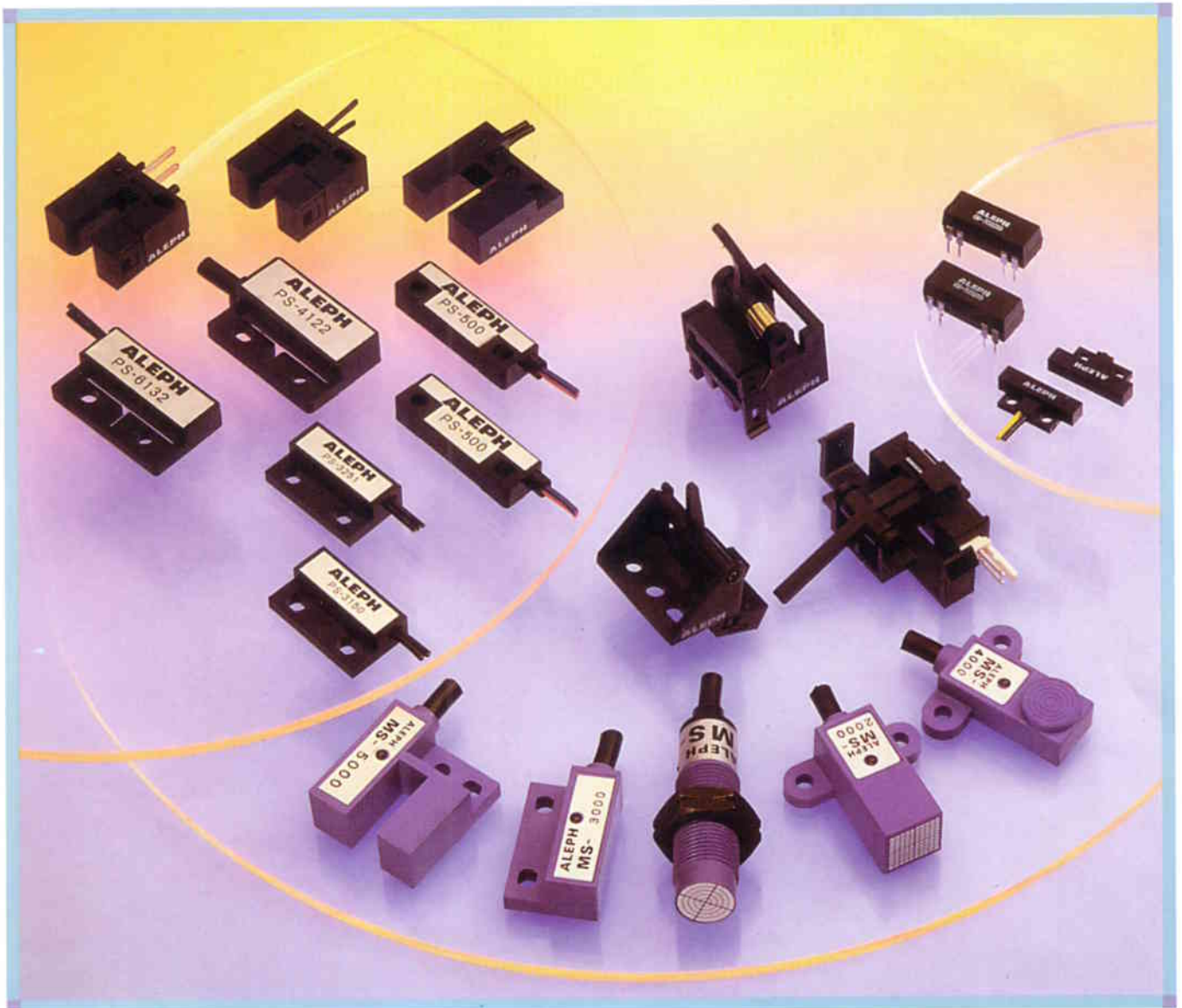


Proximity Sensors and Magnets



The Aleph line of proximity sensors includes both reed switch and solid-state magnetic proximity sensors. Both types feature models that are actuated by a magnet or magnetic shield and offer high reliability and long operational life.

Proximity sensors are used extensively in industry in such diverse applications as:

- Washing machines and driers
- Paper transport sensing in business machines
- Paper tray detection in copiers
- Auto-stop in audio equipment
- Vibration detection
- Open-door and closed-door detection
- Detection of burnt-out filaments in lamps
- Stroke position detection in hydraulic equipment
- Transport (conveyor belt) detection
- Key switch detection in home appliances

Aleph has been continually committing resources and engineering effort to develop standard and custom high-quality sensors that would best meet the increasingly diversified and sophisticated requirements of our customers.

Specify ALEPH sensors that are designed and manufactured with technology based on the philosophy of 'reliability first'.

<i>CONTENTS</i>	<i>Page</i>
<i>Proximity Sensors Design Information</i>	<i>1</i>
<i>Proximity Sensors Selection</i>	<i>5</i>
<i>Reed Switch Type Proximity Sensors</i>	
<i>Magnet Actuation Types</i>	<i>7</i>
<i>Shield Actuation Types</i>	<i>15</i>
<i>Lever Actuation Types</i>	<i>17</i>
<i>Magnets</i>	<i>18</i>
<i>Application Notes</i>	<i>20</i>

Proximity Sensors Design Information

1. Contact Types

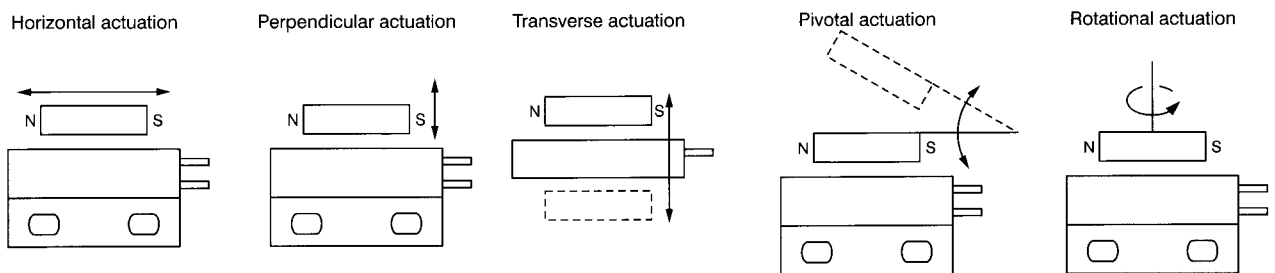
- **Form A-Type (normally-open "make" contacts):** This type has contacts that are normally open in the absence of a magnetic field.
- **Form B-Type (normally-closed "break" contacts):** The contacts of this type of sensor are normally closed in the absence of a magnetic field.
- **Form C-Type (double-throw "break before make" contacts):** The normally-closed contacts of this type of sensor open before the normally-open contacts are closed.

2. Operating Methods

Alcoph proximity sensors detect the closeness of two mechanical parts by having the sensor mounted on one of the parts and a permanent magnet, magnetic plate or shield plate mounted on the other. These methods are illustrated below. Typical applications are the detection of door closures, the detection of the presence of paper trays in copiers, safety interlock systems, and the detection of the "home position" of a mechanical assembly.

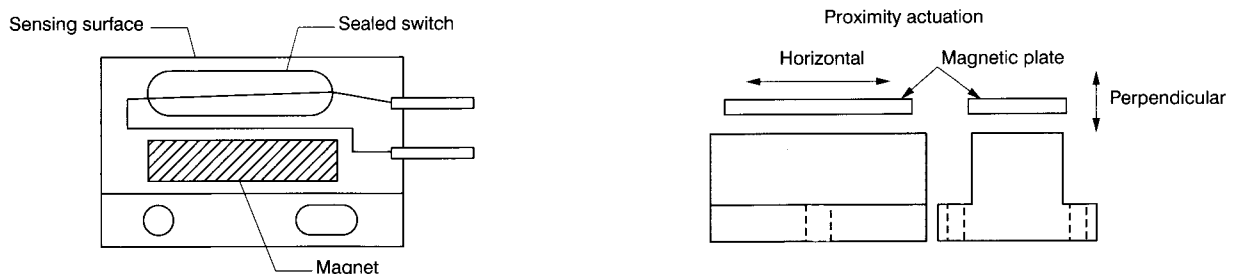
• Permanent magnet actuation

A permanent magnet is attached to a moving object which is to be sensed by a fixed proximity sensor. The sensor may be actuated by moving the permanent magnet in any of the following ways: horizontal, perpendicular, transverse, pivotal or rotational.



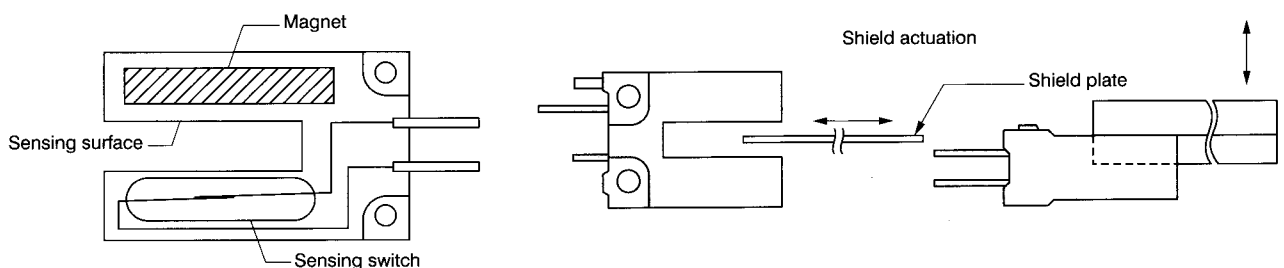
• Magnetic material actuation - Proximity method

In this type, a magnet and sensor are encapsulated together. The internal magnet biases the switch 'ON'. When a piece of magnetic material approaches the sensor, actuation results from changes in the magnetic flux of the built-in magnet. The sensor may be actuated by moving the magnetic material in any of the following ways: horizontal or perpendicular.



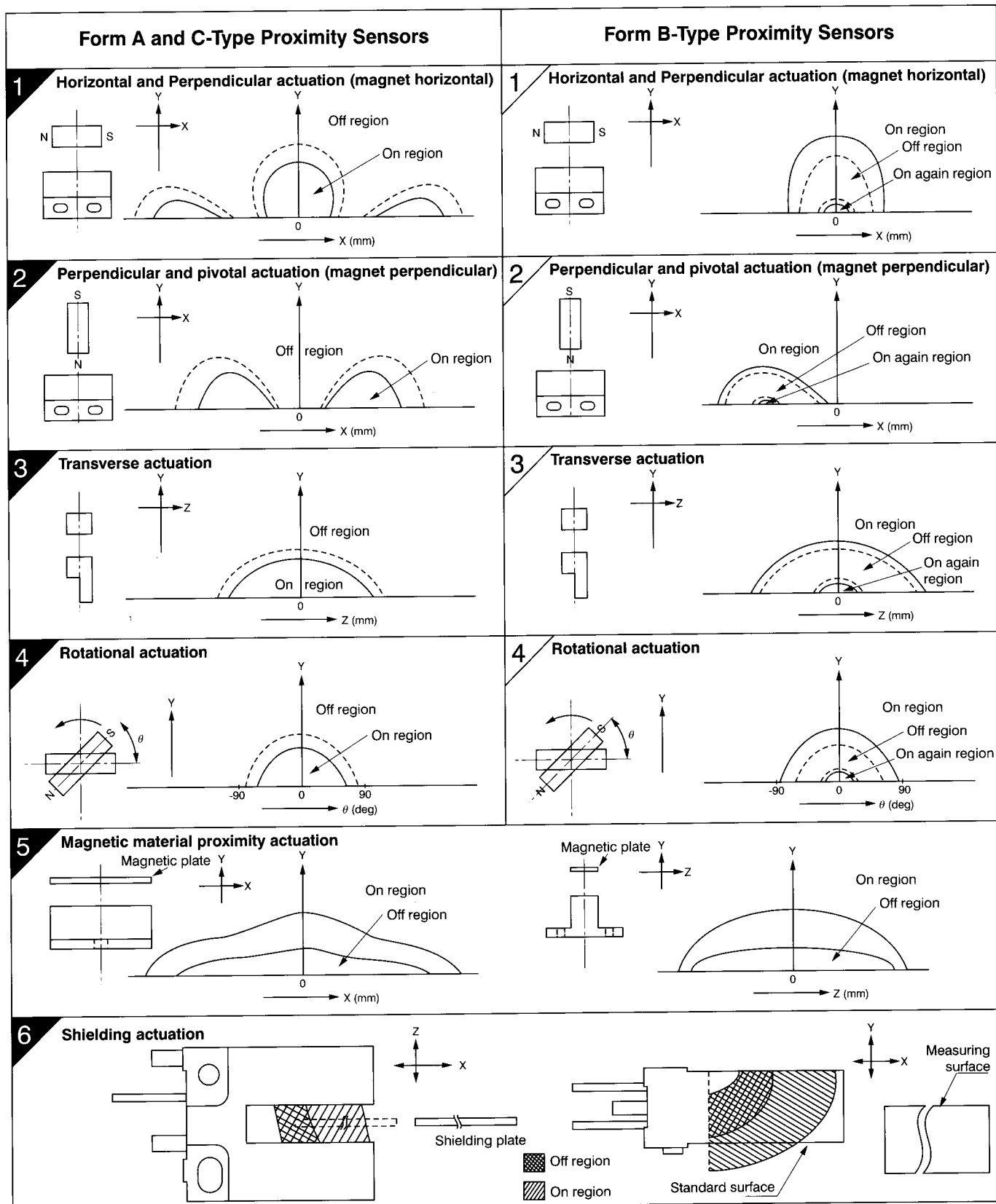
• Magnetic material actuation - Shield method

This sensor has a slot which separates magnet and switch elements. When a piece of magnetic material shields the magnetic field in the slot, the contact opens. When the piece is removed, the contact closes. The sensors may be actuated by moving the magnetic material in any of the following ways: horizontal, transverse or pivotal.



Proximity Sensors Design Information

3. General Operating Characteristics



Proximity Sensors Design Information

4. Physical Characteristics

We can divide proximity sensors' physical characteristics into four basic categories:

- Operational characteristics
- Electrical characteristics
- Mechanical characteristics
- Environmental characteristics

Operational Characteristics

The major operational characteristic is **actuating distance**. A secondary factor is **differential**.

'ON' distance is the distance at which the sensor is activated as magnetic material moves toward it.

'OFF' distance is the distance at which the sensor changes state as magnetic material moves away from it.

'DIFFERENTIAL' is the difference between the ON and OFF distances.

(Nb: Form B-type (NC) sensors require an actuating magnetic field of opposite polarity from the built-in magnet.)

REPEAT ACCURACY: The repeat accuracy of a typical sensor is normally within $\pm 0.2\text{mm}$ (± 0.008 inches).

See Section 3 for the general operating characteristics of different types of magnetic proximity sensors. Each has its own special features and considerations.

Electrical Characteristics

Tracking Frequency: 200 - 300 Hz

Bounce Time: Normally less than 0.3 milliseconds
If the sensor contains a mercury reed switch, there is no bounce.

On Resistance: Normally not more than 200 milliohms.
This figure reflects resistance intrinsic to the connection area. Contact resistance will vary slightly because contact pressure will change with the distance of the actuating magnet from the sensor.

Contact Breakdown Voltage: Normally 200 VDC
Sometimes as high as 1000 VDC. This refers to the voltage between open contacts.

Dielectric Strength: Normally not less than 1500 VDC, measured across the case and sensor charging area.

Insulation Resistance: Normally not less than 10 milliohms, measured across the case and contacts.

Mechanical Characteristics

Shock: When subjected to shock, changes to the ON and OFF distances may occur. Form B-type contacts may change when receiving shocks of over 20 G. Form A-type contacts can normally withstand a shock of 30 G.

Vibration: Magnetic proximity sensors are relatively immune to vibration. However, changes can occur if acceleration ratings are exceeded.

Tensile Strength: Types with wires using #26AWG wire: 5 kg
Types with integral connector: 3kg, depending on connector.

Environmental Characteristics

Temperature Ranges: Plastic case: -20°C to $+70^{\circ}\text{C}$
Heavy-duty case: range can be extended.
Internal reed switch: -30°C to $+125^{\circ}\text{C}$
The sensor itself undergoes only slight changes due to temperature variations. The temperature characteristics of the actuating permanent magnet are more important. When temperature rises, sensitivity of Form A-type sensors (NO) will fall, while sensitivity of Form B-types (NC) will rise.

Humidity: Excellent immunity to humidity.
However, prolonged exposure to high-humidity environments will produce a drop in insulation resistance.

Proximity Sensors Design Information

5. Selecting and Installing Proximity Sensors

To get optimum benefits, proximity sensors will need to be selected correctly. This implies evaluating the application and choosing a sensor type with appropriate actuation method, operating mode, contact closure type, etc.

How to Select Proximity Sensors

1. By Method of Actuation	Magnetic actuation:	Series PS-500, PS-3000, PS-4000, PS-5000, PS-6000
	Magnetic shielding:	Series PS-7000, Type PS-0031
	Lever actuation:	Series AS
2. By Load Type	Universal:	Series PS-500, PS-3000, Types PS-4122, PS-4221, Series PS-6000 etc
	High power:	Series PS-6000
	Inductive:	Types PS-6132, PS-6231
	Capacitive:	Type PS-6132
3. By Contact Configuration	A-Type:	Type PS-500, PS-3150, PS-4122, PS-6132 etc
	B-Type:	Type PS-510, PS-3251, PS-3980, PS-4221, PS-6231, PS-7000
	Changeover:	Types PS-520, PS-5381, PS-6341
4. By Application	Universal:	Series PS-500, PS-3000, Types PS-4122, PS-4221, Series PS-6000 etc
	Indicator lamp:	Series PS-0024
	Non-bounce:	Types PS-4502, PS-6503
	Cylinder position sensor:	Type PS-0021
	PCB mount:	Types PS-5171, PS-5381, PS-0018
	Machine tools:	Types PS-4122, PS-4221, PS-4501, PS-4502
	High temperature:	Type PS-3529
	Water resistant:	Series PS-4000, Types PS-0016, PS-0031

In addition to the above the following information on choosing magnets should be considered when selecting and installing proximity sensors.

Choosing Permanent Magnets

Many applications use a permanent magnet attached to an object whose proximity is to be sensed. The permanent magnet actuates the sensor. There are various types of permanent magnets:

Isotropic Ferrite Magnets:

- High magnetic retention properties. No demagnetisation or ageing.
- Flux density can vary significantly. Not suitable for some applications.
- Ceramic construction. Chemically stable.
- Ideal where flat shapes are required. Easily worked.
- Various forms of magnetisation possible.
- Good for use when actuation is less than 10 mm (0.400 inches).

Anisotropic Ferrite Magnets:

- High magnetic retention properties. No demagnetisation or ageing.
- Flux density can vary significantly. Not suitable for some applications.
- Ceramic construction. Chemically stable.
- Ideal where flat shapes are required. Easily worked.
- Various forms of magnetisation possible. Care must be taken to prevent irreversible demagnetisation.
- Good for use when actuation distance is greater than 10 mm (0.400 inches).

Alnico Magnets:

- Flux density is high. Ideal for applications requiring a large actuation ('ON') distance.
- Often rod-shaped.
- Good when actuation distance is greater than 10 mm (0.400 inches).

Rare Earth Magnets:

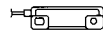
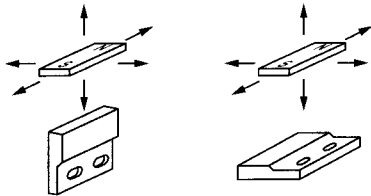
- High magnetic retention properties.
- Flux density is high. Ideal for applications requiring a large actuation ('ON') distance.
- Relatively small dimensions.
- Good when actuation distance is greater than 10 mm (0.400 inches).

Proximity Sensors Selection

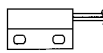
Reed Switch Type Proximity Sensors

Magnet Actuation

Inexpensive proximity sensor with internal reed switch, that is turned on and off by change of magnetic field strength (vertical, horizontal or longitudinal movement of magnet).



Miniature



General purpose

PS-3529 - High temperature

Contact Form	Part Number	Page
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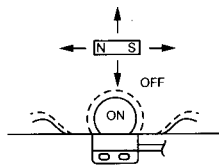
NO	PS-500	P7
NC	PS-510	
Transfer	PS-520	

NO	PS-3150	P8
NO	PS-3529	
NC	PS-3251	

▼Contact Form

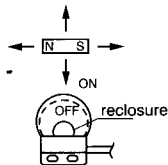
N.O. Contact (Normally Open)

Contact which is normally open. It will be closed when magnetic field is applied.



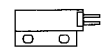
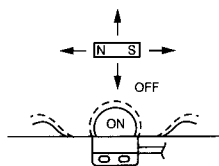
N.C. Contact (Normally Closed)

Contact which is normally closed. It will be opened when magnetic field is applied.



Transfer Contact (Form 'C')

Common contact (wiper) will switch from N.C. to N.O. contact when magnetic field is applied.



Connector terminated



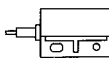
General purpose



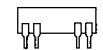
Long-life



Ultra-miniature



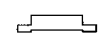
Water resistant



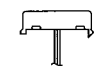
PCB mount



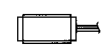
High power



Water resistant



For lamp loads



Threaded package

NO	PS-3670	P10
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NO	PS-3170	P9
----	----------------	----

NO	PS-3870	P9
----	----------------	----

NO	PS-0048	P10
----	----------------	-----

NO	PS-4122	P11
NC	PS-4221	
NO	PS-4501	
NO (Mercury)	PS-4502	

NO	PS-5171	P13
----	----------------	-----

NO	PS-6132	P12
NC	PS-6231	
Transfer	PS-6341	
NO (Mercury)	PS-6503	

NO	PS-0016	P14
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NC • NO	PS-0024	P14
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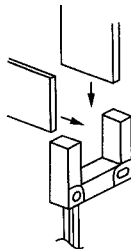
NO	PS-0021	P14
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Proximity Sensors Selection

Reed Switch Type Proximity Sensors

Shield Actuation

Sensor with Normally Closed contact will open when shield made of magnetic material is inserted into sensing slot.



General purpose ►

NC	PS-7711	P15
----	----------------	-----



General purpose
(connector terminated) ►

NC	PS-7702	P15
----	----------------	-----

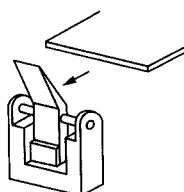


Water resistant ►

NC	PS-0031	P16
----	----------------	-----

Lever Actuation

Lever equipped with magnet, when actuated by physical object will open reed switch contact.



Counterweight
(snap-mount) ►

NC	AS-101	P17
----	---------------	-----



Counterweight
(snap-mount) ►

NC	AS-202	P17
----	---------------	-----

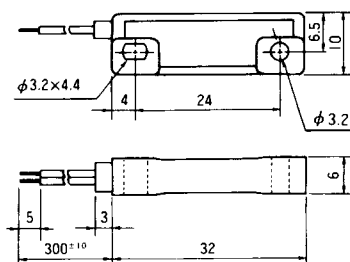


Spring loaded
(snap-mount) ►

NC	AS-303	P17
----	---------------	-----

PS-500 • PS-510 • PS-520

- Miniature (completely sealed)



Case material: Heat resistant ABS
Wire: UL-1007, AWG#26
*Dimensions in mm (1mm = 0.0394 inches)

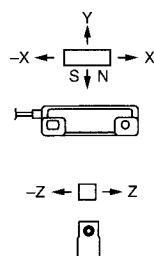
SPECIFICATIONS

Part Number	PS-500	PS-510	PS-520
Contact Form	NO	NC	Transfer
Contact Rating	10W max.		3W max.
Switching Voltage	200VDC max.		100VDC max.
Switching Current	0.5A max.		0.2A max.
Breakdown Voltage (open contact)	200VDC min.		
Contact Resistance (initial)	0.3Ω max.		
Electrical Life (resistive loads)	10 ⁶ (100VDC, 10mA)		
Operating Temp.	-10 to +60°C		

OPERATING CHARACTERISTICS

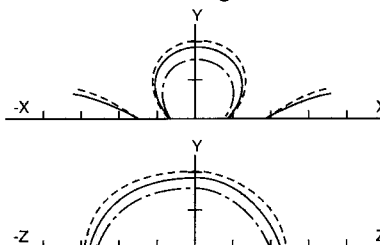
• PS-500

----- OFF max.
——— ON max.
- - - - ON min.

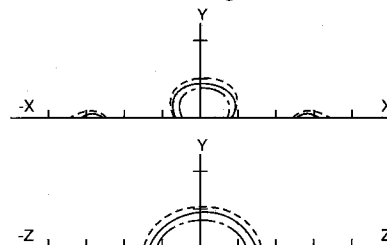


Grid scale: 1mm

PS-500 ↔ Magnet TG-0016

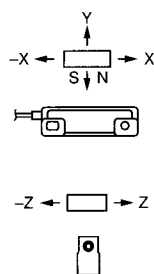


PS-500 ↔ Magnet TG-0043



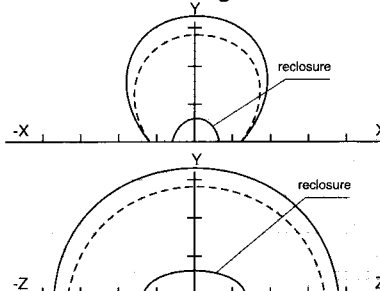
• PS-510

----- OFF max.
——— ON max.

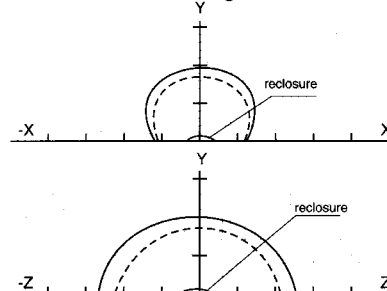


Grid scale: 1mm

PS-510 ↔ Magnet TG-0016

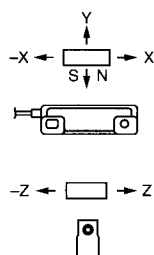


PS-510 ↔ Magnet TG-0043



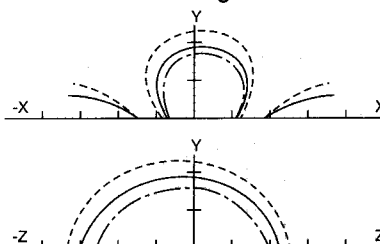
• PS-520

----- OFF max. (NC-COM)
——— ON max. (NO-COM)
- - - - ON min.

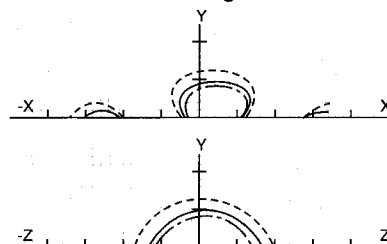


Grid scale: 1mm

PS-520 ↔ Magnet TG-0016

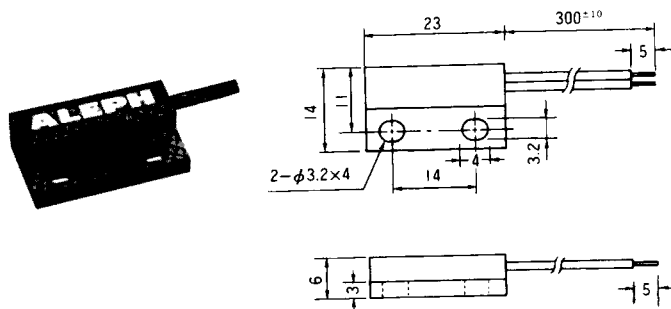


PS-520 ↔ Magnet TG-0043



PS-3150 • PS-3529 • PS-3251

- General purpose (completely sealed)
- High temperature applications: PS-3529



Case material: Heat resistant ABS

Wire: UL-1007, AWG#26

*Dimensions in mm (1mm = 0.0394 inches)

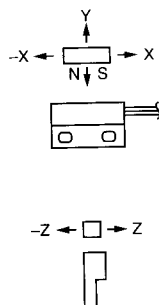
SPECIFICATIONS

Part Number	PS-3150	PS-3529	PS-3251
Contact Form	NO		NC
Contact Rating	10W max.		
Switching Voltage	100VDC max.		
Switching Current	0.5A max.		
Breakdown Voltage (open contact)	250VDC min.		
Contact Resistance (initial)	0.3Ω max.		
Electrical Life (resistive loads)	10 ⁷ (6VDC, 10mA)		
Operating Temp.	-10 to +60°C	0 to +100°C	-10 to +60°C

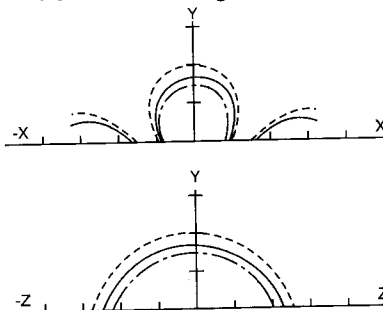
OPERATING CHARACTERISTICS

• PS-3150

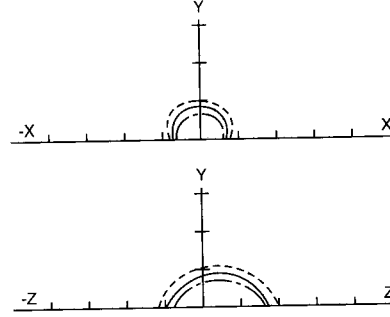
----- OFF max.
 ——— ON max.
 - - - - - ON min.



PS-3150 ↔ Magnet TG-0016



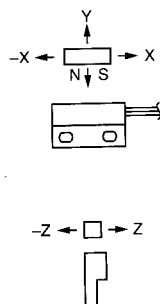
PS-3150 ↔ Magnet TG-0043



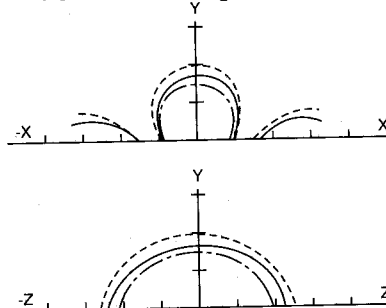
Grid scale: 1mm

• PS-3529

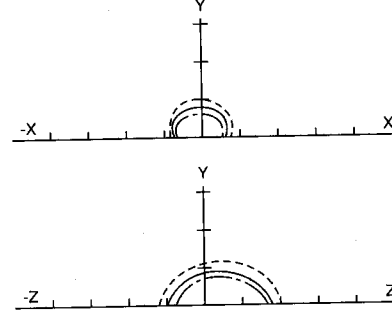
----- OFF max.
 ——— ON max.
 - - - - - ON min.



PS-3529 ↔ Magnet TG-0016



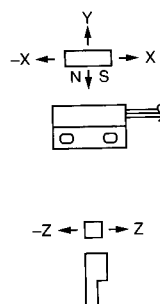
PS-3529 ↔ Magnet TG-0043



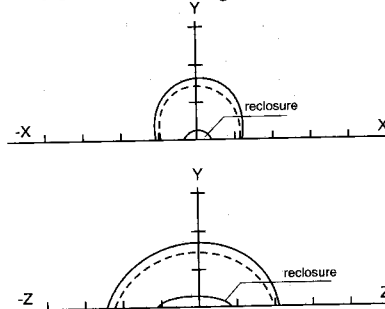
Grid scale: 1mm

• PS-3251

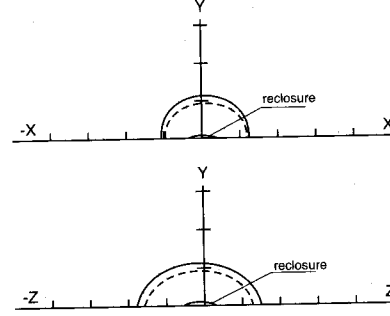
----- OFF max.
 ——— ON max.



PS-3251 ↔ Magnet TG-0016



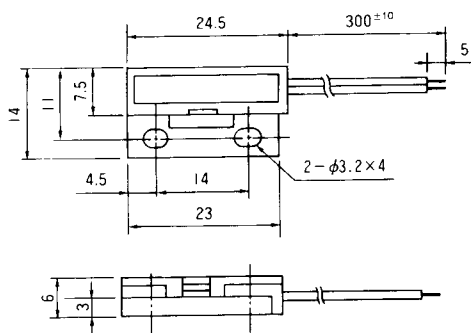
PS-3251 ↔ Magnet TG-0043



Grid scale: 1mm

PS-3170

- General purpose (nonsealed)

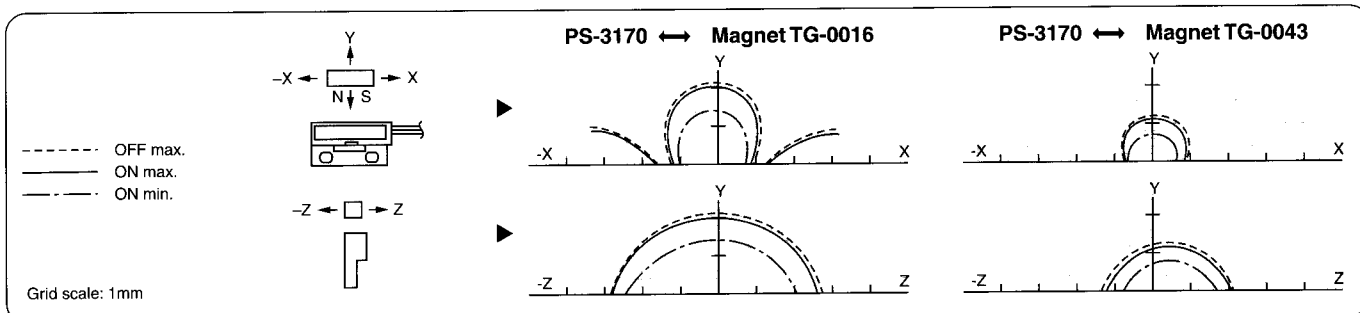


Case material: Heat resistant ABS
Wire: UL-1007, AWG#26
*Dimensions in mm (1mm = 0.0394 inches)

SPECIFICATIONS

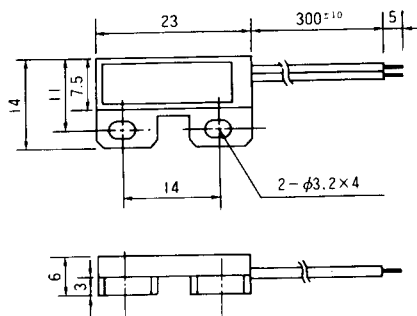
Part Number	PS-3170
Contact Form	NO
Contact Rating	10W max.
Switching Voltage	100VDC max.
Switching Current	0.5A max.
Breakdown Voltage (open contact)	250VDC min.
Contact Resistance (initial)	0.3Ω max.
Electrical Life (resistive loads)	10 ⁷ (6VDC, 10mA)
Operating Temp.	-10 to +60°C

OPERATING CHARACTERISTICS



PS-3870

- Long-life (nonsealed)

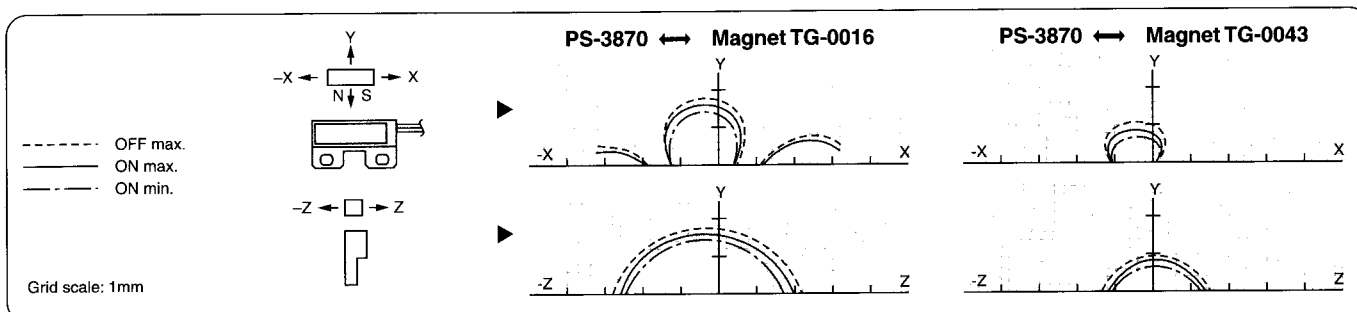


Case material: Heat resistant ABS
Wire: UL-1007, AWG#24
*Dimensions in mm (1mm = 0.0394 inches)

SPECIFICATIONS

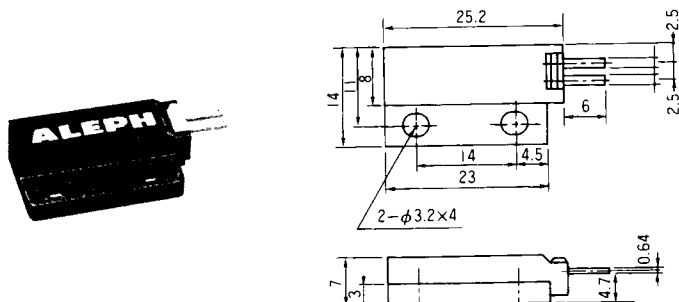
Part Number	PS-3870
Contact Form	NO
Contact Rating	10W max.
Switching Voltage	100VDC max.
Switching Current	0.5A max.
Breakdown Voltage (open contact)	250VDC min.
Contact Resistance (initial)	0.3Ω max.
Electrical Life (resistive loads)	10 ⁸ (6VDC, 10mA)
Operating Temp.	-10 to +60°C

OPERATING CHARACTERISTICS



PS-3670

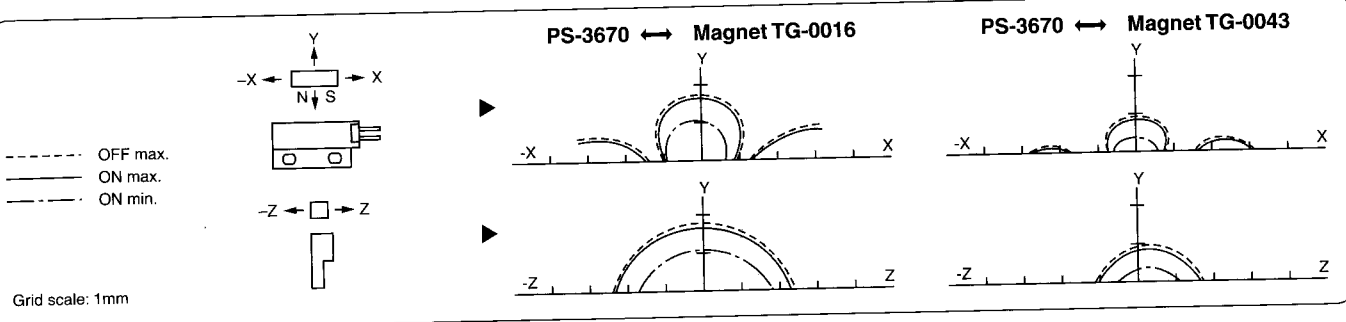
- Connector-terminated (completely sealed)



Case material: Heat resistant ABS
Connector: JFT B2P-SHF-1
*Dimensions in mm (1mm = 0.0394 inches)

SPECIFICATIONS

Part Number	PS-3670
Contact Form	NO
Contact Rating	10W max.
Switching Voltage	100VDC max.
Switching Current	0.5A max.
Breakdown Voltage (open contact)	250VDC min.
Contact Resistance (initial)	0.2Ω max.
Electrical Life (resistive loads)	10 ⁷ (6VDC, 10mA)
Operating Temp.	-10 to +60°C

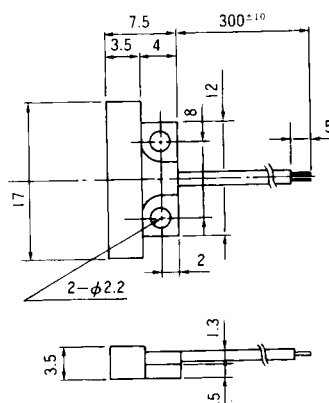


PS-0048

- Ultraminiature (completely sealed)



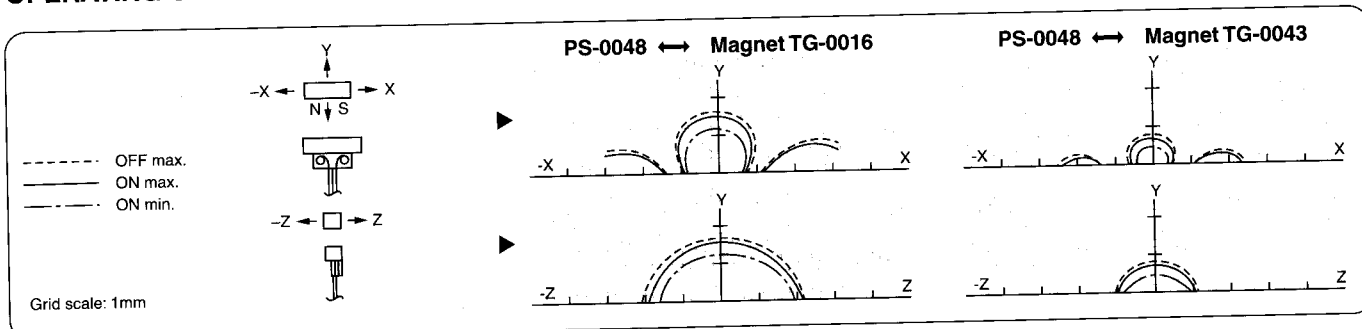
Case material: PPE
Wire: UL-1007, AWG#28
*Dimensions in mm (1mm = 0.0394 inches)



SPECIFICATIONS

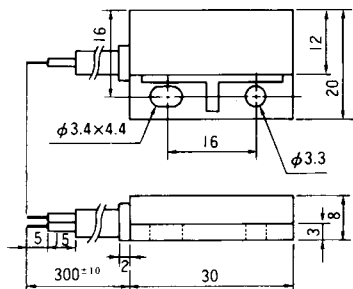
Part Number	PS-0048
Contact Form	NO
Contact Rating	10W max.
Switching Voltage	100VDC max.
Switching Current	0.5A max.
Breakdown Voltage (open contact)	250VDC min.
Contact Resistance (initial)	0.3Ω max.
Electrical Life (resistive loads)	10 ⁷ (6VDC, 10mA)
Operating Temp.	-20 to +70°C

OPERATING CHARACTERISTICS



PS-4122 • PDS-4221

- Dust and water-resistant
- Recommended for factory automation applications

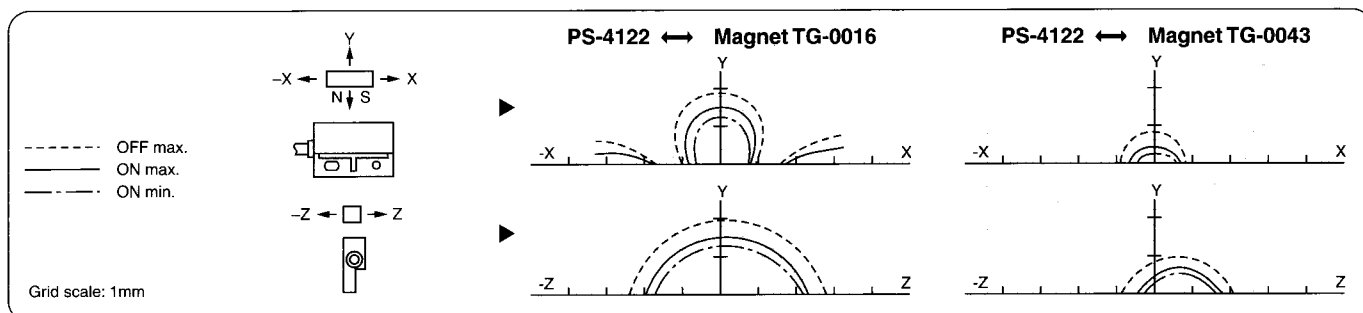


Case material: PBT
Wire: Twin core cable
*Dimensions in mm (1mm = 0.0394 inches)

SPECIFICATIONS

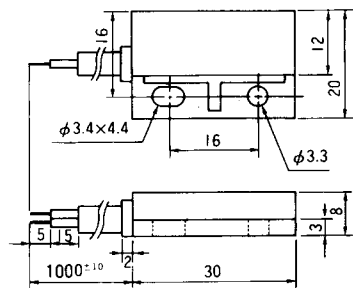
Part Number	PS-4122	PS-4221
Contact Form	NO	NC
Contact Rating	10W max.	
Switching Voltage	200VDC max.	
Switching Current	0.5A max.	
Breakdown Voltage (open contact)	300VDC min.	250VDC min.
Contact Resistance (initial)	0.4Ω max.	
Electrical Life (resistive loads)	10 ⁶ (100VDC, 0.1A)	5 x 10 ⁵ (100VDC, 0.1A)
Operating Temp.	-10 to +80°C	

OPERATING CHARACTERISTICS



PS-4501 • PS-4502

- Dust and water-resistant
- Recommended for factory automation applications
- Long lead length
- High-power: PS-4502



Case material: PBT
Wire: Twin core cable
*Dimensions in mm (1mm = 0.0394 inches)

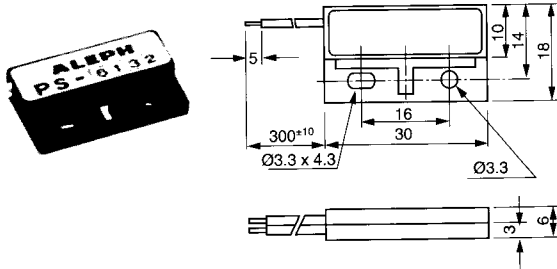
SPECIFICATIONS

Part Number	PS-4501	PS-4502*
Contact Form	NO	NO (Mercury)
Contact Rating	10W max.	50W max.
Switching Voltage	500VDC max.	100VDC max.
Switching Current	0.5A max.	2.0A max.
Breakdown Voltage (open contact)	1000VDC min.	
Contact Resistance (initial)	0.4Ω max.	
Electrical Life (resistive loads)	10 ⁶ (100VDC, 0.1A)	10 ⁷ (100VDC, 0.1A)
Operating Temp.	-10 to +80°C	

*PS-4502: must be mounted ±30° from vertical

PS-6132 • PS-6231 • PS-6341 • PS-6503

- High power NO and NC types (completely sealed)
- Mercury reed switch type: PS-6503
- UL listed: PS-6132



Case material: Heat resistant ABS

Wire: UL-1007, AWG#26

*Dimensions in mm (1mm = 0.0394 inches)

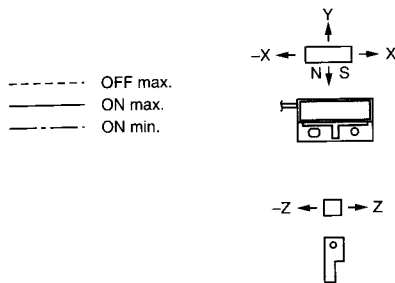
SPECIFICATIONS

Part Number	PS-6132	PS-6231	PS-6341	PS-6503*
Contact Form	NO	NC	Transfer	NO (Mercury)
Contact Rating	50W max.	25W max.	3W max.	50W max.
Switching Voltage	200VDC max.		100VDC max.	
Switching Current	1.0A max.	0.5A max.	0.2A max.	2.0A max.
Breakdown Voltage (open contact)	250VDC min.		200VDC min.	100VDC min.
Contact Resistance (initial)	0.3Ω max.			
Electrical Life (resistive loads)	10 ⁶ (6VDC, 10mA)			
Operating Temp.	-10 to +60°C			

*PS-6503: must be mounted within ±30° from vertical

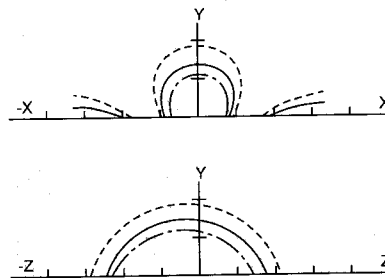
OPERATING CHARACTERISTICS

• PS-6132

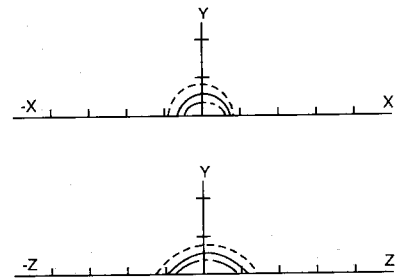


Grid scale: 1mm

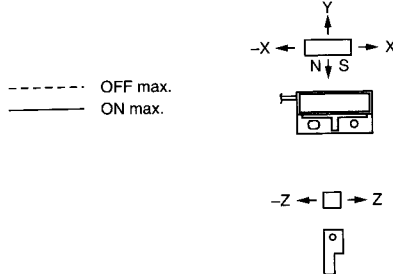
PS-6132 ↔ Magnet TG-0016



PS-6132 ↔ Magnet TG-0043

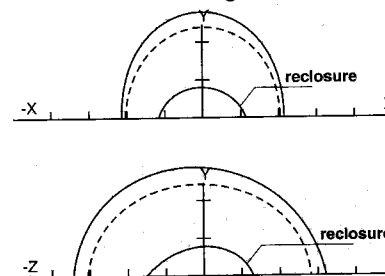


• PS-6231

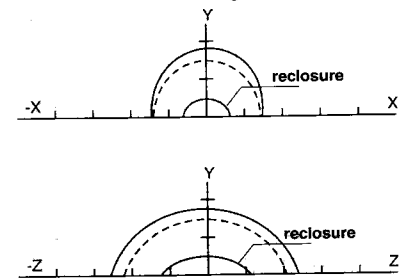


Grid scale: 1mm

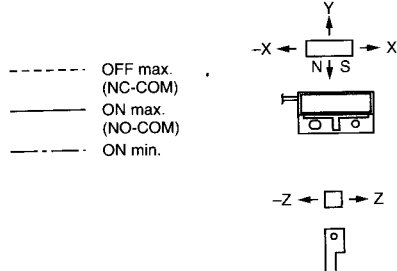
PS-6231 ↔ Magnet TG-0016



PS-6231 ↔ Magnet TG-0043

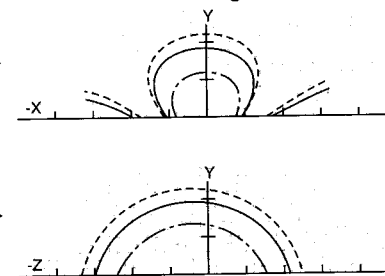


• PS-6341

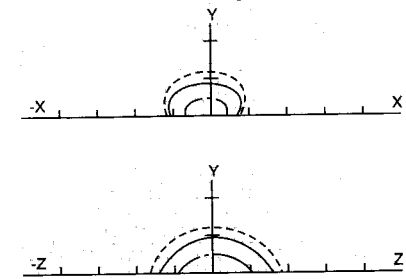


Grid scale: 1mm

PS-6341 ↔ Magnet TG-0016

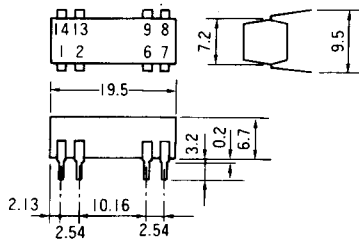
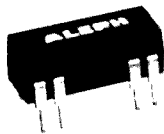


PS-6341 ↔ Magnet TG-0043



PS-5171

- Miniature (transfer-moulded)
- PCB mount



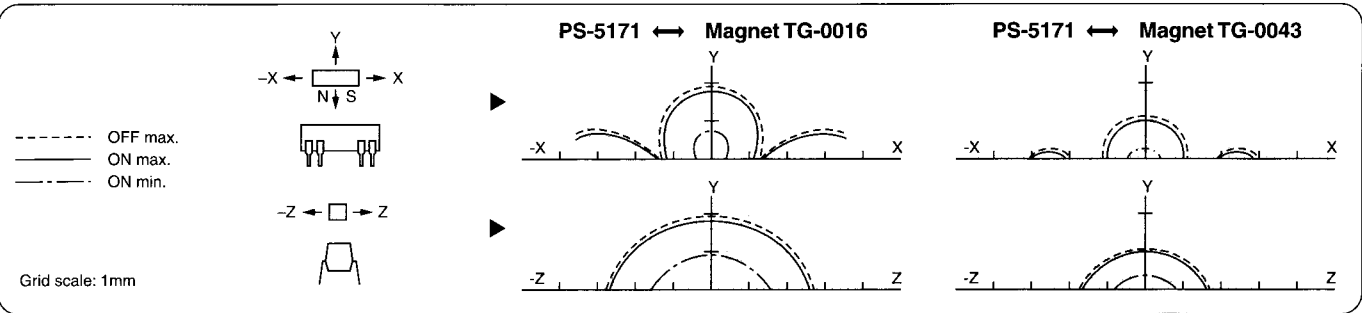
Case material: Epoxy
Lead: Permalloy, 0.25mm thick, tin plating
*Dimensions in mm (1mm = 0.0394 inches)

----- OFF max.
———— ON max.
- - - - - ON min.

SPECIFICATIONS

Part Number	PS-5171
Contact Form	NO
Contact Rating	10W max.
Switching Voltage	100VDC max.
Switching Current	0.25A max.
Breakdown Voltage (open contact)	250VDC min.
Contact Resistance (initial)	0.2Ω max.
Electrical Life (resistive loads)	10 ⁷ (6VDC, 10mA)
Operating Temp.	-25 to +75°C

OPERATING CHARACTERISTICS



SPECIAL DESIGNS

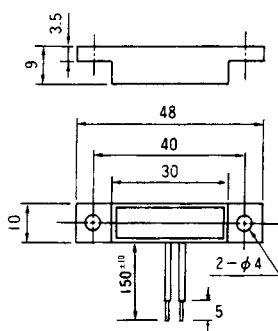
Aleph can modify standard proximity sensors to meet customers specific requirements.

Where appropriate, changes may be made to lead length or lead type, specific connectors or high-temperature sleeving may be added, electrical specifications may be selected, complete mechanical modifications involving custom mouldings may be undertaken.

For further information please discuss your requirements with your nearest Aleph sales office, who will be pleased to advise on the minimum order quantities required and supply a quotation.

PS-0016

- Duct and water-resistant
- Recommended for vending machine applications



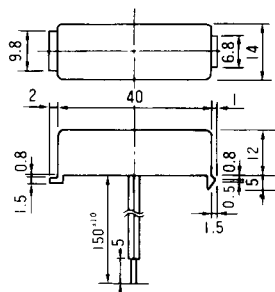
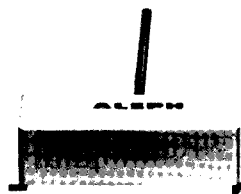
Case material: Heat-resistant ABS
Wire: UL-1007, AWG#20
*Dimensions in mm (1mm=0.0394 inches)

SPECIFICATIONS

Specifications		Operating Characteristic
Contact Form	NO	Magnet TZ-0011
Contact Rating	10W max.	
Switching Voltage	200VDC max.	
Switching Current	0.5A max.	
Breakdown Voltage (open contact)	250VDC min.	
Contact Resistance (initial)	0.5Ω max.	
Electrical Life (resistive loads)	10 ⁶	
Operating Temp.	-30 to +70°C	

PS-0024

- Snap-action mount (completely sealed)
- Up to 3 Amp. inrush current



Case material: Heat-resistant ABS
Wire: UL-1007, AWG#22
*Dimensions in mm (1mm = 0.0394 inches)

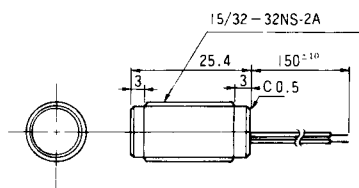
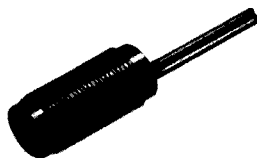
SPECIFICATIONS

Specifications		Operating Characteristic
Contact Form	NC	OFF (operate point) : Y=16mm ON (release point) : Y=70mm Magnet TZ-0183 *Reversed operation is possible
Contact Rating	10W max.	
Switching Voltage	120VAC max.	
Switching Current	0.2A max.	
Breakdown Voltage (open contact)	200VDC min.	
Contact Resistance (initial)	0.5Ω max.	
Electrical Life (resistive loads)	10 ⁶ (100VDC, 10W lamp loads)	
Operating Temp.	-10 to +60°C	

Contact Aleph for NO (normally open) version

PS-0021

- Miniature, dust and waterproof
- Adjustable position with threaded package
- Recommended for satellite antenna controllers



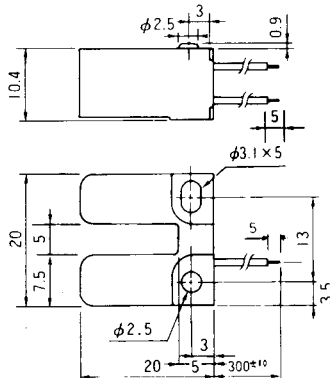
Case material: Glass filled Nylon 6
Wire: UL-1007, AWG#20
*Dimensions in mm (1mm = 0.0394 inches)

SPECIFICATIONS

Specifications		Operating Characteristic
Contact Form	NO	OFF (operate point) : Y=5.5mm ON (release point) : Y=14mm Magnet TZ-0141
Contact Rating	20W max.	
Switching Voltage	200VDC max.	
Switching Current	0.5A max.	
Breakdown Voltage (open contact)	1500VDC min.	
Contact Resistance (initial)	0.2Ω max.	
Electrical Life (resistive loads)	10 ⁷ (12VDC, 5mA)	
Operating Temp.	-10 to +60°C	

PS-7711

- Interrupter-type, wire leads



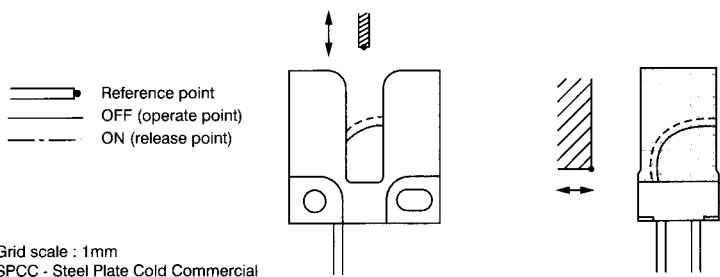
Case material: Heat-resistant ABS
Wire: UL-1007, AWG#26
*Dimensions in mm (1mm = 0.0394 inches)

SPECIFICATIONS

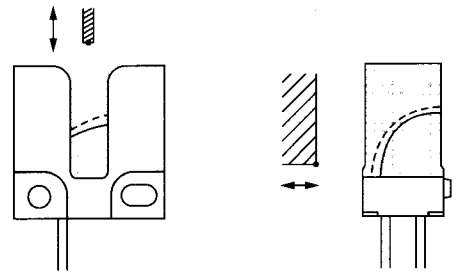
Part Number	PS-7711
Contact Form	NC
Contact Rating	10W max.
Switching Voltage	100VDC max.
Switching Current	0.25A max.
Breakdown Voltage (open contact)	200VDC min.
Contact Resistance (initial)	0.4Ω max.
Electrical Life (resistive loads)	5 x 10 ⁶ (24VDC, 5mA)
Operating Temp.	0 to +60°C

OPERATING CHARACTERISTICS

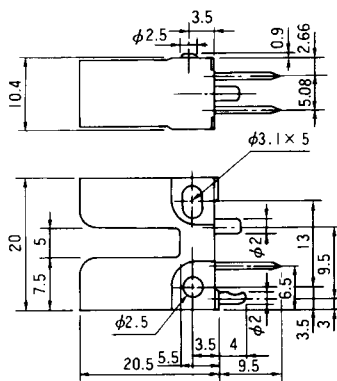
- PS-7711 ↔ SPCC shield plate (11 x 9 x 1mm)



- PS-7711 ↔ SPCC shield plate (22 x 18 x 1mm)

**PS-7702**

- Interrupter-type, connector terminated



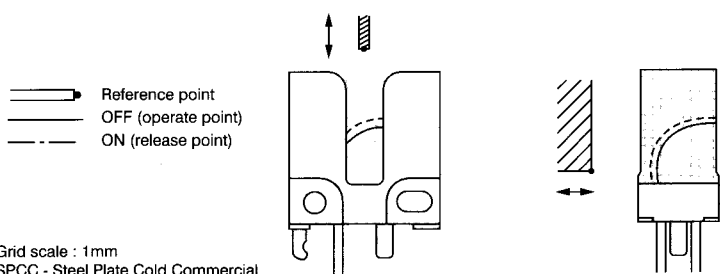
Case material: Heat-resistant ABS
Connector: Molex 5058-02 housing and housing terminal
*Dimensions in mm (1mm = 0.0394 inches)

SPECIFICATIONS

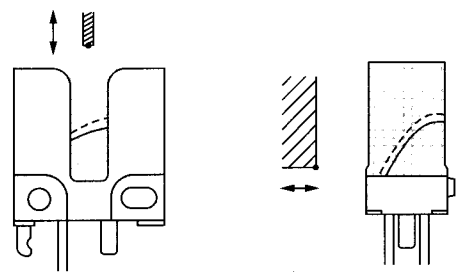
Part Number	PS-7702
Contact Form	NC
Contact Rating	10W max.
Switching Voltage	100VDC max.
Switching Current	0.25A max.
Breakdown Voltage (open contact)	200VDC min.
Contact Resistance (initial)	0.15Ω max.
Electrical Life (resistive loads)	5 x 10 ⁶ (24VDC, 5mA)
Operating Temp.	0 to +60°C

OPERATING CHARACTERISTICS

- PS-7702 ↔ SPCC shield plate (11 x 9 x 1mm)

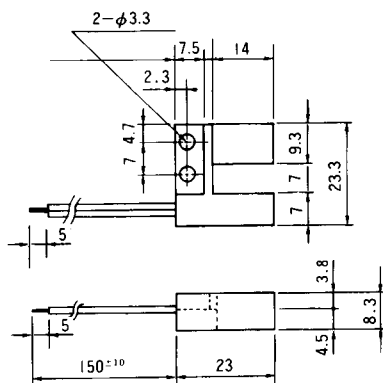
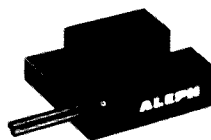


- PS-7702 ↔ SPCC shield plate (22 x 18 x 1mm)



PS-0031

- Wide sensing slot, interrupter-type
- Dust and water-resistant



Case material: Nylon 6

Wire: UL-1007, AWG#22

*Dimensions in mm (1mm = 0.0394 inches)

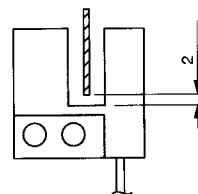
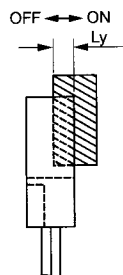
SPECIFICATIONS

Part Number	PS-0031
Contact Form	NC
Contact Rating	20W max.
Switching Voltage	100VDC max.
Switching Current	0.5A max.
Breakdown Voltage (open contact)	250VDC min.
Contact Resistance (initial)	0.2Ω max.
Electrical Life (resistive loads)	10 ⁷ (6VDC, 15mA)
Operating Temp.	-20 to +60°C

OPERATING CHARACTERISTICS

- PS-0031 ↔ SUS shield plate (14 x 10 x 0.8mm)

ON (release point) : $L_y = -3$ to 0mm
 OFF (operate point) : $L_y = 2$ mm



SUS - Steel Use Stainless

- Lever actuated (physical contact) sensor
- Counterweight operation
- Snap action mounting
- Recommended for paper sensing applications (office automation)
- Different actuator styles for various applications



AS-101



AS-202



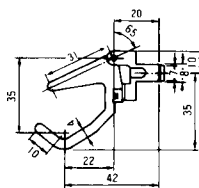
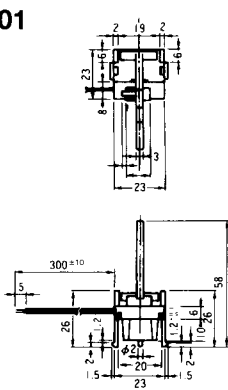
AS-303

DIMENSIONS

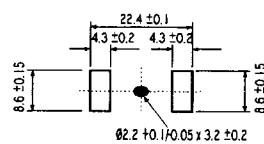
SPECIFICATIONS

Part Number	AS-101	AS-202	AS-303
Contact Form	NC		
Contact Rating	20W max.		
Switching Voltage	100VDC max.		
Switching Current	0.5A max.		
Breakdown Voltage (open contact)	250VDC min.		
Contact Resistance (initial)	0.3Ω max.		
Electrical Life (resistive loads)	5 x 10 ⁶ (6VDC, 10mA)		
Mechanical Life	10 ⁸		
Operating Temp.	-10 to +60°C		

• AS-101

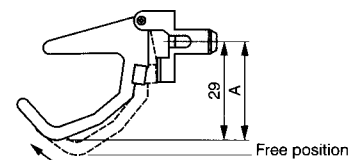


PCB Locating Hole



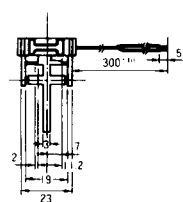
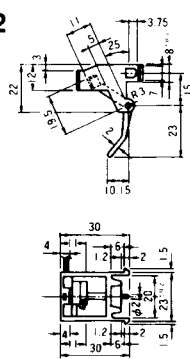
Case material : Heat-resistant ABS
Actuator material : Polyacetal
Wire : UL-1007, AWG#26

Operating Characteristics

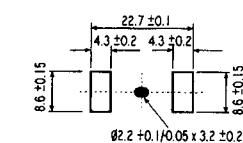


ON	in free position
OFF	A = 29mm max.
Operating force	0.3g to 1.0g

• AS-202

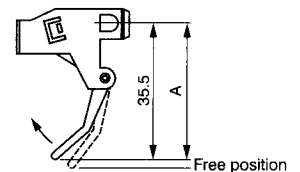


PCB Locating Hole



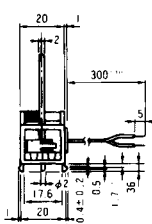
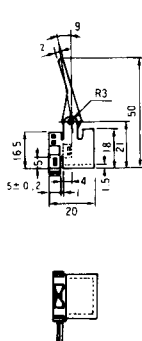
Case material : Heat-resistant ABS
Actuator material : Polyacetal
Wire : UL-1007, AWG#26

Operating Characteristics

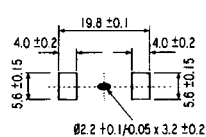


ON	in free position
OFF	A = 35.5mm max.
Operating force	0.4g to 1.2g

• AS-303

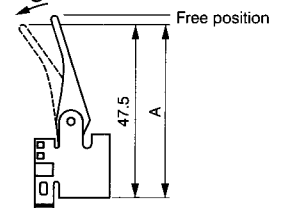


PCB Locating Hole



Case material : Heat-resistant ABS
Actuator material : Polyacetal
Wire : UL-1007, AWG#26
* Dimensions in mm (1mm = 0.0394 inches)

Operating Characteristics

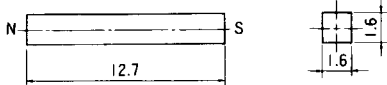
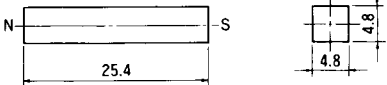
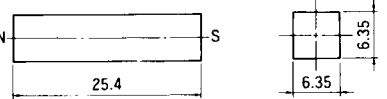
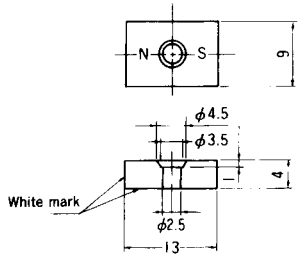
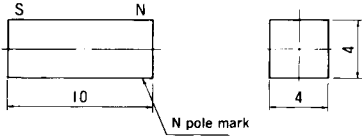
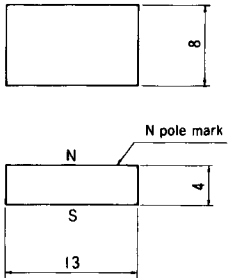
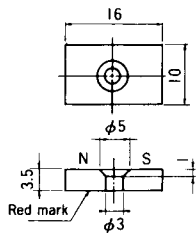
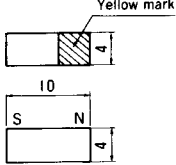
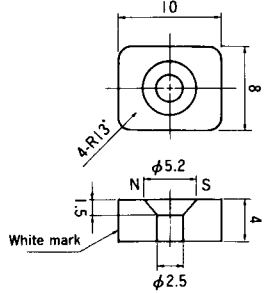
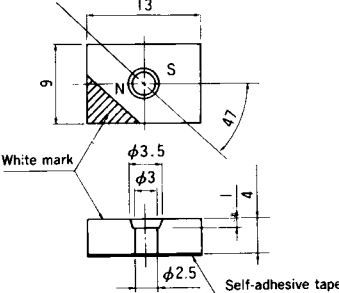
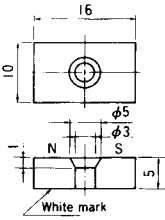
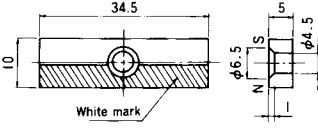


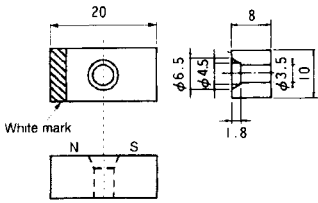
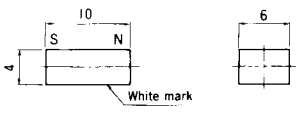
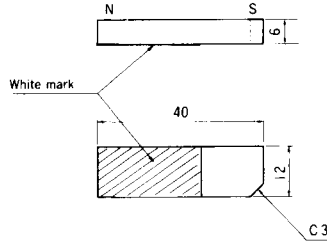
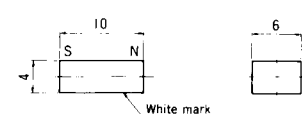
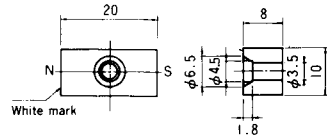
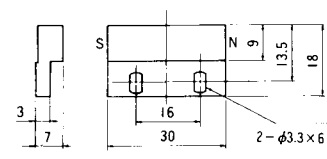
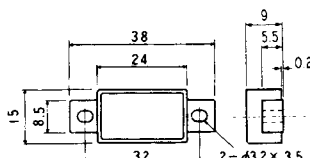
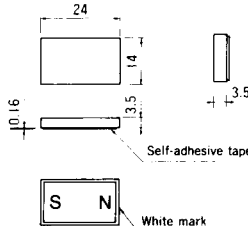
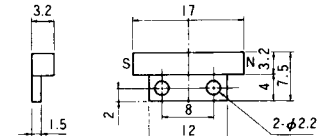
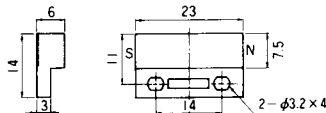
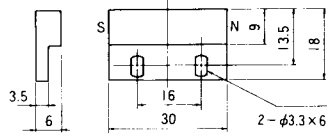
ON	in free position
OFF	A = 47.5mm max.
Operating force	0.5g to 1.5g

Magnets

TG, TZ, PS Series

*Dimensions in mm (1mm = 0.0394 inches)

TG-0001  MATERIAL : Alnico-5 MAGNETIC FLUX DENSITY : 600 to 800 Gauss MAGNETISATION : Fully magnetised	TG-0003  MATERIAL : Alnico-5 MAGNETIC FLUX DENSITY : 900 to 1200 Gauss MAGNETISATION : Fully magnetised	TG-0004  MATERIAL : Alnico-5 MAGNETIC FLUX DENSITY : 1000 to 1400 Gauss MAGNETISATION : Fully magnetised
TG-0016  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 270 to 440 Gauss MAGNETISATION : One side magnetised only as shown above	TG-0043 • TG-0303 TG-0043 = as shown below TG-0303 = TG-0043 + additional N pole marking on end face  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 280 to 380 Gauss MAGNETISATION : One side magnetised only as shown above	TG-0080  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 500 to 600 Gauss MAGNETISATION : Fully magnetised
TG-0096  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 300 to 380 Gauss MAGNETISATION : One side magnetised only as shown above	TG-0101  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 280 to 380 Gauss MAGNETISATION : One side magnetised only as shown above	TG-0127  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 300 to 360 Gauss MAGNETISATION : One side magnetised only as shown above
TG-0137  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 350 to 480 Gauss MAGNETISATION : One side magnetised only as shown above	TG-0149  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 350 to 450 Gauss MAGNETISATION : One side magnetised only as shown above	TG-0159  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 600 to 700 Gauss MAGNETISATION : One side magnetised only as shown above

TG-0174-01  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 360 to 440 Gauss MAGNETISATION : One side magnetised only as shown above	TG-0180  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 380 to 480 Gauss MAGNETISATION : One side magnetised only as shown above	TG-0183  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 350 to 500 Gauss MAGNETISATION : One side magnetised only as shown above
TG-0191  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 750 to 850 Gauss MAGNETISATION : One side magnetised only as shown above	TG-0226  MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 700 to 850 Gauss MAGNETISATION : Fully magnetised	TZ-0010  *For PS-6231 and PS-4000 series CASE : ABS MATERIAL : Strontium-Ferrite MAGNETIC FLUX DENSITY : Call Aleph MAGNETISATION : Partly magnetised
TZ-0011  MATERIAL : Barium-Ferrite Encapsulated magnet to match PS-0016 For further details refer to data on PS-0016	TZ-0017  MATERIAL : Flexible magnet MAGNETIC FLUX DENSITY : 500 to 700 Gauss MAGNETISATION : One side magnetised only as shown above	TZ-0046  *For PS-0048 MATERIAL : Alnico-5 MAGNETIC FLUX DENSITY : 650 to 700 Gauss MAGNETISATION : Fully magnetised
PS-3002  *For PS-3150 MATERIAL : Barium-Ferrite MAGNETIC FLUX DENSITY : 450 to 750 Gauss MAGNETISATION : Fully magnetised	PS-6001  *For PS-6000 series MATERIAL : Alnico-5 MAGNETIC FLUX DENSITY : 900 to 1200 Gauss MAGNETISATION : Fully magnetised	

Application Notes

■ Special Requests

- Please contact ALEPH, if your application requirements cannot be met by any of our standard models, for any of the reasons listed below:
 - wire style (colour, UL grade, gauge, length)
 - connector style
 - package style
 - high speed or extremely low speed
 - long operational life
 - lever style
 - mounting-plate thickness, etc.

■ Handling

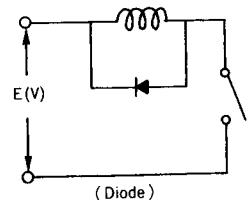
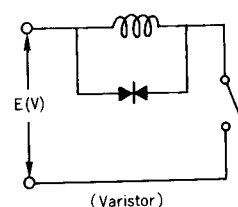
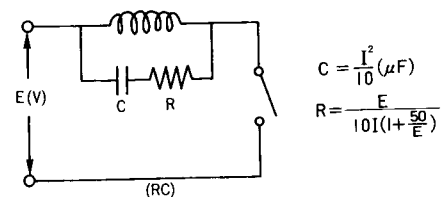
- Tightening torque on M3 screws for mounting sensors is 5kg cm² max. Avoid using tools such as pneumatic screwdrivers, which apply shock and vibration to sensors.
- Mounting surfaces should be clean and flat and free of debris. Mounting on uneven surfaces will result in stress forces being applied to sensors. This may result in damage to the internal reed switch.
- If a sensor is dropped from a height of 30 cm or more onto a hard surface, its operating characteristics are likely to change and deteriorate. Care should be taken during handling.

■ Magnetic Interference

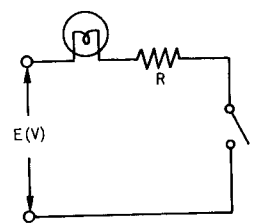
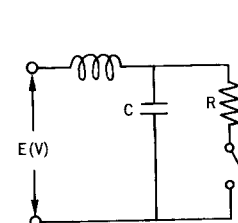
- Machines such as motors and solenoids, in close proximity to the sensor, may cause a change in its characteristics resulting in erroneous operation. Place the sensor away from such magnetic field-generating devices, or use magnetic shielding to screen the sensor from these fields.
- Magnetic materials (iron plate, etc) in close proximity to the sensor, may cause a change in its operating characteristics. The operation of the sensor needs to be verified in these circumstances.
- Check for multi-point operation. The magnetic properties of the actuating magnet may cause the switch to operate at more than one point.

■ Contact Protection

- **Resistive loads:**
A proximity sensor will normally have a service life of several tens of millions of sensings. Resistive load conditions do not pose a severe problem to the sensor.
- **Inductive loads:**
When using reed switch based proximity sensors for switching inductive loads such as motors, relay coils, solenoids, etc, contacts will be subjected to high induced voltages during opening of sensor contacts and arcing may occur. Such high induced voltages (transients) may cause damage to sensor contacts and significantly reduce their operational life. Therefore, protective circuits such as RC (snubber) networks, varistors, or clamping diodes are recommended.



- **Capacitive loads:**
When using reed switch based proximity sensors for switching capacitive loads such as capacitors, incandescent lamps or long cables (harnesses), contacts will be subjected to high surge (inrush) current. Therefore protective circuits such as surge suppressors or current-limiting resistors are recommended.



Application Notes

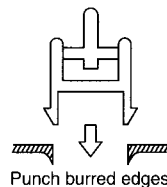
■ Notes on Lever Actuated Sensors

• Mounting

There are two types of lever-actuated sensors: spring-loaded and counterweight. Spring-loaded lever sensors can be mounted in any position, but counterweight lever sensors must be mounted in the position as shown in their specifications. The AS-Series products described in this catalogue are counterweight versions. For spring-loaded types please contact Aleph.

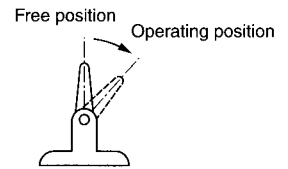
- Lever-actuated sensors are designed to be mounted on sheet metal. When mounting on printed circuit boards or plastic, proper attachment to such materials must be provided to avoid mechanical shift. If more adhesion is needed, glue may be used.
- For mounting-hole sizes and the shape of holes for mounting snap-in action types see recommended mounting-hole dimensions for each model in the specifications.

- If mounting-hole has punch-burred edges, insert sensor from the other side. Reversed insertion may cause mechanical damage to sensor.



• Mechanical

Proper operating angle is important to achieve stable operation; see specification sheets.



- When used for high-speed sensing, make sure that the actuator has enough time to return to the free position.
- When using spring-loaded lever actuators, make sure that spring pressure on actuator will allow for proper movement of sensed object. Keep in mind that the actuator will wear through repeated mechanical contact with the sensed object.

■ Critical Applications

The information contained within this catalogue is deemed to be correct at the date of publication. Engineers designing parts into critical applications should consult with Aleph to check the latest specification and, if necessary, develop a custom part for the application concerned.

Conditions of Purchase

1. Change of Specifications

Please note in advance that the specifications/contents of the products shown in this catalogue may be partly changed for the purpose of improvement.

2. Agreement of Specification

In your adoption of the product shown in this catalogue, including products partly changed in their specification as requested, we will make an agreement with you noting that the equipments/apparatuses containing the adopted product mounted therein are necessarily identified in the specification. Otherwise, we will not be able to fulfil our responsibility, even when any breakdown in functions or trouble on safety of the product occurred in the equipment/apparatuses.

3. Use Methods/Conditions/Environments

In using the adopted product referred to in paragraph 2 above, please draw your attention to the use methods/conditions/environments indicated in the agreed specification. If the products are used under the wrong ranges of the use methods/conditions/environments, beyond the range indicated in the agreed specification, and it results in the occurrence of any difficulties with the product liability, we will not be able to fulfil our responsibility for the damages due to the difficulties.

4. Term of Guarantee

The term of guarantee of the products is one (1) year from the delivery date when they were delivered to the place as requested by a buyer.

5. Range of Guarantee

If the breakdown due to our responsibility occurred during the term as indicated in the preceding paragraph, the broken part(s) is(are) exchanged with a fresh part(s) or repaired at our responsibility, except for cases (1) to (4) as follows:

- (1) User handled it improperly or incorrectly;
- (2) The breakdown was not caused by the products themselves;
- (3) The products were reformed/improved by other persons or companies other than our company; and
- (4) The breakdown was inevitably caused by disasters such as natural disasters.

Furthermore, the "guarantee" referred to herein is applied to the damage of the products themselves, but not to the damage derived by the break down of the products.

6. Range of Service

The price of the products does not involve our service charge for sending our technical persons to you. Our service charges are incurred for the following cases:

- (1) For our arranging or setting and adjusting of the product, and our attending to the test operation;
- (2) For maintenance, adjustment and repairing by us; and
- (3) For technical guidance or education by us to your technical persons.

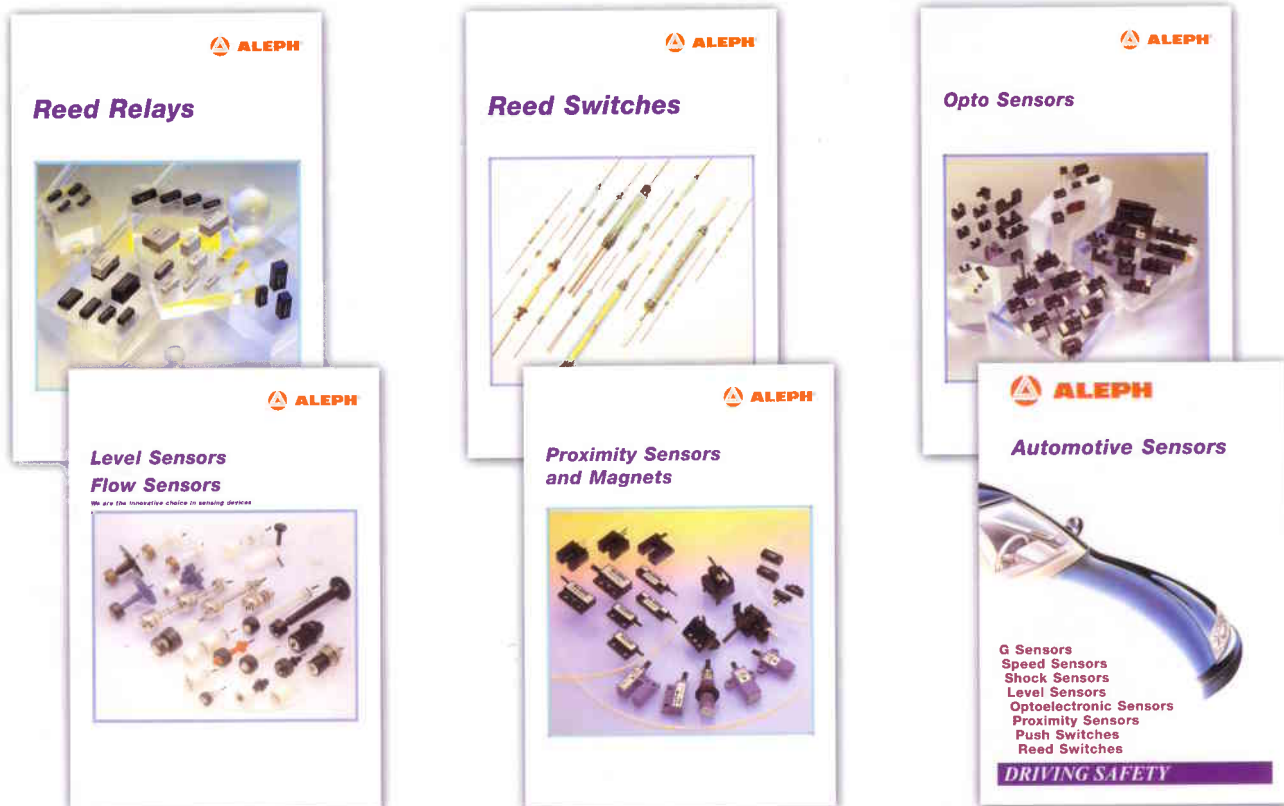
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Aleph manufactures and supplies:

- Reed Relays
- Reed Switches
- Opto Sensors
- Level, Flow and Pressure Sensors
- Proximity Sensors and Magnets
- Automotive Sensors

ALEPH COMPONENT PRODUCT CATALOGUES



For further information on any of these products, please contact your local Aleph sales office given below:



Europe

ALEPH EUROPE LTD.

1 Newton Close, Park Farm Industrial Estate, Wellingborough
Northamptonshire NN8 6UW, England
Tel: +44 1933 679600 Fax: +44 1933 401165
E-mail: info@alepheurope.com
www.alepheurope.com

Japan

NIPPON ALEPH CORPORATION

1-28-52 Komaoka-cho, Tsurumi-ku, Yokohama, Japan
Tel: +81 45 5751111 Telex: J47772 Fax: +81 45 582-5173

Americas

ALEPH INTERNATIONAL CORPORATION

1026 Griswold Avenue, San Fernando, California 91340, U.S.A.
Tel: +1 818 3659856 Fax: +1 818 3657274

Hong Kong

HONG KONG ALEPH CO. LTD.

Southeast Industrial Building 24/F, Flat E,
611-619 Castle Peak Road, Tsuen Wan, N.T., Hong Kong
Tel: +852 2 411 0318 Fax: +852 2 411 4035

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