OPPERATING PRINCIPLES FOR MAGNETIC SENSORS

Magnetic sensors are actuated by the presence of a permanent magnet. Their operating principle is based on the use of reed contacts, whose thin plates are hermetically sealed in a glass bulb with inert gas. The presences of a magnetic field makes the thin plates flex and touch each other causing an electrical contact. The plate’s surface has been treated with a special material particularly suitable for low current or high inductive circuits. Magnetic sensors compared to traditional mechanical switches have the following advantage:

- Contacts are well protected against dust, oxidization and corrosion due to the hermetic glass bulb and inert gas; contacts are activated by means of a magnetic field rather than mechanical parts
- Special surface treatment of contacts assures long contact life
- Maintenance free
- Easy operation
- Reduced size

When using the NO (normally open) type the open reed contact closes as the magnet approaches. NO Magnetic sensors are two wires. When using the NO+NC type both NO (normally open) and NC (normally closed) functions are made available by means of a single glass bulb. NO+NC Magnetic sensors are supplied with three wires, one is in common, one is NO and one is NC

In the BISTABLE versions, contact closes only when external activation magnet is in NORTH polarity position. This state is maintained even when Magnet goes out of sensing area. Contact opens back only when SOUTH polarity of magnet is present, maintaining this condition even when magnet goes out of sensing zone, and can close again only when a NORTH polarity magnet is present.

TYPICAL REED CONTACT PROTECTIONS
The lifespan of a magnetic sensor at low values of voltage and current depends on the mechanical characteristics of the contact while for higher values the operating life depends on the characteristics of the load. In these cases, it is suggested to apply some form of external protection at the sensor output.

EXAMPLE OF FUNCTIONING

D: Max switching distance in relation to the magnet used.
C: Differential stroke.
D + C: Distance of contact re-opening during the removal magnet.
Magnetic Proximity Sensors

Extremely small dimensions and high operating distances characterize these magnetic sensors in metallic case. To actuate sensor a magnetic is required.

**Features:**
- High operating distance
- Threaded metallic case
- Protection degree of IP 67
- Hermetically sealed
- RoHS & Compliant to the EMC directive

<table>
<thead>
<tr>
<th>Output</th>
<th>VA</th>
<th>V</th>
<th>A</th>
<th>MODEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>50</td>
<td>230</td>
<td>0.5</td>
<td>S3390</td>
</tr>
<tr>
<td>NO+NC</td>
<td>20</td>
<td>150</td>
<td>1</td>
<td>S3398</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>S3390</td>
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<td></td>
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<td>S3391</td>
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<td>S400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S401</td>
</tr>
</tbody>
</table>

Dimensions: mm

External Dimensions
- Φ 6 mm
- M8 x 1
- M10 x 1
- M12 x 1

Operating Distance
- See Table 1

Switching Frequency
- NO output = 230 Hz max/ NO+NC output = 250 Hz max

Case
- Nickel-Plated Brass

Protection Degree
- IP 67

Operating Temperature
- -25 to +100°C (-13 to +212°F)

Output Connection
- Cable: 2 x 0.14 mm², L=2m

<table>
<thead>
<tr>
<th>Output</th>
<th>NO</th>
<th>NO/NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3410</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>S3411</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>S3412</td>
<td>40</td>
<td>33</td>
</tr>
</tbody>
</table>

Table 1. Operating distances as a function of the magnetic unit (mm)

Dimensions: mm, 1" = 25.4 mm, 1 mm = .03937"
Magnetic Proximity Sensors

Increase current ratings and high operating distances make these sensors suitable for many applications. To actuate sensor a magnetic is required.

**Features:**

- High operating distance
- Threaded metallic case
- Protection degree of IP 67
- Hermetically sealed
- RoHS & Compliant to the EMC directive

<table>
<thead>
<tr>
<th>Output</th>
<th>VA</th>
<th>V</th>
<th>A</th>
<th>MODEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>10</td>
<td>220</td>
<td>0.5</td>
<td>S3396</td>
</tr>
<tr>
<td>NO</td>
<td>120</td>
<td>250</td>
<td>3</td>
<td>S3396L S3393L S3406</td>
</tr>
<tr>
<td>NO+NC</td>
<td>60</td>
<td>500</td>
<td>3</td>
<td>S3404</td>
</tr>
<tr>
<td>BISTABLE</td>
<td>60</td>
<td>230</td>
<td>1</td>
<td>S3407</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S3393LB</td>
</tr>
</tbody>
</table>

**Dimensions:** mm

- 1" = 25.4 mm
- 1 mm = .03937"

**Wiring**

- Blue: NO
- Brown: NO

**Changeover, NO+NC**

- Blue: NO
- Black: NC
- Brown: NO

**External Dimensions**

- Ø 12 mm, PG 9
- M12 x1
- M18 x 1

**Operating Distance**

- See Table 1

**Switching Frequency**

- NO(10VA) 230Hz, NO (120VA) 100Hz, NO/NC 150Hz, BISTABLE 230Hz

**Case**

- Nickel-Plated Brass

**Protection Degree**

- IP 67

**Operating Temperature**

- -25 to +100°C (-13 to +212°F)

**Output Connection**

- Cable: 2 x 0.14 mm², L=2m

**Magnet**

<table>
<thead>
<tr>
<th>Output</th>
<th>NO (10VA)</th>
<th>NO (120VA)</th>
<th>NO/NC</th>
<th>BISTABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3410</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>S3411</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>S3412</td>
<td>40</td>
<td>33</td>
<td>33</td>
<td>40</td>
</tr>
</tbody>
</table>

**Table 1. Operating distances as a function of the magnetic unit (mm)**

**Dimensions:** mm, 1" = 25.4 mm, 1 mm = .03937"

- S3410
- S3411
- S3412

- not to scale
Rectangular Magnetic Proximity Sensors

To actuate sensor a magnetic is required.

**Features:**
- High operating distance
- Rectangular case
- Protection degree of IP 67
- Hermetically sealed
- RoHS & Compliant to the EMC directive

<table>
<thead>
<tr>
<th>Output</th>
<th>VA</th>
<th>V</th>
<th>A</th>
<th>MODEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>10</td>
<td>220</td>
<td>0.5</td>
<td>S3394</td>
</tr>
<tr>
<td>NO+NC</td>
<td>20</td>
<td>150</td>
<td>1</td>
<td>S3402</td>
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<td></td>
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<td>S3403</td>
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</tbody>
</table>

Dimensions mm, 1mm = .03937”

- Wiring:
  - **NO**
    - blue
    - brown
  - **NO+NC**
    - blue
    - black
    - brown

- Operating Distance: 10 mm
- Switching Frequency:
  - NO output = 230 Hz max
  - NO+NC output = 250 Hz max
- Case:
  - Plastic
  - Anodized Aluminum
- Protection Degree: IP 67
- Operating Temperature: -25 to +100°C (-13 to +212°F)
- Output Connection: Cable: 2 x 0.14 mm², L=2m
- Required Magnet:
  - S3414 M302, Ferrite in Plastic Housing (dimensions same as sensor)
  - S3415 M304, Ferrite in Aluminum Housing (dimensions same as sensor)