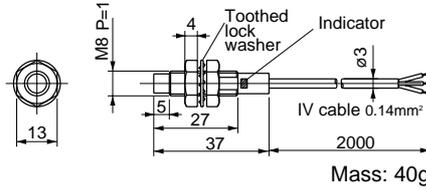
# Proximity Switches PE2-C

## ■ Dimensions, mm

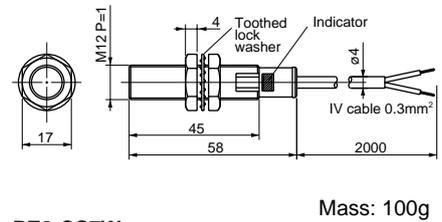
### PE2-CSN2S, PE2-CS2□



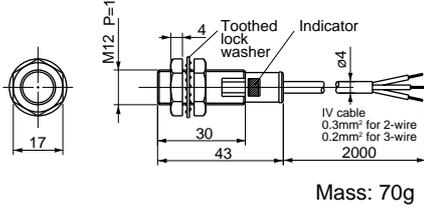
### PE2-C4□



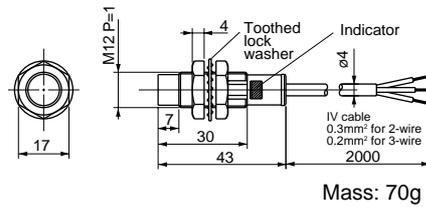
### PE2-CS3W



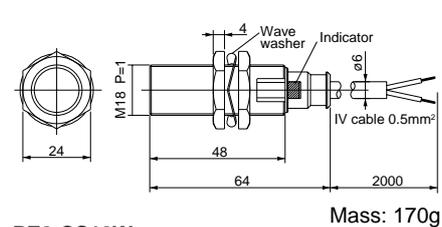
### PE2-CS3□



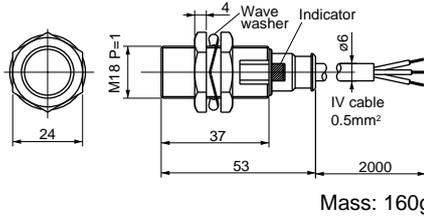
### PE2-C8□



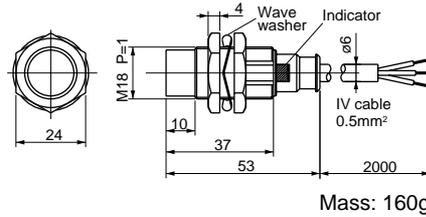
### PE2-CS7W



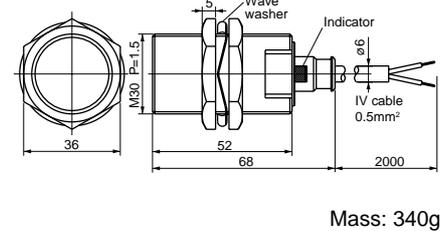
### PE2-CS7□



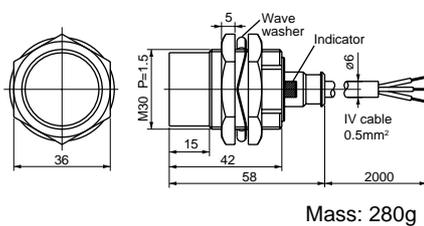
### PE2-C14□



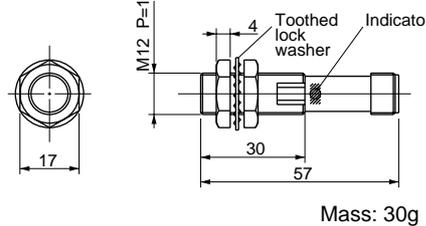
### PE2-CS10W



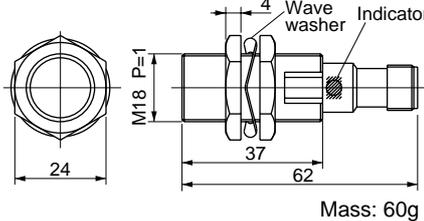
### PE2-C24□



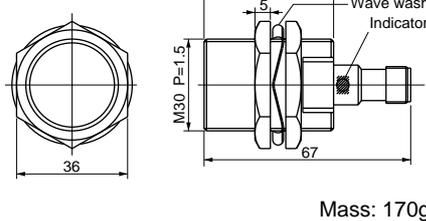
### PE2-CS3S



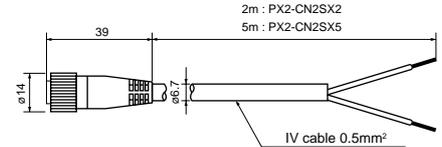
### PE2-CS7S



### PE2-CS10S



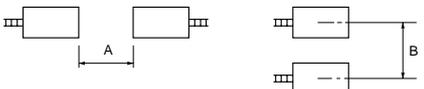
### Plug for connector



Note: A mark band is attached when the oscillation frequency differs from that of standard products.

## ■ Mutual interference:

Be sure to space two switches at a distance greater than that shown in the table at right to prevent mutual interference.



| Type        | A (mm)    | B (mm)    |
|-------------|-----------|-----------|
| PE2-CS(N)2□ | 20        | 15        |
| PE2-CS3□    | 30 (15)   | 20 (12)   |
| PE2-CS7□    | 50 (25)   | 35 (18)   |
| PE2-CS10W   | 100 (50)  | 70 (35)   |
| PE2-C4□     | 80        | 60        |
| PE2-C8□     | 120 (60)  | 80 (40)   |
| PE2-C14□    | 200 (100) | 120 (60)  |
| PE2-C24□    | 350 (175) | 250 (125) |

Note: The values in parentheses are applicable when using two switches with oscillation frequencies different from each other.

## ■ Ordering information

Specify the following:

1. Type number or ordering code

## Inductive proximity switches—Flat type, PE-X3D

Easy-to-mount thin inductive type proximity switches

Operating system:  
DC supply/3-wire system  
Operating distance: 3mm

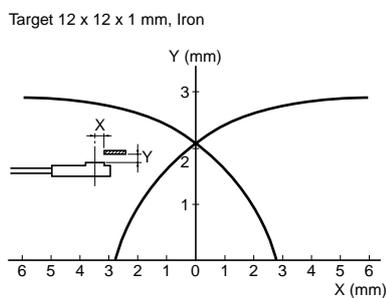
### ■ Features

- A mere 7mm height
- Only two screws are needed to affix each switch, eliminating the need for exclusive mounting brackets
- Incorporates a stable operating level indicator
- Equipped with surge suppression circuits and protection circuits against reverse polarity

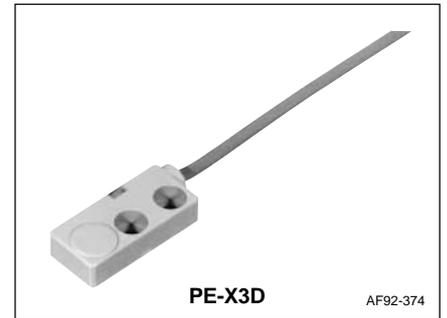
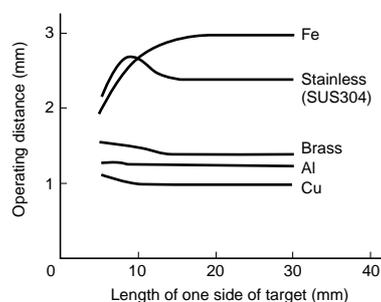
### ■ Specifications

|  |  |
|--|--|
| Type (Ordering code)                     | PE-X3D (PE1X03-D)  |
| Operating system                         | DC supply/3-wire   |
| Output                                   | NPN transistor, current output, 1NO  |
| Operating distance                       | 3mm ±10%   |
| Target size                              | 12 × 12 × 1mm (iron)   |
| Differential distance                    | Max. ±10% of operating distance  |
| Power supply voltage                     | 12/24V DC  |
| Operating voltage range                  | 10 to 30V DC   |
| Current consumption                      | 15mA max. at 24V DC  |
| Switching capacity                       | 100mA max.   |
| Residual voltage                         | 1.5V max. at 24V DC 100mA  |
| Response frequency                       | 50Hz or more   |
| Ambient temperature                      | −25 to +70°C (no icing)  |
| Humidity                                 | 35 to 95% RH   |
| Circuit protection                       | Surge voltage, reverse polarity  |
| Variation due to temperature fluctuation | Max. ±10% of operating distance at 20°C within temperature range of −25 to +70°C                     |
| Variation due to voltage fluctuation     | Max. ±1% of operating distance at 12/24V DC when operated within 85% to 115% of power supply voltage |
| Dielectric strength                      | 1000V AC, 1 min.   |
| Insulation resistance                    | 50MΩ (500V DC)   |
| Degree of protection                     | IP66 (IEC Standard)  |
| Vibration                                | 10–55Hz, 1.5mm double amplitude  |
| Shock                                    | 500m/s <sup>2</sup>  |

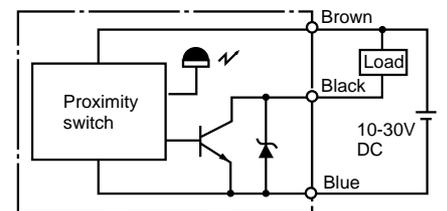
### ■ Response curve for iron



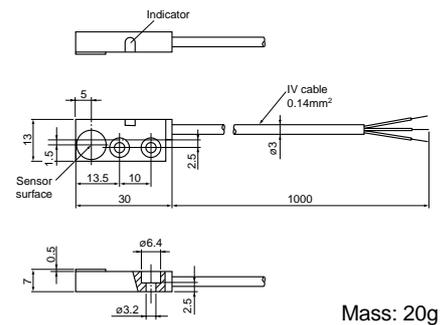
### ■ Material of target—Operating distance



### ■ Wiring diagram

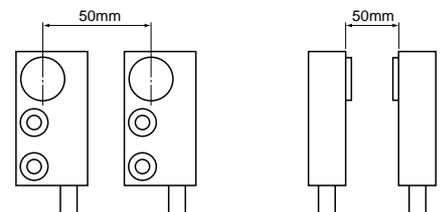


### ■ Dimensions, mm



### ■ Mutual interference

Be sure to space two switches at a distance greater than that shown in the figure below to prevent mutual interference.



### ■ Ordering information

Specify the following:  
1. Type number or ordering code

# Proximity Switches

## PE-G4D

### Inductive proximity switches— Square type, PE-G4D

Operating system:  
DC supply/3-wire system  
Supply voltage range: 10 to 30V DC  
Operating distance: 4mm

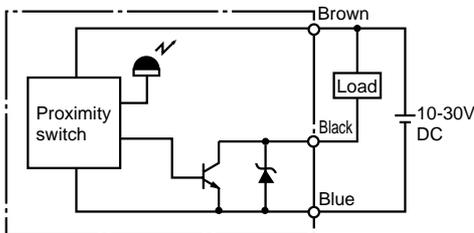
### ■ Features

- Degree of protection meets the requirements of IEC IP67, thus permitting operations in unfavorable environment.
- Only two screws are needed to affix each switch, eliminating the need for exclusive mounting brackets.
- Incorporates surge suppression circuits and protection circuits against reverse polarity and short-circuits.

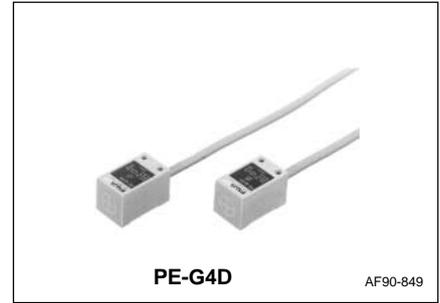
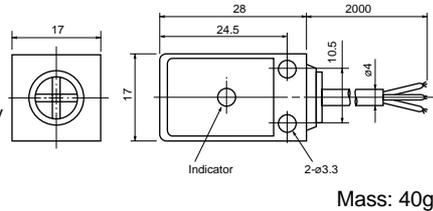
### ■ Specifications

| Type (Ordering code)                     | PE-G4D (PE1G04-D)  |
|--|--|
| Operating system                         | DC supply/3-wire   |
| Output                                   | 1NO  |
| Operating distance                       | 4mm ±10%   |
| Target size (iron)                       | 20×20×1mm  |
| Differential distance                    | Max. ±10% of operating distance  |
| Rated voltage                            | 12/24V DC (10 to 30V DC)   |
| Switching capacity                       | 50mA max.  |
| Current consumption                      | 15mA max. at 24V DC  |
| Residual voltage                         | 1.5V max. at 50mA  |
| Response frequency                       | 200Hz  |
| Variation due to voltage fluctuation     | Max. ±1% of operating distance at 12/24V DC when operated within 10 to 30V DC    |
| Variation due to temperature fluctuation | Max. ±10% of operating distance at 20°C within temperature range of -25 to +70°C |
| Dielectric strength                      | 2000V AC, 1min.  |
| Insulation resistance                    | 50MΩ or more (500V DC)   |
| Degree of protection                     | IP67 (IEC)   |
| Ambient temperature                      | -25 to +70°C (no icing)  |
| Humidity                                 | 35 to 95% RH   |
| Vibration                                | 10–55Hz, 1.5mm double amplitude  |
| Shock                                    | 500m/s <sup>2</sup>  |

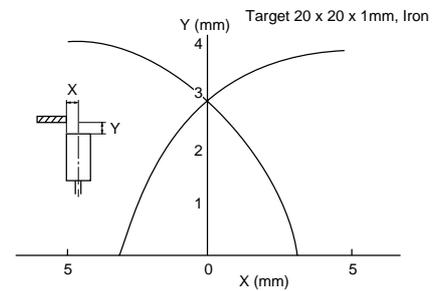
### ■ Wiring diagrams



### ■ Dimensions, mm

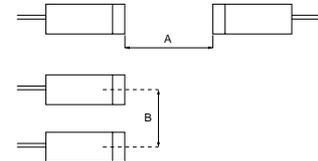


### ■ Response curve for iron



### ■ Mutual interference

Be sure to space two switches at a distance greater than that shown in the figure below to prevent mutual interference.



| Type   | A (mm) | B (mm) |
|--------|--------|--------|
| PE-G4D | 60     | 60     |

### ■ Ordering information

Specify the following:  
1. Type number or ordering code

### Magnetically operated reed switches, PM Standard type

Operating distance: Maximum 35, 70, 120mm  
 Reed switch: 1NO, 2 Amps

#### ■ Features

- Power source not required
- Comprises sensing magnetic element and reed switch
- Resin molded construction
- Water- and dust-tight, shock-resistant
- Breaking capacity: 0.5Amps at 220V AC
- Operating distance is longer than oscillating type.
- Economically priced
- 1 meter color-coded lead wires

#### ■ Ordering information

Specify the following:

1. Type number or ordering code (Specify reed switch and magnet separately.)



#### ■ Specifications

##### Magnet (standard type)

| Type                | PM-2M         | PM-4M         | PM-10M        |
|---------------------|---------------|---------------|---------------|
| Operating distance  | 25 – 40mm     | 50 – 70mm     | 80 – 120mm    |
| Differential        | 5 – 15mm      | 5 – 20mm      | 15 – 40mm     |
| Ambient temperature | -10° to +65°C | -10° to +65°C | -10° to +65°C |

##### Magnet (High temperature using type)

| Type                | PM-2MH         | PM-4MH         | PM-10MH        |
|---------------------|----------------|----------------|----------------|
| Operating distance  | 25 – 40mm      | 40 – 70mm      | 100 – 140mm    |
| Differential        | 5 – 15mm       | 5 – 20mm       | 15 – 40mm      |
| Ambient temperature | -20° to +130°C | -20° to +130°C | -20° to +130°C |

#### PM2S, PM-2SH read switches

Rated operating voltage: 220V AC, DC (Max.)

Rated operating current: 0.5A (Max.)

Make and break capacity: 50W DC, 50VA AC (Max.)

Mechanical: durability 100 million operations

Electrical: 2 million operations at 200V AC 0.125A  
 1.4 million operations at 100V AC 0.25A

Insulation resistance: Over 100MΩ at 500V DC

Dielectric strength: 700V AC rms. 1 minute (Contact to contact)

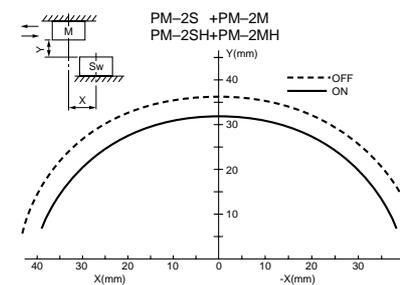
Ambient temperature: -10 to +65°C (For 130°C use is also available)  
 1 meter lead wires are normally provided.

#### ■ Response curves, typical

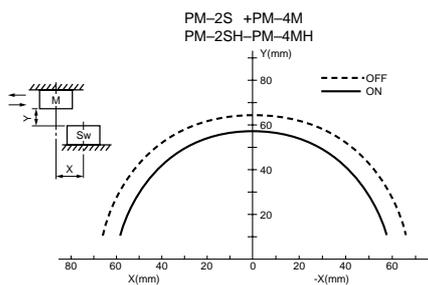
Short axis

M: Magnet

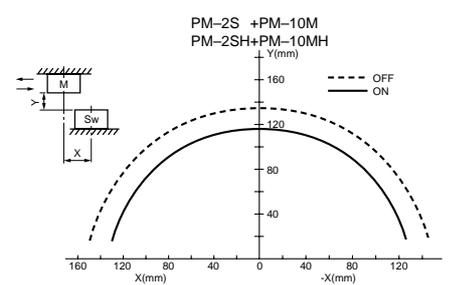
Sw: Reed switch



PM-2S



PM-2S

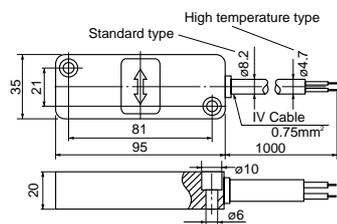


PM-2S

#### ■ Dimensions, mm

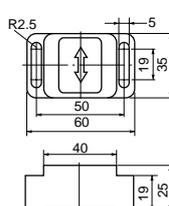
PM-2S Mass: 210g

PM-2SH



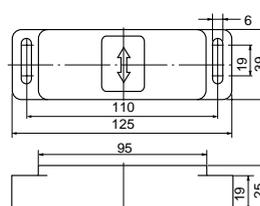
PM-2M Mass: 170g

PM-2MH



PM-4M Mass: 440g

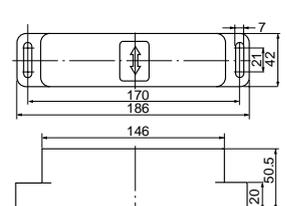
PM-4MH



PM-10M

PM-10MH

Mass: 1300g



- Notes:
- Reed switch and magnetic element are mounted on anti-magnetic material. The operating distance will be decreased when mounted on magnetized materials.
  - Both reed switch and magnetic element cannot be used in over 5-gauss magnetic fields.

# Proximity Switches

## Magnetically operated reed switches - slot type

### PM1U

#### Magnetically operated reed switches—Slot type PM1U

##### ■ Features

- Stable switch operation is ensured by inserting the object for detection 35mm into the switch slot. Ideal for detecting the position of a ferromagnetic-material plate passing in the switch slot.
- Magnetically operated switch using a sealed contact is never affected by electrical noise, ensuring highly reliable detection.
- The built-in permanent magnet enables switching of both AC and DC signals without using a power supply.
- Models with an output indicator are also available.
- Our advanced design assures superior environmental protection complying with IP67 (IEC).



##### ■ Ordering information

Specify the following:

1. Type number (ordering code)

##### ■ Specifications

| Operating slot width | Detecting distance* | Hysteresis  | Contact arrangement | Output indicator | Type (=Ordering code) | Measurement conditions for an operating position and hysteresis |
|----------------------|---------------------|-------------|---------------------|------------------|-----------------------|---|
| 25mm                 | +4 ±6mm             | 10mm (Max.) | 1NO (ON: Detected)  | Not provided     | <b>PM1U-25ALF</b>     |   |
|                      |                     |             |                     | Provided         | <b>PM1U-25ALF2</b>    |   |
|                      | -4 ±6mm             | 7mm (Max.)  | 1NC (OFF: Detected) | Not provided     | <b>PM1U25BLF</b>      |   |
|                      |                     |             |                     | Provided         | <b>PM1U-25BLF2</b>    |   |

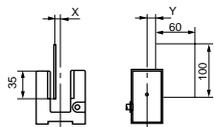
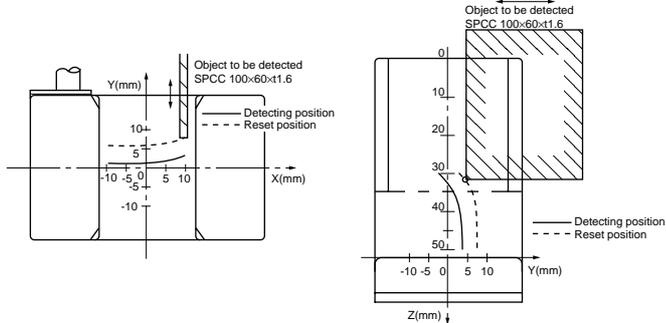
Note \*: The detecting distance and hysteresis are defined in the standard detecting conditions shown above.

| Type                          | <b>PM1U-25ALF</b>  | <b>PM1U-25ALF2</b> | <b>PM1U-25BLF</b> | <b>PM1U-25BLF2</b> |
|-------------------------------|--|--------------------|-------------------|--------------------|
| Output indicator              | Not provided   | Provided           | Not provided      | Provided           |
| Operating slot width          | 25mm   |                    |                   |                    |
| Object insertion length       | 35mm (Min.)  |                    |                   |                    |
| Rated operating voltage       | 220V AC, DC (Max.)   |                    |                   |                    |
| Rated operating current       | 0.2A (Max.)  |                    |                   |                    |
| Make and break current        | 0.2A (Max.)  |                    |                   |                    |
| OFF → ON response time        | 2ms (Max.)   |                    |                   |                    |
| ON → OFF response time        | 0.5ms (Max.)   |                    |                   |                    |
| Life expectancy (Mechanical)  | 1×10 <sup>7</sup> operations (Min.)  |                    |                   |                    |
| Life expectancy (Electrical)  | 2×10 <sup>6</sup> operations (Min.) Load: Miniature control relay HH54P 220V AC/7mA  |                    |                   |                    |
|                               | 3×10 <sup>6</sup> operations (Min.) Load: Miniature control relay HH54P 100V AC/14mA |                    |                   |                    |
|                               | 2×10 <sup>6</sup> operations (Min.) Load: Resistance (24V DC/0.2A)                   |                    |                   |                    |
|                               | 1×10 <sup>7</sup> operations (Min.) Load: Resistance (12V DC/0.2A)                   |                    |                   |                    |
| Ambient temperature           | -10 to +65°C   |                    |                   |                    |
| Humidity                      | 45 to 95%HR  |                    |                   |                    |
| Vibration resistance          | 10 to 55Hz, 1.5mm peak-to-peak amplitude, 2-hour for each of X, Y, and Z axes        |                    |                   |                    |
| Shock resistance              | 300m/s <sup>2</sup> , three-time for each of X, Y, and Z axis                        |                    |                   |                    |
| Output resistance at ON       | 6Ω (Max.)  | —                  | 6Ω (Max.)         | —                  |
| Switch residual voltage at ON | —  | 4V (Max.)          | —                 | 4V (Max.)          |
| Insulation resistance         | 100MΩ (Min.)   |                    |                   |                    |
| Degree of protection          | IP67 (IEC standard)  |                    |                   |                    |
| Maximum signal cable length   | 300m   |                    |                   |                    |

Note: The LED indicator becomes dark when the load current is 10mA or less. (Switches with an output indicator)  
1 meter lead wire is provided.

## Object detection area (Examples)

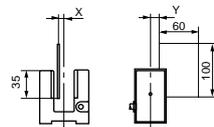
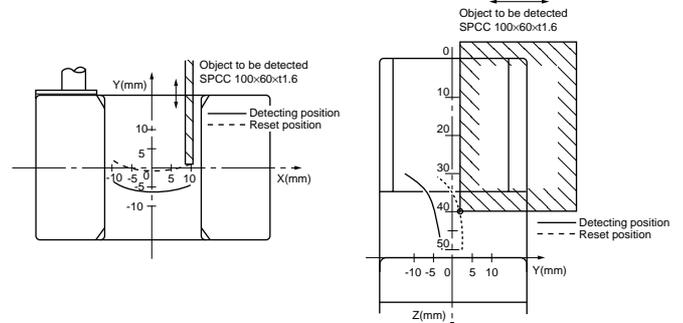
### PM1U-25A



Note: The X - Y characteristics are symmetrical to the X axis.

Note: The Y - Z characteristics are symmetrical to the Z axis.

### PM1U-25B

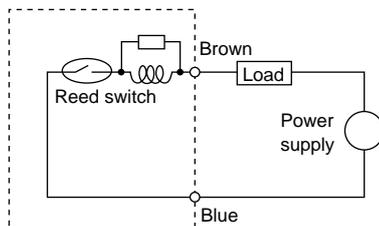


Note: The X - Y characteristics are symmetrical to the X axis.

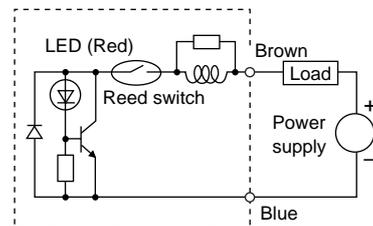
Note: The Y - Z characteristics are symmetrical to the Z axis.

## Wiring diagrams

### Switch with no output indicators



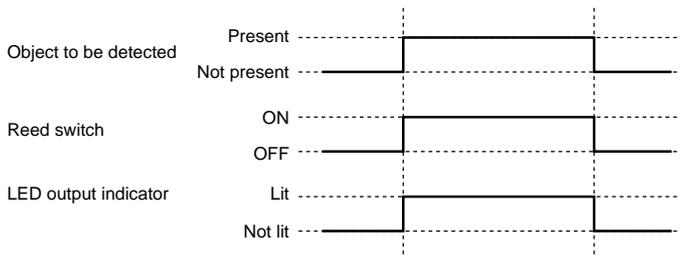
### Switch with an output indicator



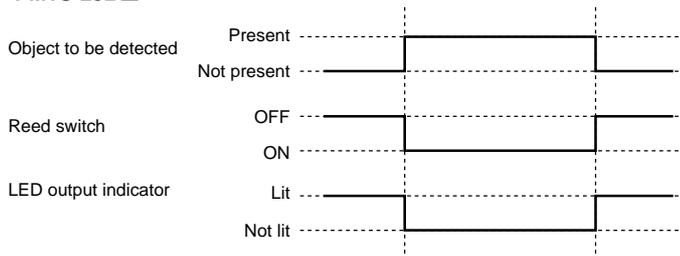
Note: When using a DC power supply, connect the brown terminal to (+) and blue terminal to (0V). Otherwise, the indicator will not go on.

## Operation chart

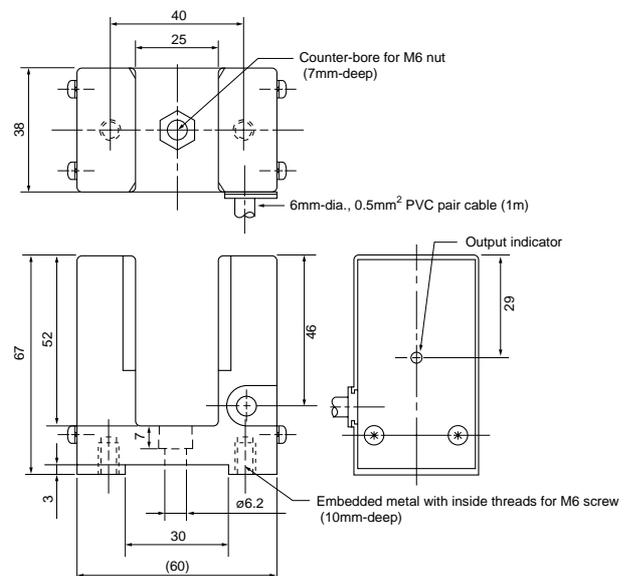
### PM1U-25A



### PM1U-25B



## Dimensions, mm



# Proximity Switches

## Magnetically operated reed switches

### AES

#### Magnetically operated reed switches

#### AES

##### Small size

Operating distance: Max. 20, 27mm

Reed switch: 1NO

Rated thermal current: 2.5A (AES402)  
2.5A (AES502)

##### Features

- Power source is not required.  
AES402 is small size, soldering terminal.
- AES502 is provided with lead wire.
- Epoxy resin molded, shock-resistant.
- Make and break capacity:
  - Max. 50VA, 50W (AES402)
  - Max. 50VA, 50W (AES502)
- Operating voltage:
  - Max. 220V AC, DC (AES402)
  - Max. 220V AC, DC (AES502)

##### Ordering information

Specify the following:

- Type number or ordering code



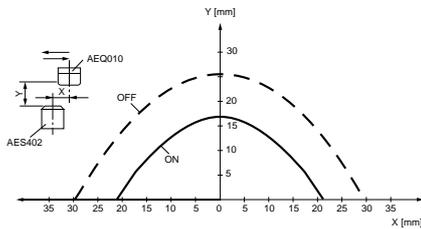
##### Specifications

| Type                  | Contact Magnet                              | AES402B-1A<br>AEQ010-1A                     | AES502L-3A<br>AEQ020-1T                     |
|-----------------------|---|---|---|
| Ordering code         | Contact Magnet                              | PM2B<br>PM34                                | PM2D<br>PM35                                |
| Contact               |   | 1NO   |   |
| Operating distance    | Differential                                | 14–20mm<br>1–12mm                           | 20–27mm<br>1–14mm                           |
| Repeat accuracy       |   | 0.5mm or less                               |   |
| Ambient temperature   |   | –20°C to +80°C                              |   |
| Dielectric strength   | Between open contacts<br>Terminal to ground | 700V AC, 1 min.<br>1500V AC, 1 min.         | 350V AC, 1 min.<br>1500V AC, 1 min.         |
| Insulation resistance |   | 100MΩ or more<br>at 500V DC                 | 100MΩ or more<br>at 500V DC                 |
| Life expectancy       | Mechanical                                  | 10 million operations                       |   |
|                       | Electrical                                  | 2 million<br>operations at<br>100V AC 3.3VA | 2 million<br>operations at<br>100V AC 3.3VA |

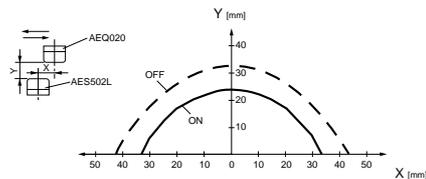
##### Response curves

###### Short axis

Contact: AES402B-1A  
Magnet AEQ010-1A

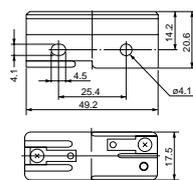


Contact: AES502L-3A  
Magnet AEQ020-1T

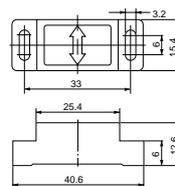


##### Dimensions, mm

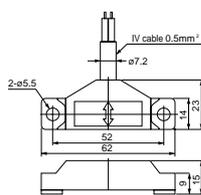
###### AES402B-1A



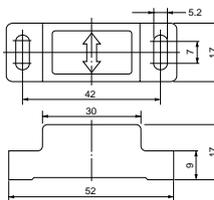
###### AEQ010-1A



###### AES502L-3A



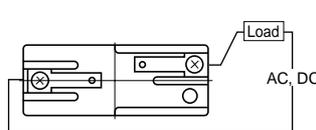
###### AEQ020-1T



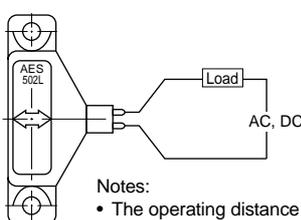
Mass:  
AES402B-1A: 20g  
AES502L-3A: 85g  
AEQ010-1A: 20g  
AEQ020-1T: 25g

##### Wiring

###### AES402B-1A



###### AES502L-3A



##### Notes:

- The operating distance will be decreased when mounted on ferromagnetic material such as iron.
- Both reed switch and magnetic elements can not be used in over 5-Gauss magnetic fields.

#### Magnetically operated reed switches AER

Operating distance: 4.0–5.5mm (at 1NO)  
 Reed switch: 1NO or 1NC  
 Rated thermal current: 2.5A

#### ■ Features

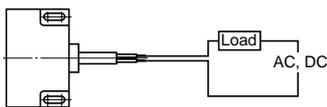
- Sensing magnetic element and reed switch element are integrated in an epoxy molded housing.
- Power source is not required.
- Travelling direction of the metal object is not limited.
- Make and break capacity:  
Max. 50VA AC, 50W DC
- Operating voltage: Max. 220V AC, DC
- Water- and dust-tight

#### ■ Specifications

| Type (Ordering code)   | AER201L-1A (PM1A)  | AER211L-1A (PM1B)     |   |
|------------------------|--|-----------------------|---|
| Contact arrangement    | 1NO  | 1NC                   |   |
| Rated voltage AC, DC   | 220 max.   | 220V max.             |   |
| Rated thermal current  | 2.5A   | 2.5A                  |   |
| Make and break current | Max. 0.5A AC, DC   | Max. 0.5A AC, DC      |   |
| Operating distance     | 4.0–5.5mm  | 3.5–5.0mm             |   |
| Differential           | 1–5.5mm  | 1–5.5mm               |   |
| Repeat accuracy        | Less than 0.5mm  | Less than 0.5mm       |   |
| Ambient temperature    | –20° to +80°C  | –20° to +80°C         |   |
| Dielectric strength    | 350V AC rms. 1 minute (Between open contacts)<br>1500V AC rms. 1 minute (Terminal to ground) |                       |   |
| Insulation resistance  | Over 100MΩ at 500V DC  |                       |   |
| Life expectancy        | Mechanical   | 10 million operations |   |
|                        |  | Electrical            | 2 million operations at 100V AC 3.3VA (Inductive)<br>2 million operations at 100V DC 1.6W (Inductive)<br>10 million operations at 12V DC 6W (Resistive) |

- Notes:
- 1 meter lead wires are normally provided.
  - The standard detected object is iron plate of 50 × 50 × 2 (mm). If the object is smaller, the operating distance is reduced.

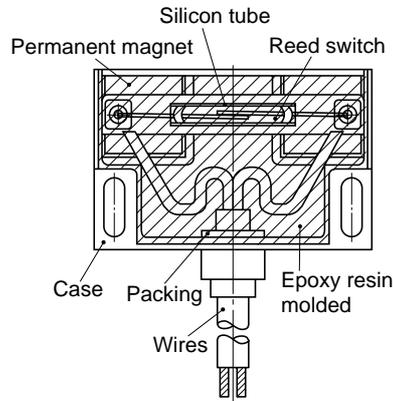
#### ■ Wiring



#### ■ Ordering information

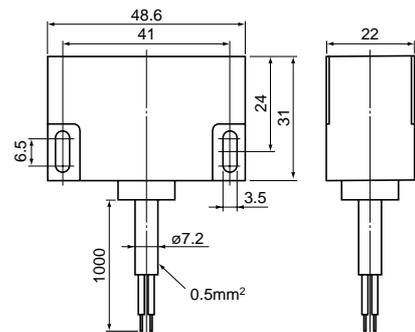
- Specify the following:  
 1. Type number or ordering code

#### ■ Construction



- Notes:
- The operating distance will be decreased when mounted on ferromagnetic material such as iron.
  - This switch cannot be used in over 5-Gauss magnetic fields.
  - Keep a distance of over 100mm from other limit switches.

#### ■ Dimensions, mm

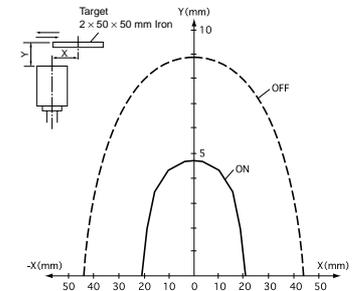


Mass: 100g

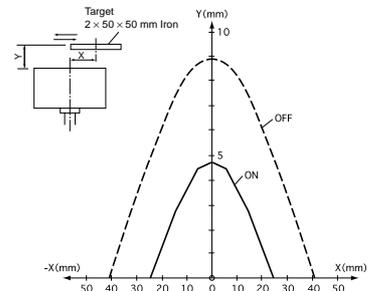


#### ■ Response curves

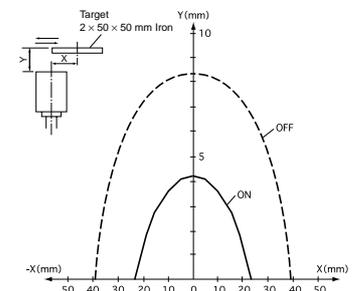
##### AER20 Short axis



##### AER20 Long axis



##### AER21 Short axis



##### AER21 Long axis

