

MAGNASPHERE® 



## Switch Product Catalog

THE PATENTED, AWARD-WINNING MAGNASPHERE® switch represents the first breakthrough in two-wire magnetic switch technology since the introduction of the reed switch used in security security systems. The MAGNASPHERE® switch exhibits a wide range of characteristics, making it an ideal solution for many industrial and commercial OEM applications.



For more product information, visit [magnasphere.com](http://magnasphere.com) or call 262-347-0711

MAGNASPHERE® Represents the First Significant Improvement in Magnetic Switch and Sensor Technology in 70 Years.

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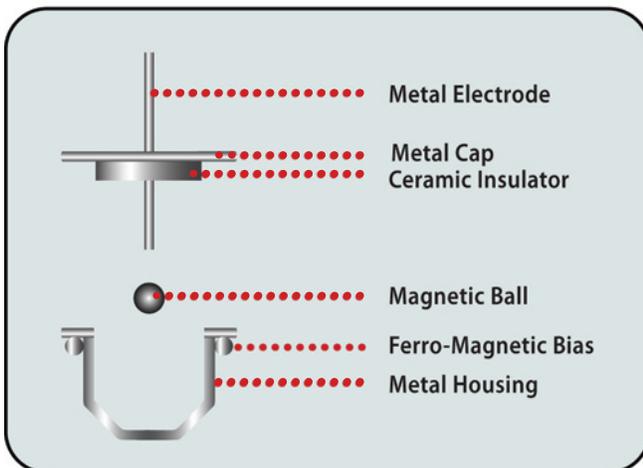
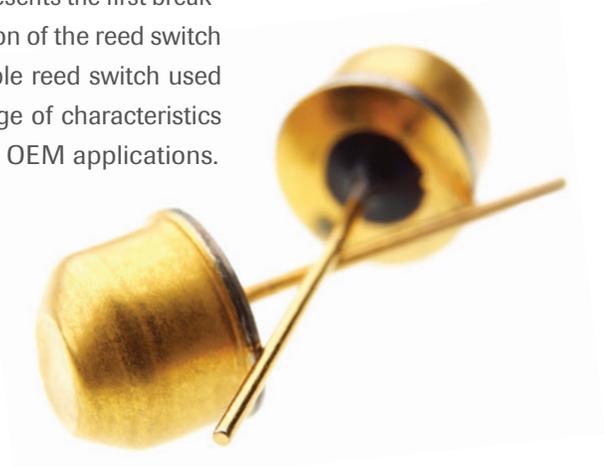
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# Technology Overview

**THE PATENTED, AWARD-WINNING MAGNASPHERE SWITCH** represents the first breakthrough in two-wire magnetic switch technology since the introduction of the reed switch in the 1930's. Originally designed as a replacement for the vulnerable reed switch used in security systems, the MAGNASPHERE switch exhibits a wide range of characteristics that make it an ideal solution for many industrial and commercial OEM applications.

- Hermetically sealed contacts
- Non-contact operation
- Robust metal construction
- Magnetic anti-tamper
- High voltage EMI resistance
- Wide operating temperature range
- Intrinsically safe for use in volatile atmospheres
- Compact size
- Low cost ferrous proximity sensing
- Available in form A (n.o.) and form B (n.c.)

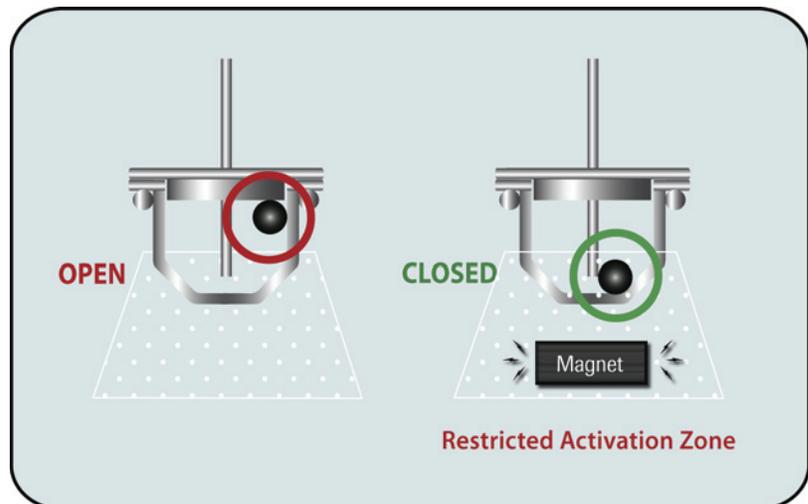


## CONSTRUCTION

The basis of the technology is a magnetic sphere, or ball contact housed in a durable metal housing. Completing the switch is a seal that contains the contacting electrode, insulated from the magnetic perimeter by a ceramic to metal bond. The case or seal provide the second contact point required to complete the electrical circuit. The seal/electrode cap is welded to the housing in an inert atmosphere providing a hermetically sealed contact. Post-assembly magnetizing activates the magnetic properties of the contact.

## FUNCTIONALITY

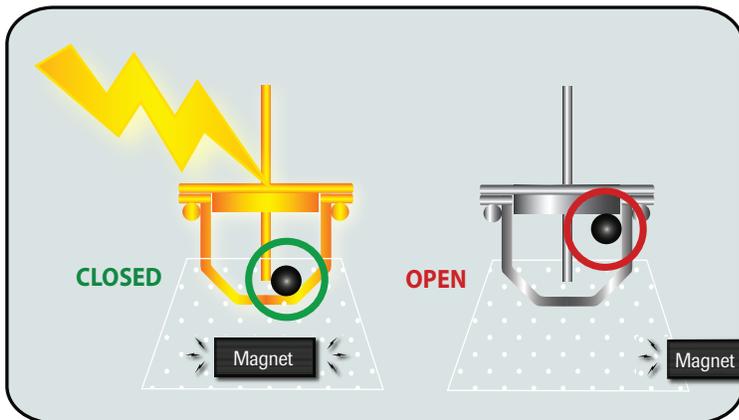
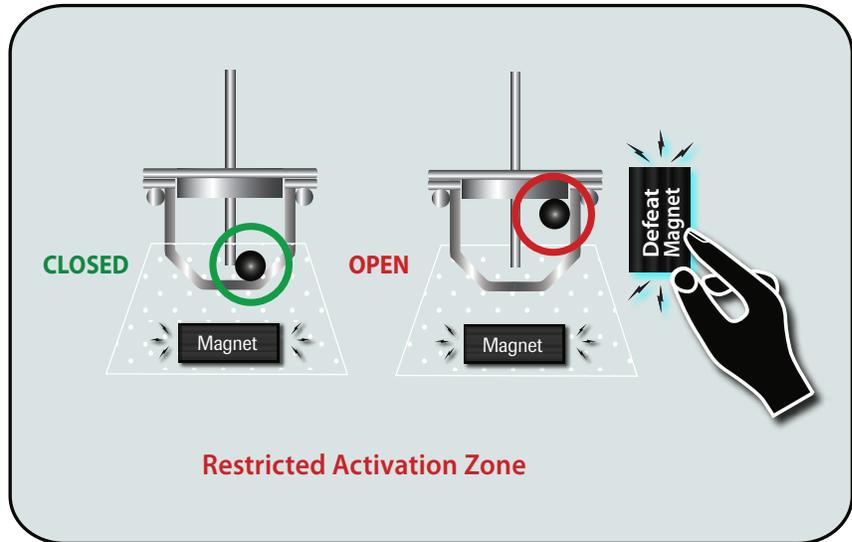
In the open position, the magnetic sphere is attracted to the ferromagnetic bias ring, away from the electrode. Because of this attraction, the switch may be positioned in any orientation and will remain open. When an actuating magnet approaches the switch from the end of the switch opposite the electrode, the magnetic ball is attracted to this field, and “snaps” to the bottom of the case, making contact with the electrode and case, closing the switch.



# Technology Overview

## MAGNETIC TAMPER RESISTANCE

MAGNASPHERE'S technology utilizes the principle of spherical magnetism. The spherical shape is not polarity sensitive and will be attracted to either pole of the actuating magnet. Unlike a reed switch that responds to a magnet within a global activation zone, the MAGNASPHERE switch responds to a magnet only within a restricted zone. A stronger magnet outside the zone pulls the ball off the center electrode to open the switch.



## HIGH VOLTAGE AND EMI RESISTANCE

The MAGNASPHERE spherical contact is a magnet and couples with a target magnet through magnetic attraction. If contacts should weld, the natural movement of the target will attract the ball contact. In addition, high closed contact integrity makes MAGNASPHERE technology highly resistant to electromagnetic interference – a problem found in other magnetic switch and sensor technology.

# Features and Benefits

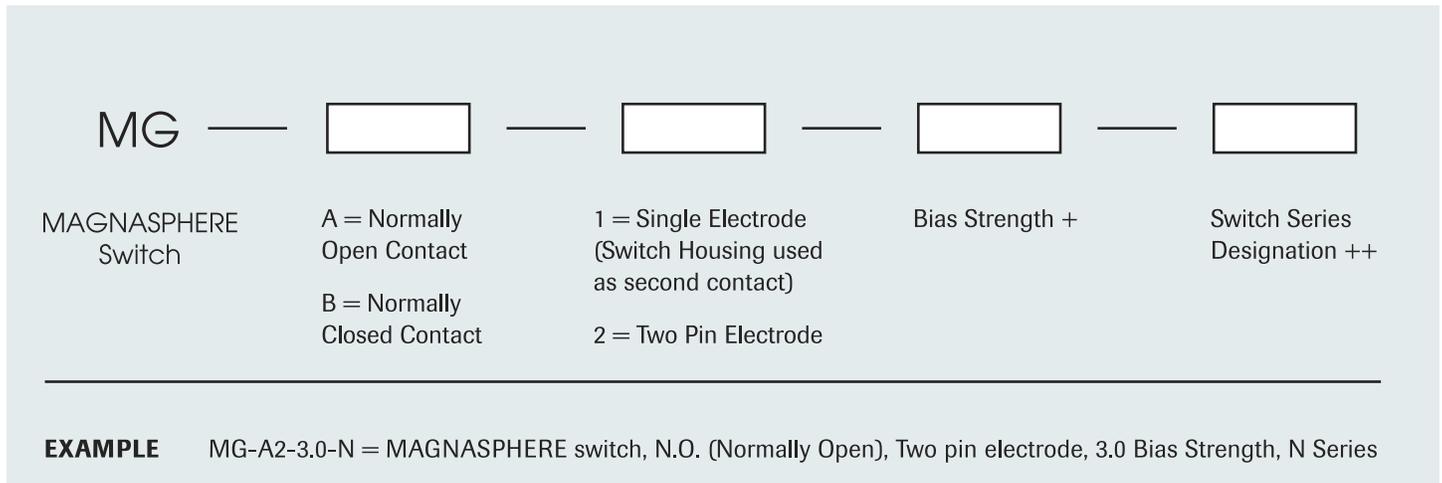
<b>Switch Features</b>	 <p>REED</p>	 <p>MAGNASPHERE</p>
Construction	Glass/Metal Oxide Bond	<b>All Metal Switch</b>
Durability	Fragile Even When Packaged	<b>Virtually Indestructible</b>
Plastic Insert Molding	Fragility a Problem	<b>Can Be Insert Molded</b>
Ferrous Proximity Sensor	Requires Additional Magnet / Cost and Size Issues	<b>Only Stand-Alone Technology with Capability / Lower Cost</b>
Magnetic Activation – Defeat	Globally – Easily Defeated	<b>Defined Zone – Cannot Defeat</b>
High Voltage Exposure	Permanent Contact Welding	<b>Resistant to Contact Welding</b>
Electromagnetic Interference	Easily Affected	<b>Not Affected</b>

## **MAGNASPHERE IS ALSO A SUPERIOR REPLACEMENT FOR HALL EFFECT SWITCHES.**

- Does not require a third wire as a power source.
- Does not drain battery supply during stand-by.
- Operates on similar magnetic field strengths.
- Does not require RFI/EMI protective filter.
- Does not sense only one magnetic polarity.
- Uses similar PCB “real estate” area.
- Does not require shielded wire harness.
- Robust to shock forces and impact.

# MAGNASPHERE® Part Numbering System

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**+ Bias Strength** - Determines actuation distance, shock and vibration sensitivity. Switches are supplied with manufacturer recommended bias. Bias strength can be modified to “tune” switch for various performance characteristics. Contact factory to discuss custom bias options.

**++ Switch Series Designation** - All MAGNASPHERE switch types share the same robust welded construction hermetically sealed intrinsically safe dry contacts and utilize unique spherical magnet contacts. MAGNASPHERE switches can also be used as stand-alone Ferrous Proximity sensors (i.e., It does not need a magnet actuator. It will sense the presence or absence of a ferrous metal target.) See attached specification sheets for operational characteristics of each series.

## N Series Form A (Normally Open)

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The SWITCH SERIES is resistant to:



breakage



magnetic  
tamper



contact  
welding

The MAGNASPHERE N Series is the original MAGNASPHERE switch design. It's robust all metal construction is highly resistant to magnetic tamper and defeat, and permanent contact welding from power surges. The N Series switch can also be used as a close tolerance ferrous metal proximity sensor (no magnet actuator required).

# Solutions Seeking Problems.

## N-Series



The original Magnasphere switch design. Robust all metal construction is highly resistant to magnetic tamper and defeat, and permanent contact welding from power surges. Can also be used as a close tolerance ferrous metal proximity sensor (no magnet actuator required).

### CONTACT CHARACTERISTICS

Contact Form: A (Normally Open-N.O.)  
 Contact Material: Gold/Gold  
 Initial Contact Resistance (Typical): < 150 Milli Ohms  
 Contact Capacitance: < 1 pf  
 Contact Ratings: 30 VDC @ 250 ma  
 Contact Bounce\* (Typical): < 10 milliseconds\*. Recommended trial de-bounce - 15 milliseconds (min.) closed contact condition for logic state changes - or 30 Hz low pass filter buffer  
 Minimum Breakdown Voltage (Typical): 300 VDC  
 Insulation Resistance (Typical): > 5 Mega Ohms

### OPERATION CHARACTERISTICS

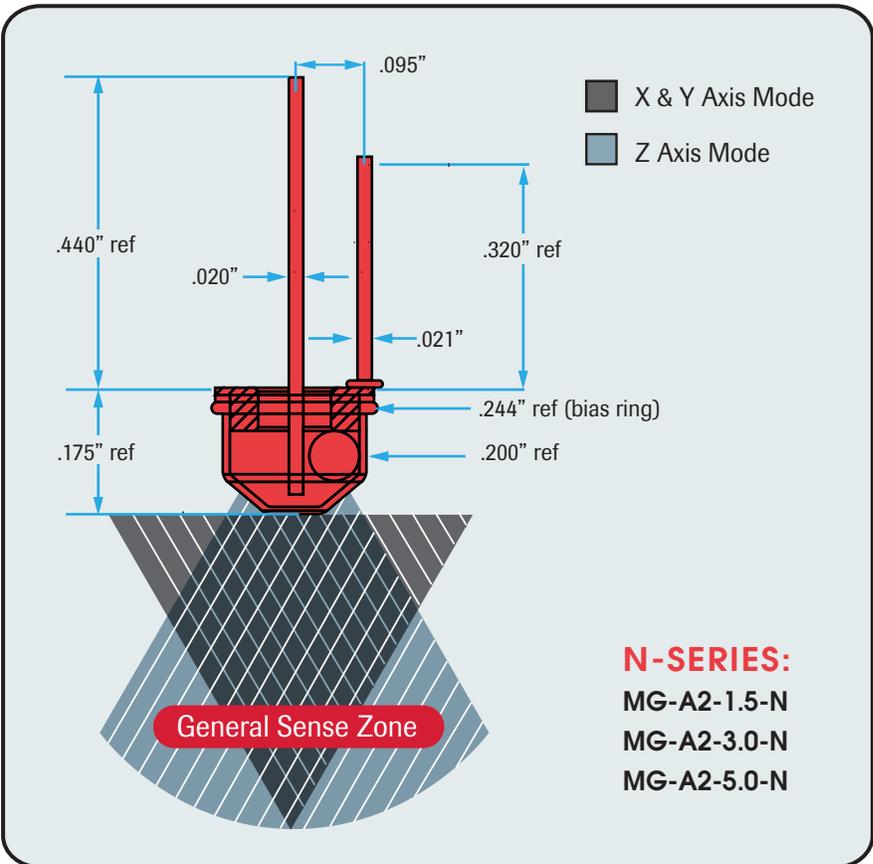
Operate/Release Values:  
 See Switching Characteristics Table  
 Actuation Magnet Orientation:  
 Either Pole  
 Maximum Operating Frequency: 20 Hz  
 Mounting Position: Any Plane  
 Operating Temperature: -40°C to +150°C  
 Shock (Switch Damage): > 100 G's  
 Vibration: 10-15 G's (80-450 Hz)  
 (Higher Values Available)

### GENERAL CHARACTERISTICS & INFORMATION

Construction: Non-Ferrous Metal Housing, Compression Seal Hermetically Sealed, Protective Gas Atmosphere, Precious Metal Plated Spherical Magnet Contact.

Soldering Guidelines: 600° F (315° C) Temperature iron for 5 sec. (max.). Do not solder within 1/8" (3 mm) of glass seal. Lead pins precious metal plated for enhanced solderability.

Termination Polarity Guidelines: Polarity selection is non-critical, though some



life gain may be realized by center pin as cathode on logic loads, but center pin as anode on larger loads.

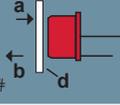
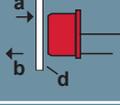
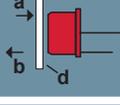
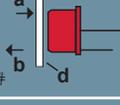
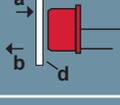
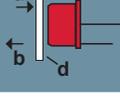
Lead Wire Cutting / Bending Guidelines: Cut length has no effect on magnetic OP/REL values. Shearing action type cutters are recommended, but end nippers and side cutters are NOT recommended. Metal style seals are extraordinarily rugged, but the bending of unsupported lead wire pins adjacent to the glass seal is not recommended (i.e. when bending

use the support of some type of parallel jaws spaced away from the glass seal to grip the lead wire pins while bending the pins' free ends, so no bending strains are imposed on the glass seal.

Other Comments: Ferromagnetic materials and strong Electromagnetic devices proximate to the switch or its actuator magnet may adversely affect expected OP/REL switching values. Experimentation is recommended to investigate areas of concern.



The Most Advanced and Effective Magnetic Sensor

SWITCHING CHARACTERISTICS		AIR GAP DISTANCE				
		POSITION	TYPICAL	MIN	MAX	
<b>MG-A2-1.5-N</b> <small>Consult factory regarding application/use of this part#</small> 	(a)	Leads Horz. <b>"CLOSED"</b>	.818"	.521"	1.115"	<b>NEO 35 MAGNET TARGET</b> 0.5" L x .375" T
	(b)	Leads Horz. <b>"OPEN"</b>	1.313"	.795"	1.431"	
<b>MG-A2-3.0-N</b> 	(a)	Leads Horz. <b>"CLOSED"</b>	.652"	.463"	.841"	
	(b)	Leads Horz. <b>"OPEN"</b>	.897"	.518"	1.276"	
<b>MG-A2-5.0-N</b> 	(a)	Leads Horz. <b>"CLOSED"</b>	.569"	.320"	.818"	
	(b)	Leads Horz. <b>"OPEN"</b>	.643"	.460"	.826"	
<b>MG-A2-1.5-N</b> <small>Consult factory regarding application/use of this part#</small> 	(a)	Leads Horz. <b>"CLOSED"</b>	.053"	.035"	.071"	<b>FERROUS METAL TARGET</b> EG, C1010 Low Carbon 1.0" L x 1.0" W x .0625" T
	(b)	Leads Horz. <b>"OPEN"</b>	.089"	.059"	.119"	
<b>MG-A2-3.0-N</b> 	(a)	Leads Horz. <b>"CLOSED"</b>	.034"	.022"	.046"	
	(b)	Leads Horz. <b>"OPEN"</b>	.061"	.037"	.085"	
<b>MG-A2-5.0-N</b> 	(a)	Leads Horz. <b>"CLOSED"</b>	.030"	.021"	.041"	
	(b)	Leads Horz. <b>"OPEN"</b>	.048"	.036"	.060"	

# N-Series

**Switching characteristics** the target moves closer (a), this normally open switch will CLOSE at the air gap distance (d), and OPEN when the target moves away (b).

## ABOUT MAGNASPHERE

MAGNASPHERE® Corp. is a privately held company founded in 2002, with the purpose of providing superior performing magnetic switch and sensor technology to the industrial/commercial OEM and security markets. MAGNASPHERE's patented, award-winning technology establishes new standards for magnetic switch performance while providing an affordable and more effective alternative to other magnetic switch technologies.

Learn more: Visit us at [www.MAGNASPHERE.com](http://www.MAGNASPHERE.com).



Standard for Industrial Control Equipment, UL 508

## PATENTED DESIGN

MAGNASPHERE® products are covered by one or more of the following U.S. and international patents:

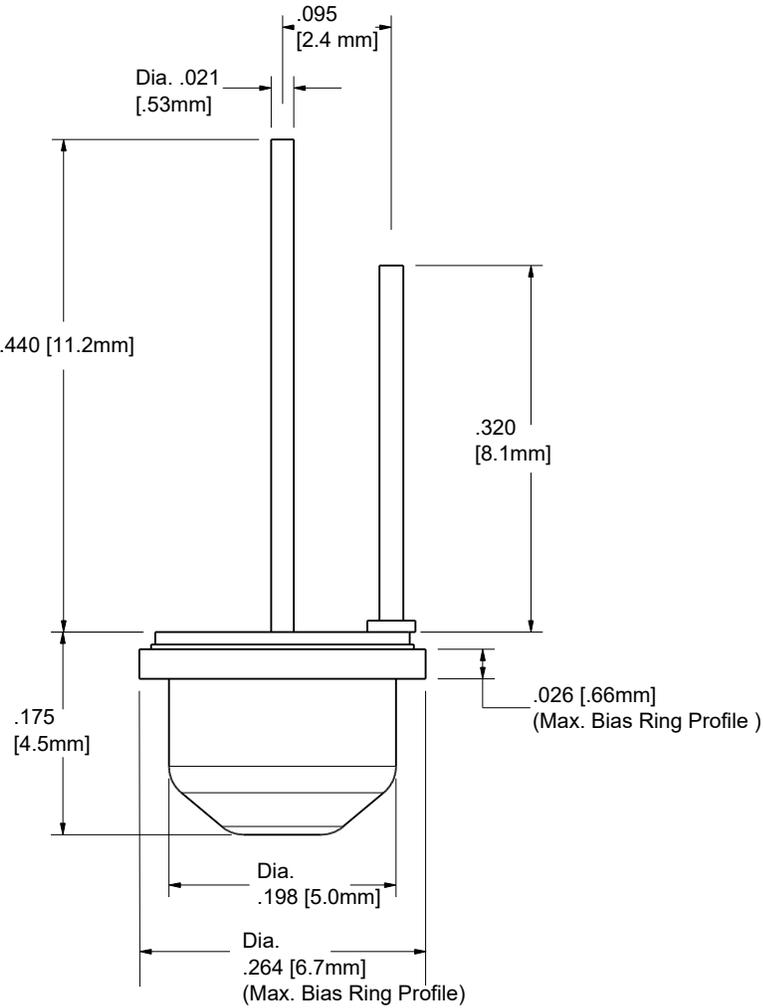
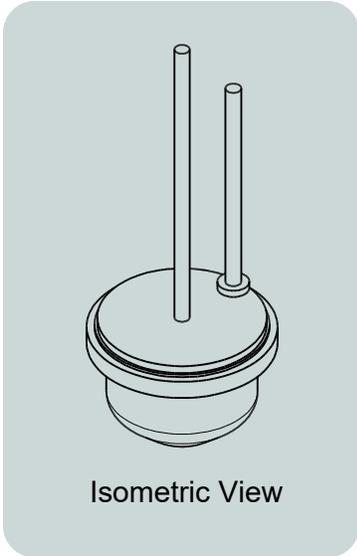
- |          |                   |          |
|----------|-------------------|----------|
| #5332992 | #5530428          | #5673021 |
| #5880659 | #5977873          | #6087936 |
| #6506987 | #6603378          | #6803845 |
| #7023308 | (Patents Pending) |          |

**MAGNASPHERE® NOTICE OF LIMITED LICENSE AND RIGHTS:** (Security Applications)  
 The purchase of MAGNASPHERE® switches provides the purchaser and the purchaser's customers with a limited right and license to make, use, offer for sale, and sell security devices, each making use of a single MAGNASPHERE® switch; however, this limited right and license does not extend to and specifically excludes security devices making use of two or more MAGNASPHERE® switches that cooperatively monitor a single area or location.

## INDUSTRY AWARDS

- Best of Show Award:**  
ISC Expo
- Gold Award**  
Sensor Technology:  
Sensors Expo
- Best Intrusion**  
Detection:  
ISC Expo

# N-Switch Reference Dimensions



## TW-Series Form A (Normally Open)

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The SWITCH SERIES is resistant to:



breakage



magnetic  
tamper



contact  
welding

The MAGNASPHERE TW Series is used in the security industry for door and window sensors in closed loop alarm systems. It has a wider actuation zone in the X or Y axis than other Form A MAGNASPHERE switches. The switch's robust all metal construction is highly resistant to magnetic tamper and defeat, and permanent contact welding from power surges.

# Solutions Seeking Problems.

## TW-Series



This series is used in the security industry for door and window sensors in Closed loop alarm systems. It has a wider actuation zone in the X or Y axis than other Form A Magnasphere switches. Robust all metal construction is highly resistant to magnetic tamper and defeat, and permanent contact welding from power surges.

### CONTACT CHARACTERISTICS

Contact Form: A (Normally Open-N.O.)  
Contact Material: Gold/Gold  
Initial Contact Resistance (Typical):  
< 150 Milli Ohms  
Contact Capacitance: < 1pf  
Contact Ratings: 30 VDC @ 250ma  
Contact Bounce\* (Typical): < 10  
milliseconds\*. Recommended trial  
de-bounce - 15 milliseconds (min.)  
closed contact condition for logic state  
changes - or 30 Hz low pass filter buffer  
Minimum Breakdown Voltage (Typical):  
300 VDC  
Insulation Resistance (Typical):  
> 5 Mega Ohms

### OPERATION CHARACTERISTICS

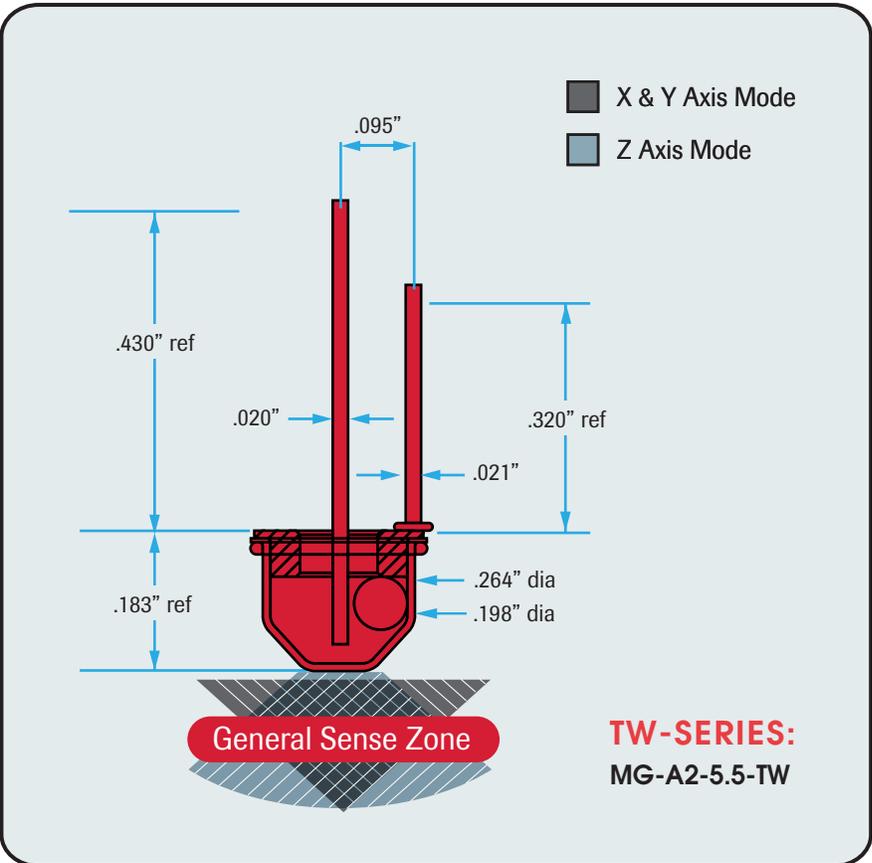
Operate/Release Values:  
See Switching Characteristics Table  
Actuation Magnet Orientation:  
Either Pole  
Maximum Operating Frequency: 20 Hz  
Mounting Position: Any Plane  
Operating Temperature: -40°C to +150°C  
Shock (Switch Damage): > 100 G's  
Vibration: 10-15 G's (80-450 Hz)  
(Higher Values Available)

### GENERAL CHARACTERISTICS & INFORMATION

**Construction:** Non-Ferrous Metal Housing, Compression Seal Hermetically Sealed, Protective Gas Atmosphere, Precious Metal Plated Spherical Magnet Contact.

**Soldering Guidelines:** 600° F (315° C) Temperature iron for 5 sec. (max.). Do not solder within 1/8" (3 mm) of glass seal. Lead pins precious metal plated for enhanced solderability.

**Termination Polarity Guidelines:** Polarity selection is non-critical, though some



life gain may be realized by center pin as cathode on logic loads, but center pin as anode on larger loads.

**Leadwire Cutting / Bending Guidelines:** Cut length has no effect on magnetic OP/REL values. Shearing action type cutters are recommended, but end nippers and side cutters are NOT recommended. Metal style seals are extraordinarily rugged, but the bending of unsupported lead wire pins adjacent to the glass seal is not recommended (i.e. when bending

use the support of some type of parallel jaws spaced away from the glass seal to grip the lead wirepins while bending the pins' free ends, so no bending strains are imposed on the glass seal.

**Other Comments:** Ferromagnetic materials and strong Electromagnetic devices proximate to the switch or its actuator magnet may adversely affect expected OP/REL switching values. Experimentation is recommended to investigate areas of concern.



The Most Advanced and Effective Magnetic Sensor

SWITCHING CHARACTERISTICS		AIR GAP DISTANCE		
	POSITION	TYPICAL	MIN	MAX
<b>MG-A2-5.5-TW</b> 	(a) Leads Horz. <b>"CLOSED"</b>	.577"	.462"	.692"
	(b) Leads Horz. <b>"OPEN"</b>	.713"	.610"	.817"
<b>MG-A2-5.5-TW</b> 	(a) Leads Horz. <b>"CLOSED"</b>	NOT RECOMMENDED		
	(b) Leads Horz. <b>"OPEN"</b>			

NEO 35 MAGNET TARGET  
0.5" L x .375" T

FERROUS METAL TARGET  
EG: C1010 Low Carbon  
1.0" L x 1.0" W x .0625" T

## TW-Series

**Switching characteristics** the target moves closer (a), this normally open switch will CLOSE at the air gap distance (d), and OPEN when the target moves away (b).

### ABOUT MAGNASPHERE

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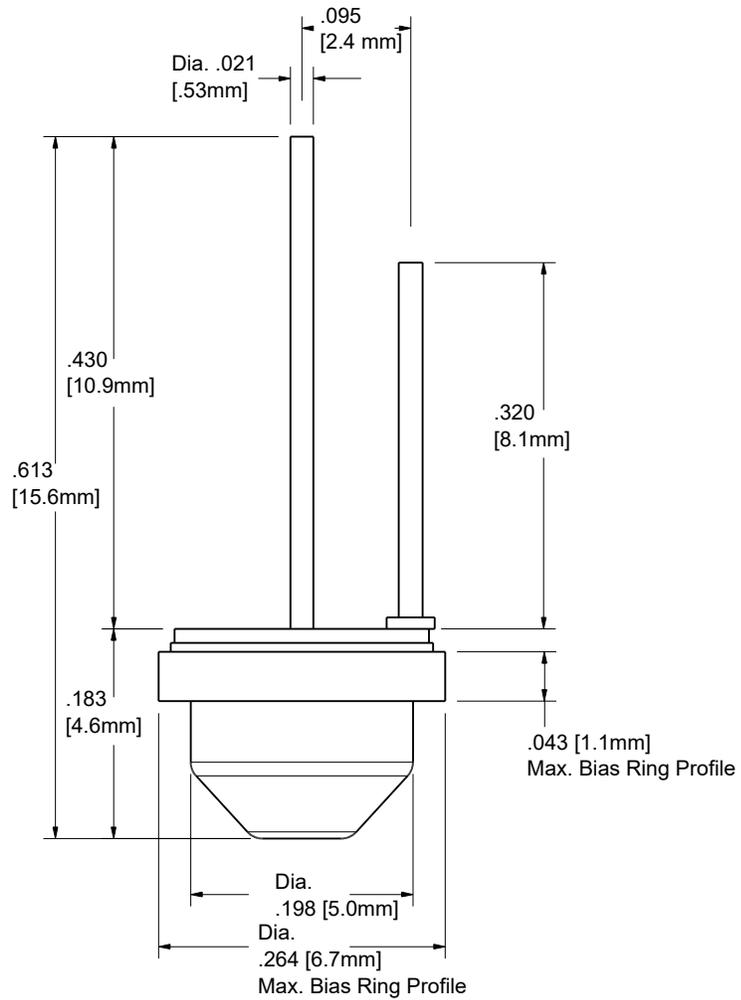
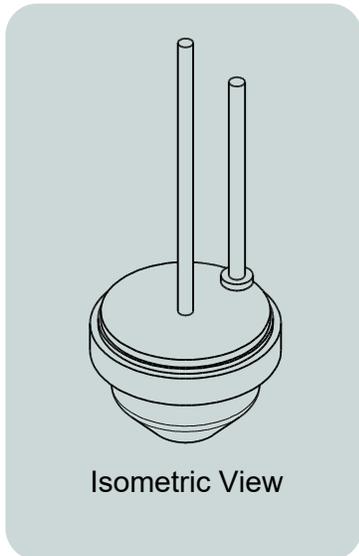
- #5332992      #5530428      #5673021
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- #6506987      #6603378      #6803845
- #7023308      (Patents Pending)

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### INDUSTRY AWARDS

- Best of Show Award:  
ISC Expo
- Gold Award  
Sensor Technology:  
Sensors Expo
- Best Intrusion  
Detection:  
ISC Expo

# TW-Switch Reference Dimensions



## L-Series Form Form B (Normally Closed)

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The SWITCH SERIES is resistant to:



breakage



contact  
welding

The MAGNASPHERE® L Series offers remarkable ferrous metal proximity sensing (needs no magnet actuator) in a compact, low cost two-wire switch. It can also be configured as a magnetically tamper resistant device. The switch's robust all metal construction and design make it highly resistant to permanent contact welding due to power surges.

# Solutions Seeking Problems.

## L-Series



Offers remarkable ferrous metal proximity sensing (needs no magnet actuator) in such a compact, low cost two-wire switch. Can also be configured as a magnetically tamper resistant device. Robust all metal construction and design make it highly resistant to permanent contact welding due to power surges.

### CONTACT CHARACTERISTICS

Contact Form: B (Normally Closed-N.C.)  
Contact Material: Gold/Gold  
Initial Contact Resistance (Typical):  
< 150 Milli Ohms  
Contact Capacitance: < 1 pf  
Contact Ratings: 30 VDC @ 250 ma  
Contact Bounce\* (Typical): < 10 milliseconds\*. Recommended trial de-bounce - 15 milliseconds (min.) closed contact condition for logic state changes - or 30 Hz low pass filter buffer  
Minimum Breakdown Voltage (Typical): 300 VDC  
Insulation Resistance (Typical): > 5 Mega Ohms

### OPERATION CHARACTERISTICS

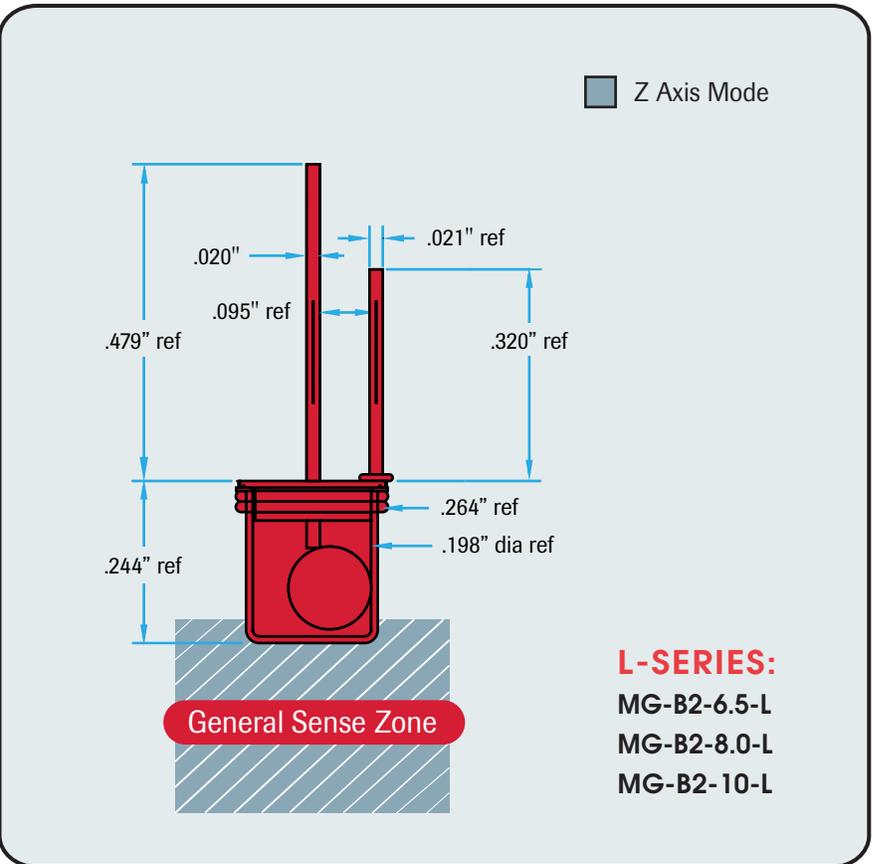
Operate/Release Values:  
See Switching Characteristics Table  
Actuation Magnet Orientation:  
Either Pole  
Maximum Operating Frequency: 20 Hz  
Mounting Position: Any Plane  
Operating Temperature: -40°C to +85°C  
Shock (Switch Damage): > 100 G's  
Vibration: 10-15 G's (80-450 Hz)  
(Higher Values Available)

### GENERAL CHARACTERISTICS & INFORMATION

Construction: Non-Ferrous Metal Housing, Compression Seal Hermetically Sealed, Protective Gas Atmosphere, Precious Metal Plated Spherical Magnet Contact.

Soldering Guidelines: 600° F (315° C) Temperature iron for 5 sec. (max.). Do not solder within 1/8" (3 mm) of glass seal. Lead pins precious metal plated for enhanced solderability.

Termination Polarity Guidelines: Polarity selection is non-critical, though some



life gain may be realized by center pin as cathode on logic loads, but center pin as anode on larger loads.

Lead Wire Cutting / Bending Guidelines: Cut length has no effect on magnetic OP/REL values. Shearing action type cutters are recommended, but end nippers and side cutters are NOT recommended. Metal style seals are extraordinarily rugged, but the bending of unsupported lead wire pins adjacent to the glass seal is not recommended (i.e. when bending

use the support of some type of parallel jaws spaced away from the glass seal to grip the lead wirepins while bending the pins' free ends, so no bending strains are imposed on the glass seal.

Other Comments: Ferromagnetic materials and strong Electromagnetic devices proximate to the switch or its actuator magnet may adversely affect expected OP/REL switching values. Experimentation is recommended to investigate areas of concern.



The Most Advanced and Effective Magnetic Sensor

		SWITCHING CHARACTERISTICS		AIR GAP DISTANCE			
		POSITION	TYPICAL	MIN	MAX		
The Most Advanced and Effective Magnetic Sensor	MG-B2-6.5-L		(a) Leads Horz. <b>"OPEN"</b> (b) Leads Horz. <b>"CLOSED"</b>	1.000" 1.092"	.813" 1.825"	1.187" 1.359"	NEO 35 MAGNET TARGET 0.5" L x .375" T
	MG-B2-8.0-L		(a) Leads Horz. <b>"OPEN"</b> (b) Leads Horz. <b>"CLOSED"</b>	.921" .989"	.831" .918"	1.011" 1.050"	
	MG-B2-10-L		(a) Leads Horz. <b>"OPEN"</b> (b) Leads Horz. <b>"CLOSED"</b>	.843" .902"	.739" .826"	.947" .978"	
	MG-B2-6.5-L		(a) Leads Horz. <b>"OPEN"</b> (b) Leads Horz. <b>"CLOSED"</b>	.128" .152"	.103" .137"	.153" .167"	FERROUS METAL TARGET EG. C1010 Low Carbon 1.0" L x 1.0" W x .0625" T
	MG-B2-8.0-L		(a) Leads Horz. <b>"OPEN"</b> (b) Leads Horz. <b>"CLOSED"</b>	.116" .138"	.084" .107"	.148" .169"	
	MG-B2-10-L		(a) Leads Horz. <b>"OPEN"</b> (b) Leads Horz. <b>"CLOSED"</b>	.111" .131"	.083" .113"	.139" .149"	

# L-Series

**Switching characteristics** the target moves closer (a), this normally closed switch will OPEN at the air gap distance (d), and CLOSE when the target moves away (b).

## ABOUT MAGNASPHERE

MAGNASPHERE® Corp. is a privately held company founded in 2002, with the purpose of providing superior performing magnetic switch and sensor technology to the industrial/commercial OEM and security markets. MAGNASPHERE's patented, award-winning technology establishes new standards for magnetic switch performance while providing an affordable and more effective alternative to other magnetic switch technologies.

Learn more: Visit us at [www.MAGNASPHERE.com](http://www.MAGNASPHERE.com).



## PATENTED DESIGN

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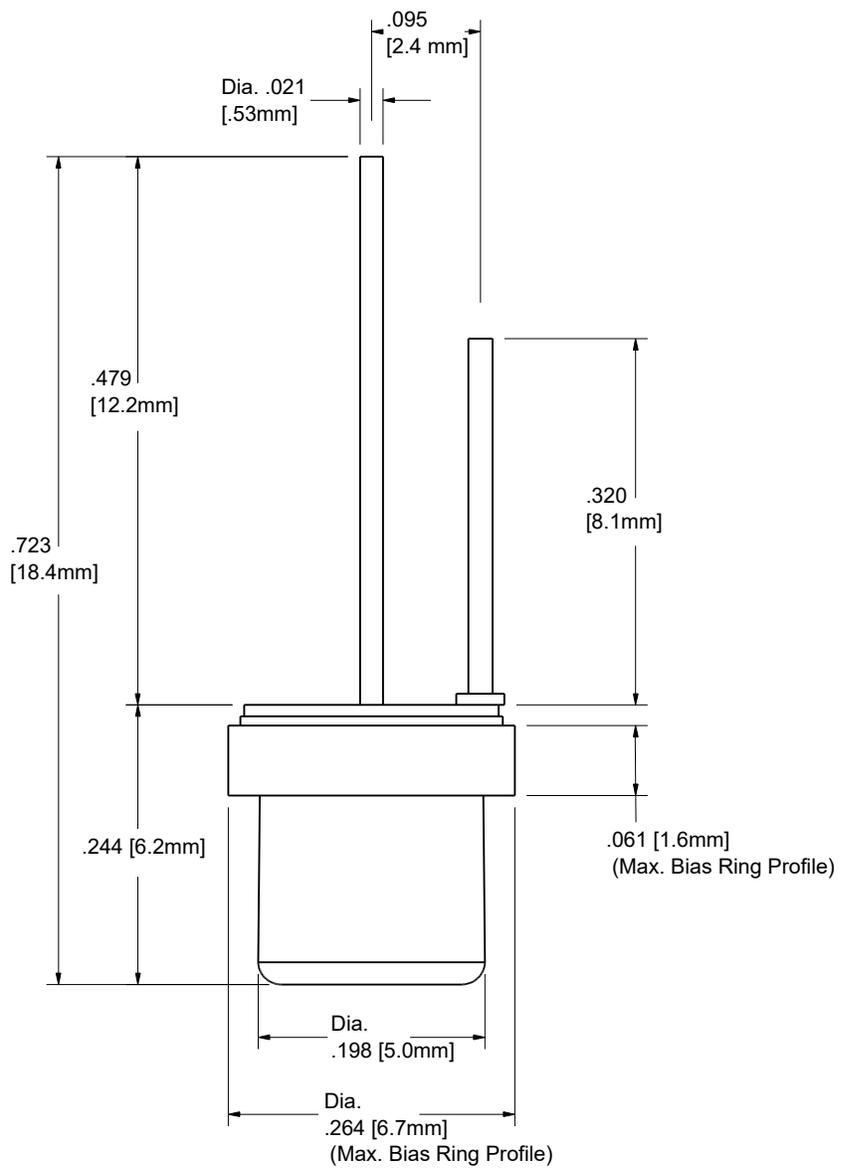
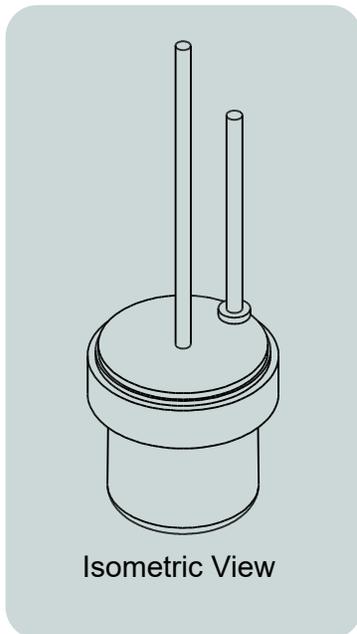
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- #5673021
- #5880659
- #5977873
- #6087936
- #6506987
- #6603378
- #6803845
- #7023308
- (Patents Pending)

## INDUSTRY AWARDS

- Best of Show Award: ISC Expo
- Gold Award Sensor Technology: Sensors Expo
- Best Intrusion Detection: ISC Expo

**MAGNASPHERE® NOTICE OF LIMITED LICENSE AND RIGHTS:** (Security Applications)  
The purchase of MAGNASPHERE® switches provides the purchaser and the purchaser's customers with a limited right and license to make, use, offer for sale, and sell security devices, each making use of a single MAGNASPHERE® switch; however, this limited right and license does not extend to and specifically excludes security devices making use of two or more MAGNASPHERE® switches that cooperatively monitor a single area or location.

# L-Switch Reference Dimensions





# L-25 Series



Offers remarkable ferrous metal proximity sensing (needs no magnet actuator) in such a compact, low cost two-wire switch. Can also be configured as a magnetically tamper resistant device. Robust all metal construction and design make it highly resistant to permanent contact welding due to power surges.

## CONTACT CHARACTERISTICS

**Contact Form:** B (Normally Closed-N.C.)  
**Contact Material:** Gold/Gold  
**Initial Contact Resistance (Typical):**  
 < 150 Milli Ohms  
**Contact Capacitance:** < 1 pf  
**Contact Ratings:** 30 VDC @ 250 ma  
**Contact Bounce\* (Typical):** < 10  
 milliseconds\*. Recommended trial  
 de-bounce - 15 milliseconds (min.)  
 closed contact condition for logic state  
 changes - or 30 Hz low pass filter buffer  
**Minimum Breakdown Voltage (Typical):**  
 300 VDC  
**Insulation Resistance (Typical):**  
 > 5 Mega Ohms

## OPERATION CHARACTERISTICS

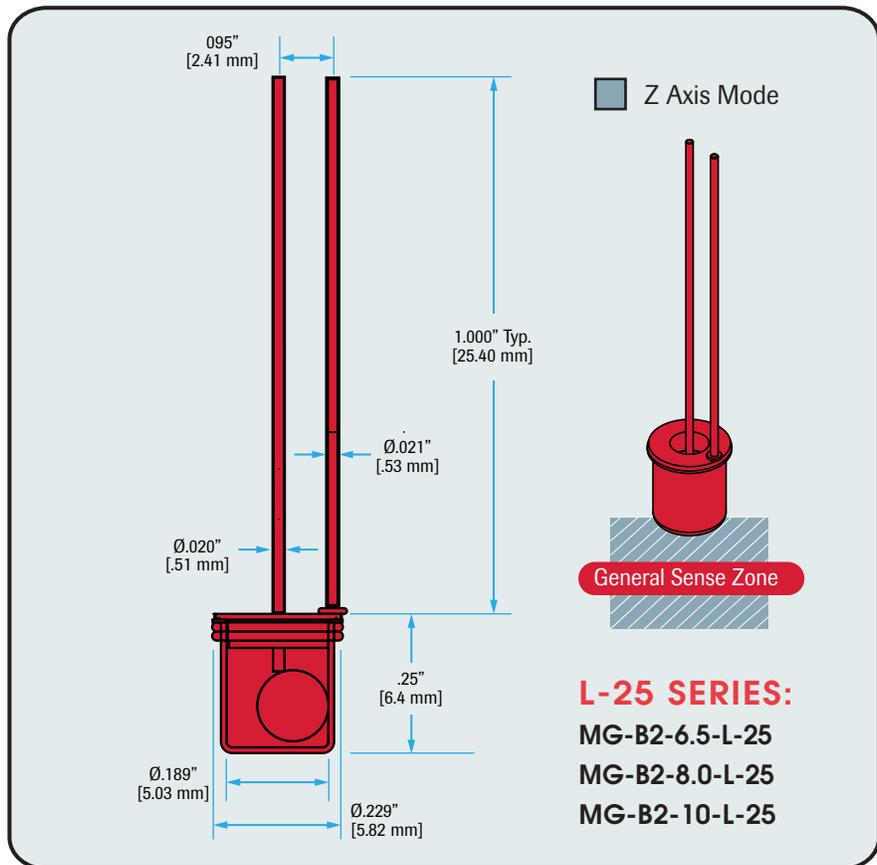
**Operate/Release Values:**  
 See Switching Characteristics Table  
**Actuation Magnet Orientation:**  
 Either Pole  
**Maximum Operating Frequency:** 20 Hz  
**Mounting Position:** Any Plane  
**Operating Temperature:** -40°C to +85°C  
**Shock (Switch Damage):** > 100 G's  
**Vibration:** 10-15 G's (80-450 Hz)  
 (Higher Values Available)

## GENERAL CHARACTERISTICS & INFORMATION

**Construction:** Non-Ferrous Metal Housing,  
 Compression Seal Hermetically Sealed,  
 Protective Gas Atmosphere, Precious  
 Metal Plated Spherical Magnet Contact.

**Soldering Guidelines:** 600° F (315° C)  
 Temperature iron for 5 sec. (max.). Do  
 not solder within 1/8" (3 mm) of glass  
 seal. Lead pins precious metal plated  
 for enhanced solderability.

**Termination Polarity Guidelines:** Polarity  
 selection is non-critical, though some



life gain may be realized by center pin  
 as cathode on logic loads, but center  
 pin as anode on larger loads.

**Lead Wire Cutting / Bending Guidelines:**  
 Cut length has no effect on magnetic  
 OP/REL values. Shearing action type  
 cutters are recommended, but end nippers  
 and side cutters are NOT recommended.  
 Metal style seals are extraordinarily  
 rugged, but the bending of unsupported  
 lead wire pins adjacent to the glass seal  
 is not recommended (i.e. when bending

use the support of some type of parallel  
 jaws spaced away from the glass seal to  
 grip the lead wirepins while bending the  
 pins' free ends, so no bending strains  
 are imposed on the glass seal.

**Other Comments:** Ferromagnetic materials  
 and strong Electromagnetic devices  
 proximate to the switch or its actuator  
 magnet may adversely affect expected  
 OP/REL switching values. Experimentation  
 is recommended to investigate areas  
 of concern.



The Most Advanced and Effective Magnetic Sensor

		SWITCHING CHARACTERISTICS		AIR GAP DISTANCE			
		POSITION	TYPICAL	MIN	MAX		
The Most Advanced and Effective Magnetic Sensor	MG-B2-6.5-L-25		(a) Leads Horz. <b>"OPEN"</b> (b) Leads Horz. <b>"CLOSED"</b>	1.000" 1.092"	.813" 1.825"	1.187" 1.359"	NEO 35 MAGNET TARGET 0.5" L x .375" T
	MG-B2-8.0-L-25		(a) Leads Horz. <b>"OPEN"</b> (b) Leads Horz. <b>"CLOSED"</b>	.921" .989"	.831" .918"	1.011" 1.050"	
	MG-B2-10-L-25		(a) Leads Horz. <b>"OPEN"</b> (b) Leads Horz. <b>"CLOSED"</b>	.843" .902"	.739" .826"	.947" .978"	
	MG-B2-6.5-L-25		(a) Leads Horz. <b>"OPEN"</b> (b) Leads Horz. <b>"CLOSED"</b>	.128" .152"	.103" .137"	.153" .167"	FERROUS METAL TARGET EG. C1010 Low Carbon 1.0" L x 1.0" W x .0625" T
	MG-B2-8.0-L-25		(a) Leads Horz. <b>"OPEN"</b> (b) Leads Horz. <b>"CLOSED"</b>	.116" .138"	.084" .107"	.148" .169"	
	MG-B2-10-L-25		(a) Leads Horz. <b>"OPEN"</b> (b) Leads Horz. <b>"CLOSED"</b>	.111" .131"	.083" .113"	.139" .149"	

## L-25 Series

**Switching characteristics** the target moves closer (a), this normally closed switch will OPEN at the air gap distance (d), and CLOSE when the target moves away (b).

### ABOUT MAGNASPHERE

MAGNASPHERE® Corp. is a privately held company founded in 2002, with the purpose of providing superior performing magnetic switch and sensor technology to the industrial/commercial OEM and security markets. MAGNASPHERE's patented, award-winning technology establishes new standards for magnetic switch performance while providing an affordable and more effective alternative to other magnetic switch technologies.

Learn more: Visit us at [www.MAGNASPHERE.com](http://www.MAGNASPHERE.com).



### PATENTED DESIGN

MAGNASPHERE® products are covered by one or more of the following U.S. and international patents:

- |          |                   |          |
|----------|-------------------|----------|
| #5332992 | #5530428          | #5673021 |
| #5880659 | #5977873          | #6087936 |
| #6506987 | #6603378          | #6803845 |
| #7023308 | (Patents Pending) |          |

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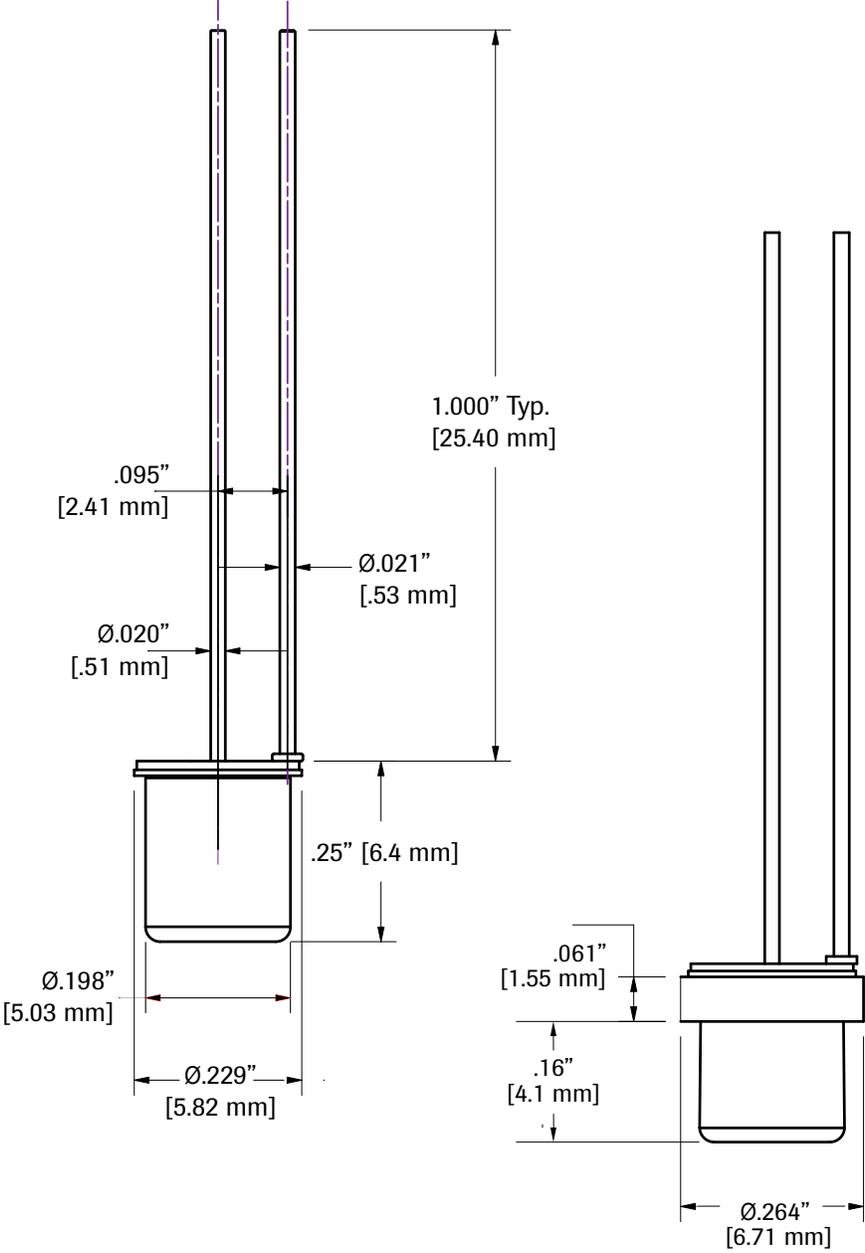
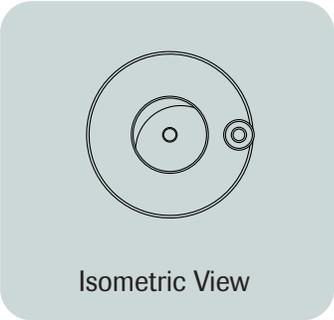
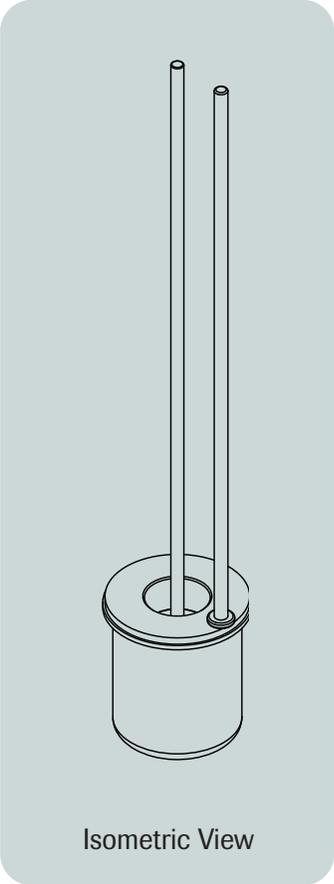
### INDUSTRY AWARDS

**Best of Show Award:**  
ISC Expo

**Gold Award**  
**Sensor Technology:**  
Sensors Expo

**Best Intrusion**  
**Detection:**  
ISC Expo

# L-25 Switch Reference Dimensions



Reference View Showing Max Bias Ring Profile

## S-Series Form B (Normally Closed)

---



The SWITCH SERIES is resistant to:



breakage



magnetic  
tamper



contact  
welding

The MAGNASPHERE S series is used in the security industry for door and window sensors in Open Loop alarm systems. It has a wider actuation zone in the X or Y axis than other Form B MAGNASPHERE switches. The robust all metal construction is highly resistant to magnetic tamper and defeat, and permanent contact welding from power surges.

# Solutions Seeking Problems.

## S-Series



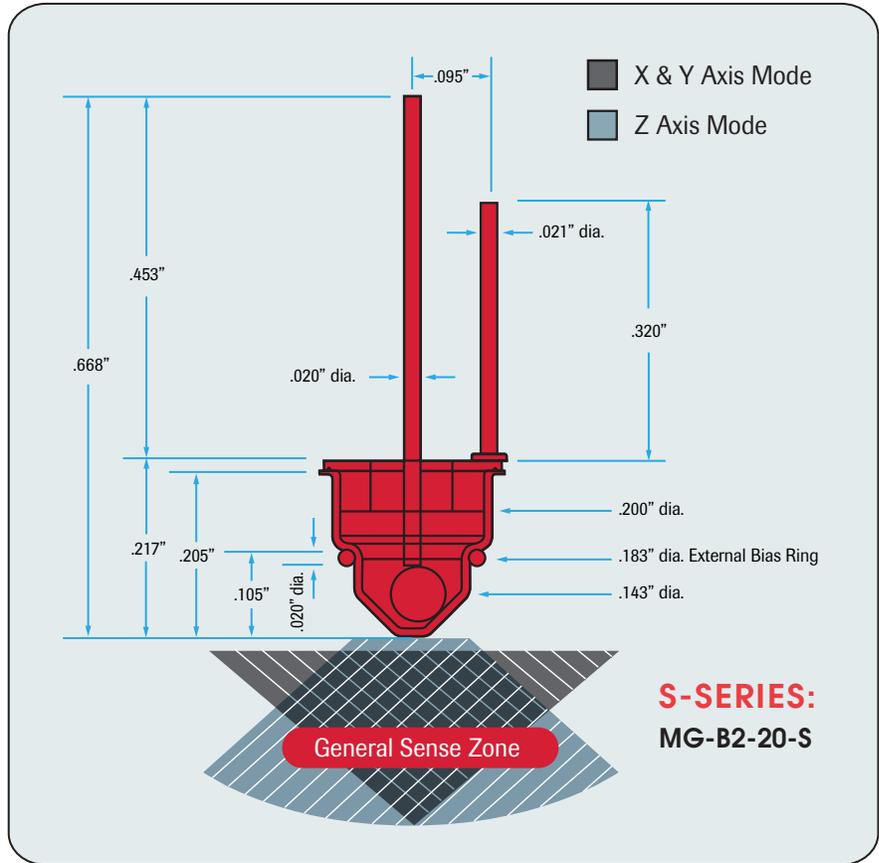
This series is used in the security industry for door and window sensors in Open Loop alarm systems. It has a wider actuation zone in the X or Y axis than other Form B Magnasphere switches. Robust all metal construction is highly resistant to magnetic tamper and defeat, and permanent contact welding from power surges.

### CONTACT CHARACTERISTICS

Contact Form: B (Normally Closed-N.C.)  
 Contact Material: Gold/Gold  
 Initial Contact Resistance (Typical):  
 < 150 Milli Ohms  
 Contact Capacitance: < 1 pf  
 Contact Ratings: 30 VDC @ 250 ma  
 Contact Bounce\* (Typical): < 10 milliseconds\*. Recommended trial de-bounce - 15 milliseconds (min.) closed contact condition for logic state changes - or 30 Hz low pass filter buffer  
 Minimum Breakdown Voltage (Typical): 300 VDC  
 Insulation Resistance (Typical): > 5 Mega Ohms

### OPERATION CHARACTERISTICS

Operate/Release Values:  
 See Switching Characteristics Table  
 Actuation Magnet Orientation:  
 Either Pole  
 Maximum Operating Frequency: 20 Hz  
 Mounting Position: Any Plane  
 Operating Temperature: -40°C to +150°C  
 Shock (Switch Damage): > 100 G's  
 Vibration: 10-15 G's (80-450 Hz)  
 (Higher Values Available)



Drawing not to scale. All dimensions in inches nominal.

### GENERAL CHARACTERISTICS & INFORMATION

Construction: Non-Ferrous Metal Housing, Compression Seal Hermetically Sealed, Protective Gas Atmosphere, Precious Metal Plated Spherical Magnet Contact.

Soldering Guidelines: 600° F (315° C) Temperature iron for 5 sec. (max.). Do not solder within 1/8" (3 mm) of glass seal. Lead pins precious metal plated for enhanced solderability.

Termination Polarity Guidelines: Polarity selection is non-critical, though some

life gain may be realized by center pin as cathode on logic loads, but center pin as anode on larger loads.

Lead Wire Cutting / Bending Guidelines: Cut length has no effect on magnetic OP/REL values. Shearing action type cutters are recommended, but end nippers and side cutters are NOT recommended. Metal style seals are extraordinarily rugged, but the bending of unsupported lead wire pins adjacent to the glass seal is not recommended (i.e. when bending

use the support of some type of parallel jaws spaced away from the glass seal to grip the lead wirepins while bending the pins' free ends, so no bending strains are imposed on the glass seal.

Other Comments: Ferromagnetic materials and strong Electromagnetic devices proximate to the switch or its actuator magnet may adversely affect expected OP/REL switching values. Experimentation is recommended to investigate areas of concern.

The Most Advanced and Effective Magnetic Sensor

		SWITCHING CHARACTERISTICS		AIR GAP DISTANCE		
		POSITION	TYPICAL	MIN	MAX	
MG-B2-20-S		(a) Leads Horz. <b>"OPEN"</b>	.626"	.197"	1.055"	<b>NEO 35 MAGNET TARGET</b> 0.5" L x .375" T
		(b) Leads Horz. <b>"CLOSED"</b>	.916"	.541"	1.291"	
MG-B2-20-S		(a) Leads Horz. <b>"OPEN"</b>	NOT RECOMMENDED			<b>FERROUS METAL TARGET</b> EG. C1010 Low Carbon 1.0" L x 1.0" W x .0625" T
		(b) Leads Horz. <b>"CLOSED"</b>				

## S-Series

**Switching characteristics** the target moves closer (a), this normally closed switch will OPEN at the air gap distance (d), and CLOSE when the target moves away (b).

### ABOUT MAGNASPHERE

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Learn more: Visit us at [www.MAGNASPHERE.com](http://www.MAGNASPHERE.com).

Standard for Industrial Control Equipment, UL 508

### PATENTED DESIGN

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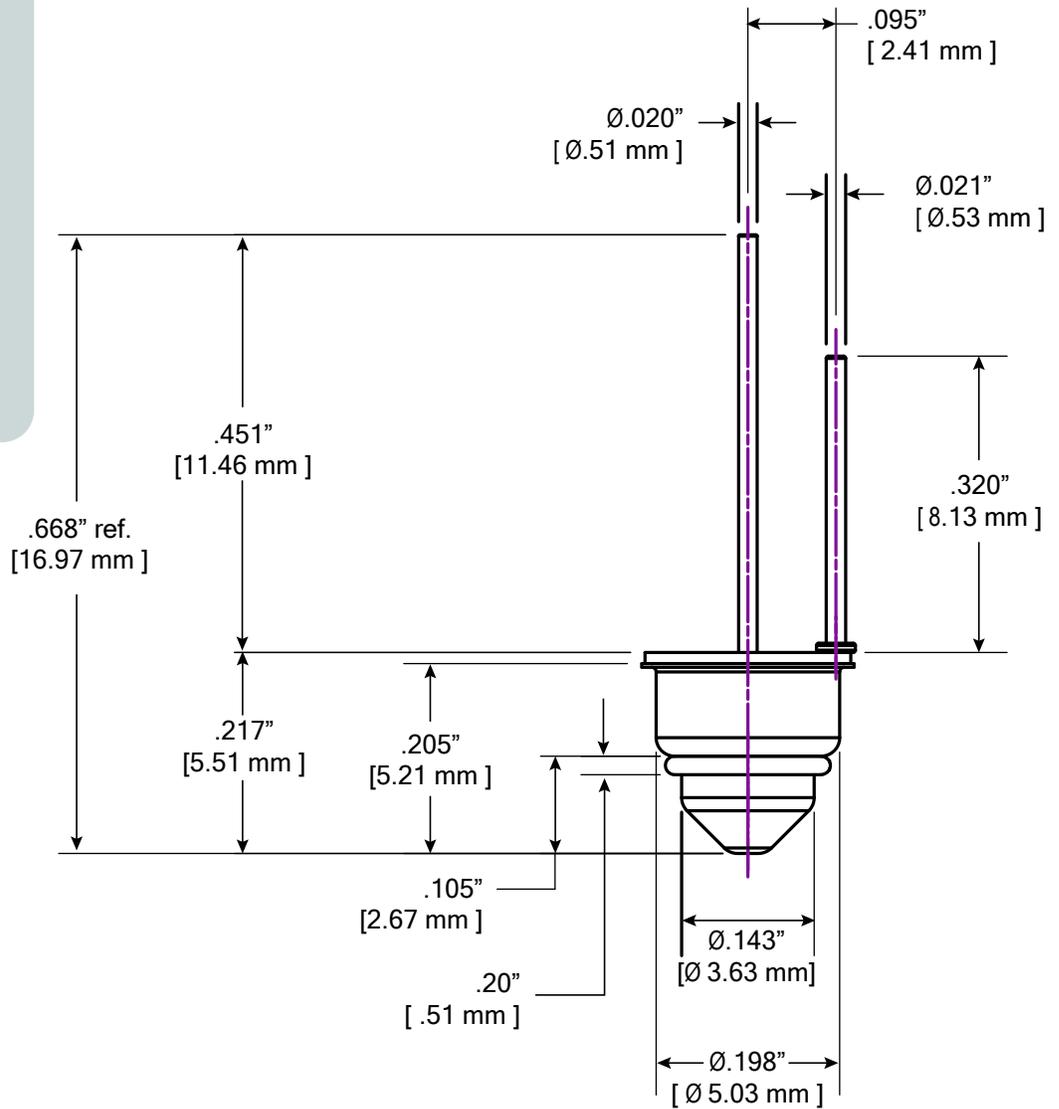
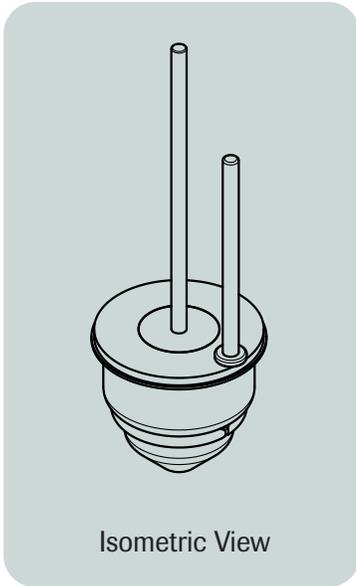
#5332992	#5530428	#5673021
#5880659	#5977873	#6087936
#6506987	#6603378	#6803845
#7023308	(Patents Pending)	

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### INDUSTRY AWARDS

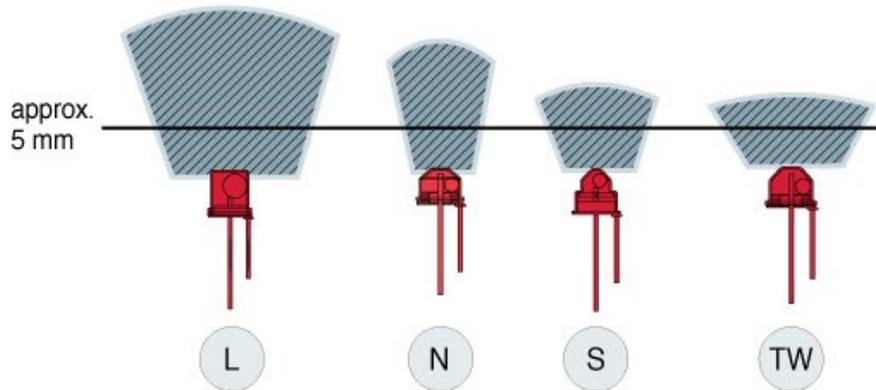
Best of Show Award:  
ISC Expo  
 Gold Award  
Sensor Technology:  
Sensors Expo  
 Best Intrusion  
Detection:  
ISC Expo

# S-Switch Reference Dimensions

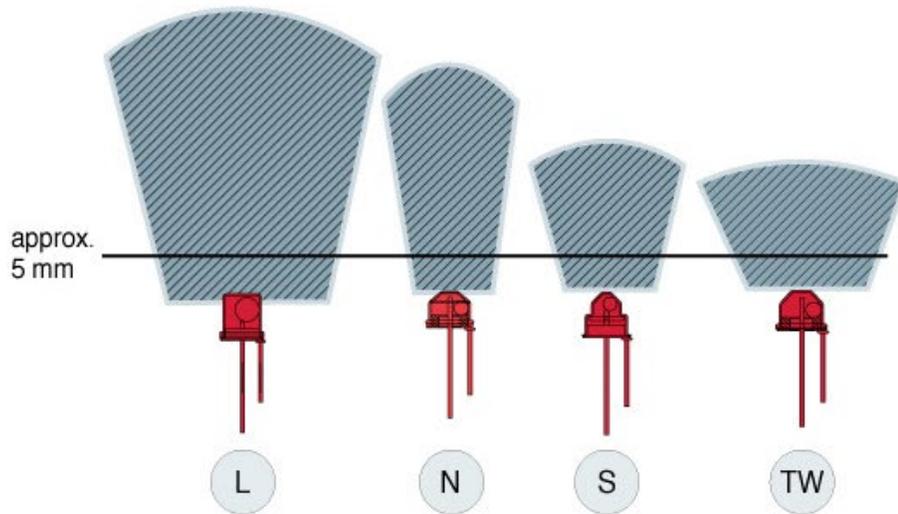


# MAGNASPHERE® Switch Sensing Zone Comparison

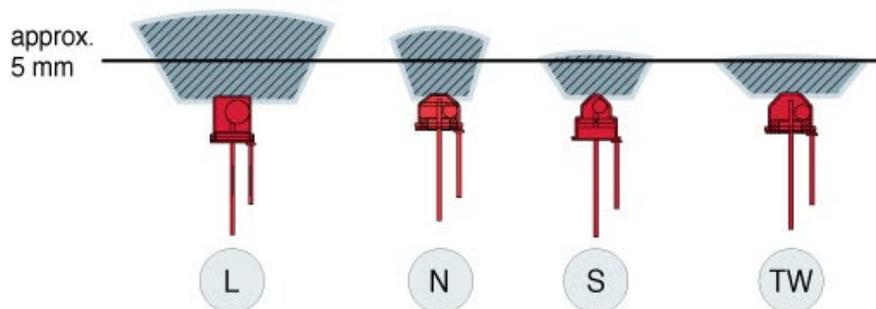
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Using a **Powerful** Target Magnet

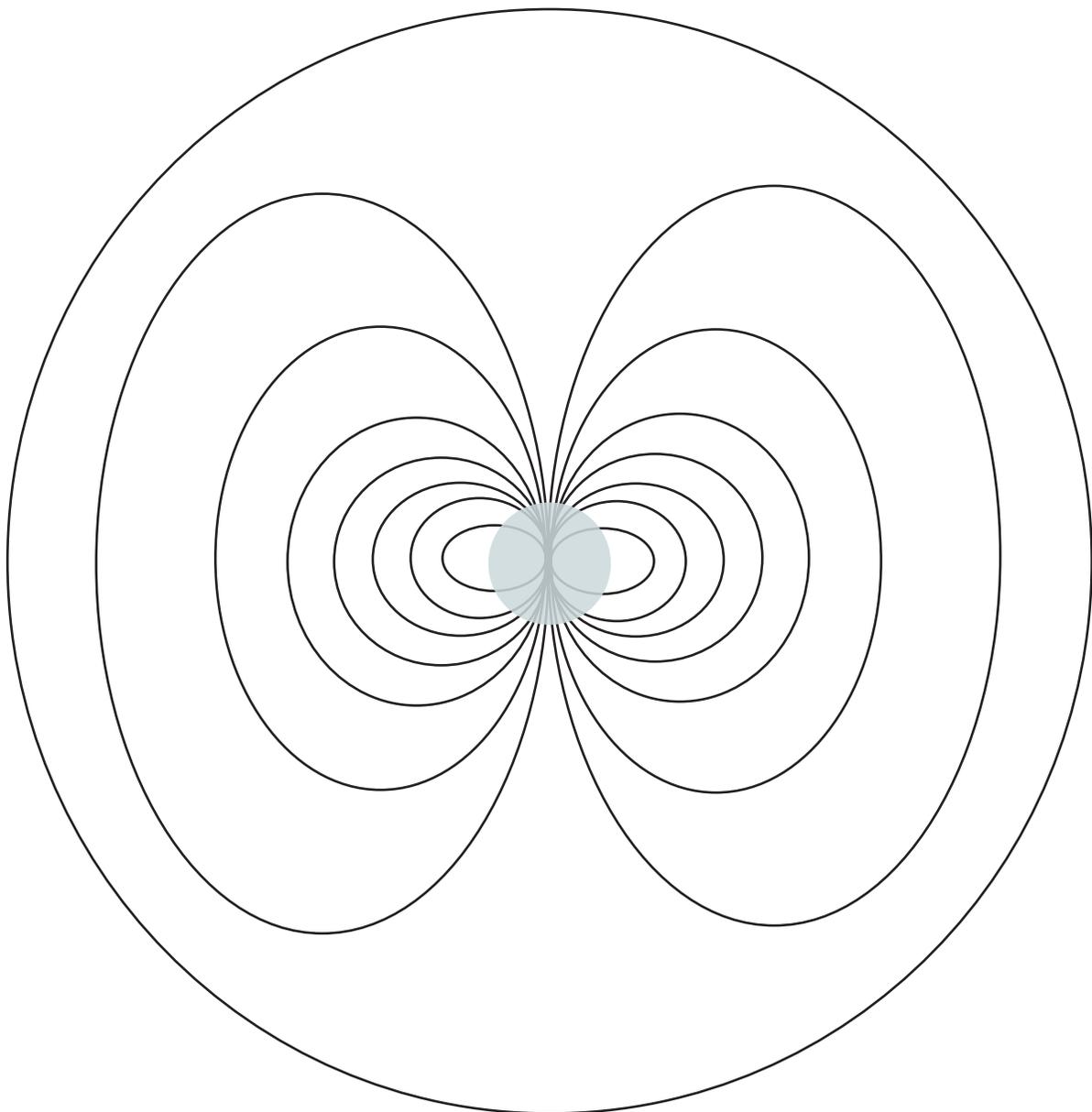


Using a **Weak** Target Magnet



# Magnetic Flux Fields of Spherical Ball Contact in MAGNASPHERE® Switch

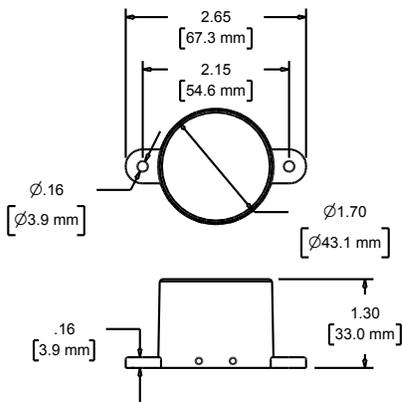
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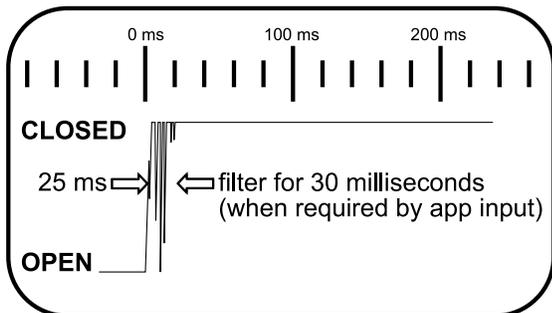
# Omnidirectional Tilt / Disturbance Switch



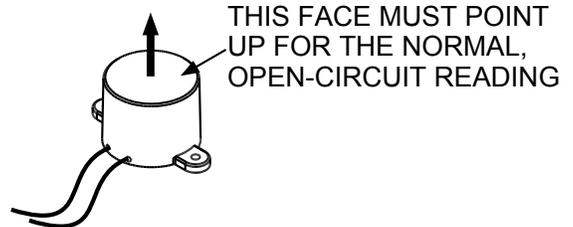
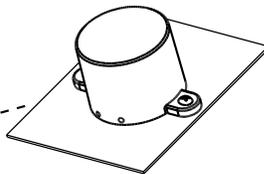
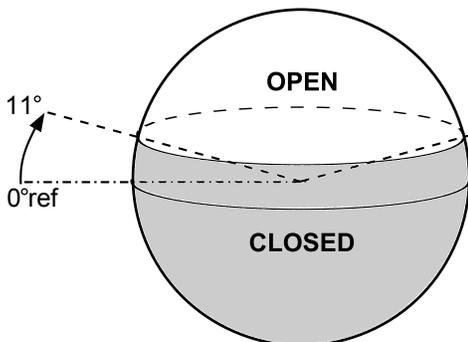
## Dimensions



## Signal Debounce



## Angles of Operation



## Mechanical and Electrical Specifications

- Poles and Circuits: SPST (ON/OFF)
- Max Current: 0.25A
- Max Voltage: 30VDC Resistive
- Max Power: 0.24 W
- Mechanical Life: 1 Million operations (Typical)
- Angles of Operation:
  - 11 degrees above horizontal typical actuator
  - 6 degrees above horizontal typical return
- Return to resting state response time:
  - 2.5s Typical
  - 9s Max Typical (Gyrational Disturbance)

## Materials

- Housing: sealed black ABS (Flame Rated: 94HB min)
- Wire Leads: 2x 20 AWG stranded black SXL insulated

## Environmental Specifications

- Operating Temperature Range: -40°F / -40°C to 165°F / 74°C
- Humidity: Outdoor, not to be submerged
- Magnetic Field: Performs normally in weak or absent magnetic fields. Operation is not affected by ferrous environments

## Features

- RoHS Compliant
- Non-Mercury Switch
- Industrial Grade
- No standby power consumption
- Magnetic switching improves vibratory contact stability over non-mercury alternatives

**Ready to install "as-is" for industrial environments**

**Mounting**

Mount using 2 pan-head screws, size #6 or 3.5mm. Alternatively, double-sided mounting tape may be used where conditions permit (ex: automotive trim grade). Universal mounting bracket(s) sold separately (p/n:1608)

**Mounting Site**

Mounting the switch near the expected tilt fulcrum will provide the most responsive reading. Mounting the switch far from the fulcrum will increase undesired centrifugal effects on the switch in quick-moving applications.

**Debounce Techniques**

Some applications may require contact debounce filtering, necessary for coping with the contact bounce of nearly any mechanical switch or pushbutton. For digital inputs, a debounce filter may be applied via software programming or by using a hardware low-pass filter. Please check your controller documentation; debounce filtering may already be available as a default. For analog applications, a hardware filter can be included in the circuit. Many detailed resources can be found online by searching using terms: CONTACT DEBOUNCE FILTER CIRCUIT

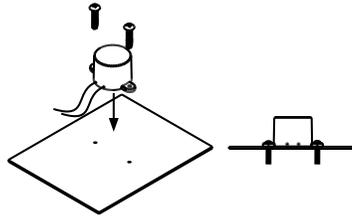
**Application Notes**

1. Magnasphere's tilt sensor is a switch, which provides great potential for power savings to wireless devices and stand-by systems.
2. This switch is constructed to be install-ready for industrial and outdoor equipment.
3. Wireless tilt sensing available for alarm panels and other applications: Contact Magnasphere details
4. The T3 will also sense disturbance, sudden movement along the mounting plane. Digital controller filters can nullify this attribute if only tilt sensing is desired.
5. Control loads above the maximum ratings by using a diode-protected or solid-state relay.
6. If the level position is meant to be normal condition for the panel input, insure the controller can (and is set to) accept open circuit as normal.

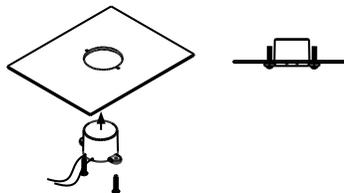
**Ideal Uses Include:**

- ATM tilt and disturbance
- Manhole cover and hatch disturbance
- Secure container, vitrine, and vault disturbance & tip
- Vending machine and appliance tip
- Compressors, pumps, power equipment, chemical container, and coolant compressor tip-over
- Heavy equipment stabilizer level indication and control interlock
- Showpiece disturbance & tip
- Auxiliary wireless input for alarm panels, home automation, and remote indication services
- Agricultural equipment: boom, hopper, loader, tank position

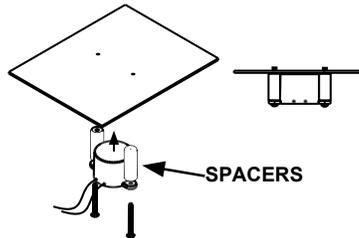
**SURFACE MOUNT:  
FASTENERS OR DOUBLE-  
SIDED MOUNTING TAPE**



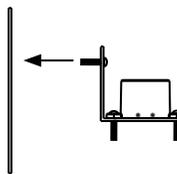
**PANEL MOUNT  
THROUGH**



**PANEL MOUNT  
UNDER**

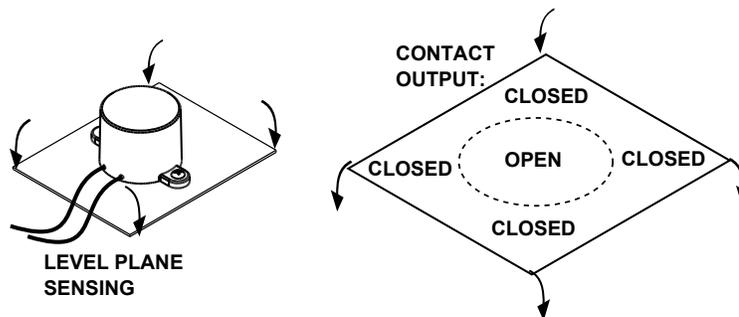
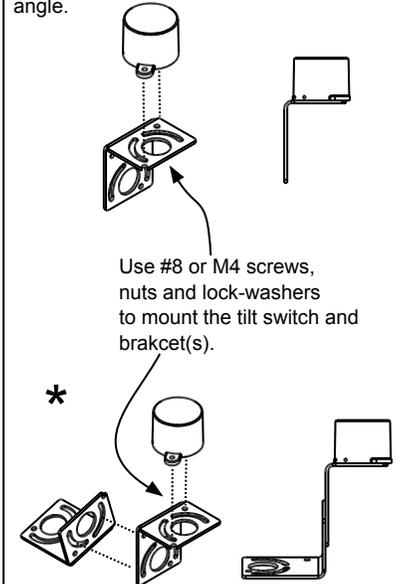


**USE AN ANGLE  
BRACKET FOR  
VERTICAL  
SURFACES**



**UNIVERSAL BRACKET(S) - P/N: 1608  
(sold separately)**

For complex mounting scenarios use universal brackets (p/n: 1608 sold separately). \* Two brackets can be used to achieve rotation in 3 axes, to nearly any compound angle.



# Unidirectional Tilt Switch



T1-AB-JS



## Mechanical and Electrical Specifications

Poles and Circuits: SPST (ON/OFF)  
 Max Current: 0.25 A Resistive  
 Max Voltage: 30VDC  
 Max Power: 0.25 W Resistive  
 Mechanical Life: 1 million operations (Typical)  
 Angles of Operation: ON= 180° (+/- 4°)  
 OFF= 180° (+/- 4°)

## Materials

**Housing:** ABS  
**Wire Leads:** JACKETED 22/2 ASG 0.11" OD x12"

## Environmental Specifications

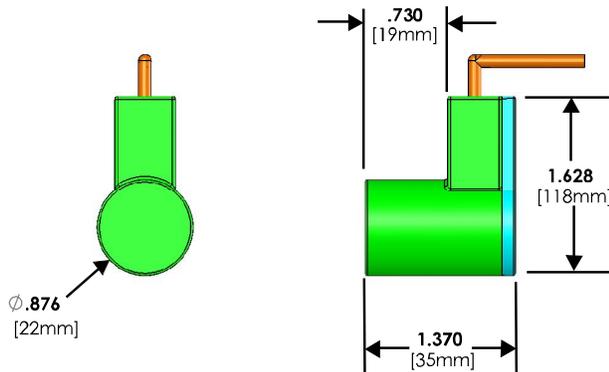
**Operating Temperature Range:**  
 -40°F/-40°C to 185°F/85°C  
**Humidity:** N/A (Sealed Construction)  
**Magnet Field:** Performs normally in weak or absent magnetic fields. Operation is not affected by ferrous environments.

## Features

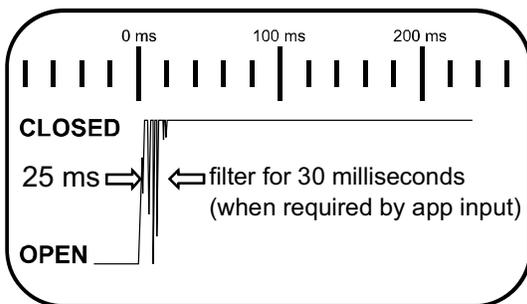
1. RoHS Compliant
2. Non-Mercury Switch
3. Contact Form B or Form A
4. Industrial Grade
5. No standby power consumption
6. Precision switching range
7. Hysteresis <10 Degrees (included angle for on/off)
8. Chemically Inert
9. Sealed from atmosphere and water
10. Magnetic switching improves vibratory contact stability over non-mercury alternates

Re-Orient for Opposite Contact Form

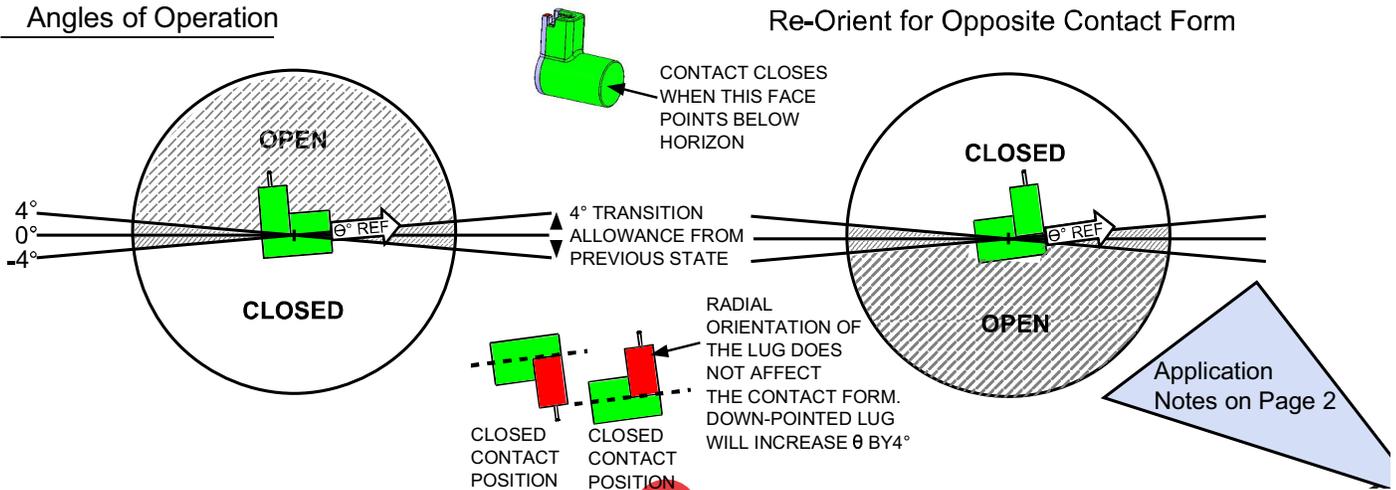
## Dimensions



## Signal Debounce



## Angles of Operation



Ready to install "as-is" for industrial environments

**Mounting**

Grip the 7/8" diameter by using a clamp:

- P-Clamp
  - Pipe Mounting/Routing Clamp
  - Rubber Bushing in a panel or plate
  - Vibration-Damping Clamp (or clamping U-Bolt) for applications with excessive vibration
- Universal mounting bracket(s) sold separately (p/n:1608)

**Mounting Site**

Mounting the switch close to the center of rotation will provide the most responsive reading. Mounting the switch far from the center of rotation will increase undesired centrifugal effects on the switch in quick-moving applications.

**Debounce Techniques**

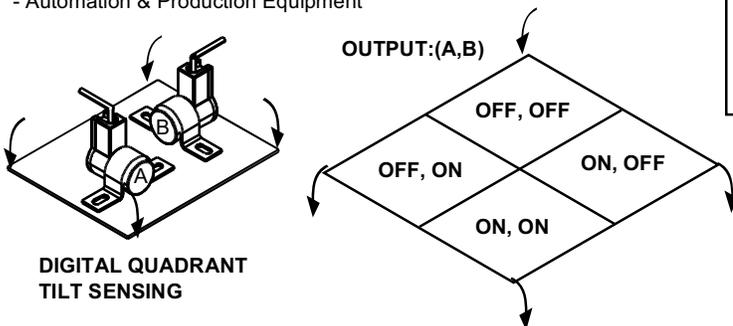
Some applications may require contact debounce filtering, necessary for coping with the contact bounce of nearly any mechanical switch or pushbutton. For digital inputs, a debounce filter may be applied via software programming or by using a hardware low-pass filter. Please check your controller documentation; debounce filtering may already be available as a default. For analog applications, a hardware filter can be included in the circuit. Many detailed resources can be found online by searching using terms: CONTACT DEBOUNCE FILTER CIRCUIT

**Application Notes**

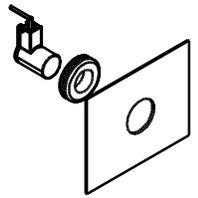
1. Magnasphere's tilt sensor is a switch, which provides great potential for power savings to wireless devices and stand-by systems.
2. This switch is constructed to be install-ready for industrial and outdoor equipment.
3. Any angle of tilt can be sensed by simply mounting the switch's axis to the desired angle. \*\*
4. Bidirectional tilt sensing can be achieved using two switches on the same circuit.
5. Control loads above the maximum ratings by using a diode-protected or solid-state relay.
6. Tilt switch should be biased above or below the horizontal plane by at least 4 degrees. \*\*

**Ideal Uses Include:**

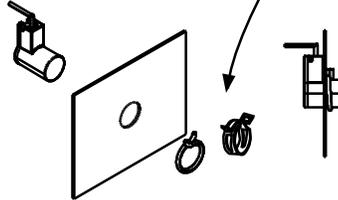
- Aerial Lifts and Aerial Booms
- Powered Access Ramps and Lifts
- Ports, Hatches, Industrial & Overhead Doors
- Appliance and Equipment Tip-Over
- Agricultural and Road Equipment Extensions
- Vehicle Trunk & Hood
- ATMs & Vending Machines
- Generators
- Safety Shutoff
- Automation & Production Equipment



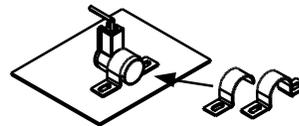
**PANEL MOUNT BY GROMMET**



**PANEL MOUNT BY SPRING (HOSE) CLIP**



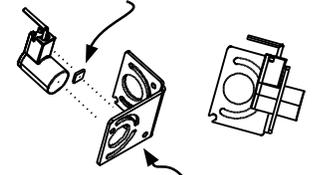
**MOUNT BY U-CLAMP OR P-CLAMP**



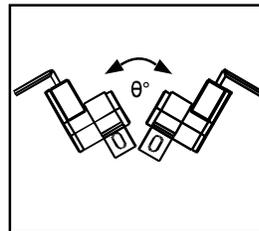
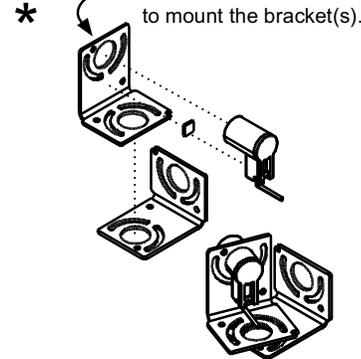
**UNIVERSAL BRACKET(S) - P/N: 1608 (sold separately)**

For complex mounting scenarios use universal brackets (p/n: 1608 sold separately). \* Two brackets can be used to achieve rotation in 3 axes, to nearly any compound angle.

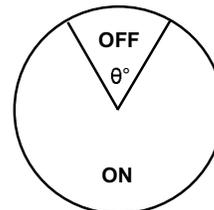
- Tilt switch should be mounted using:
1. Panel Mount Grommet
  2. Spring (Hose) Clip
  3. Weather-Proof Double Sided Tape



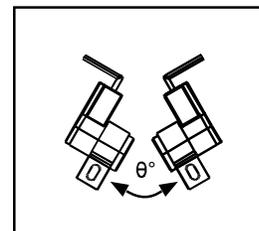
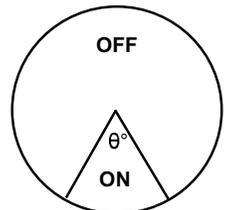
Use #8 or M4 screws, nuts and lock-washers to mount the bracket(s).



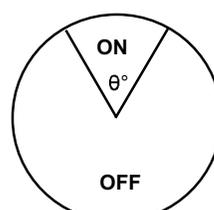
**2 SWITCHES IN PARALLEL**



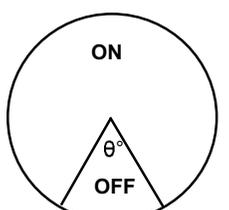
**2 SWITCHES IN SERIES**



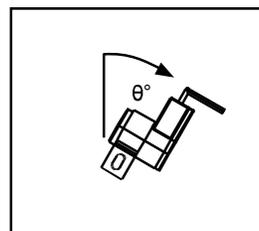
**2 SWITCHES IN SERIES**



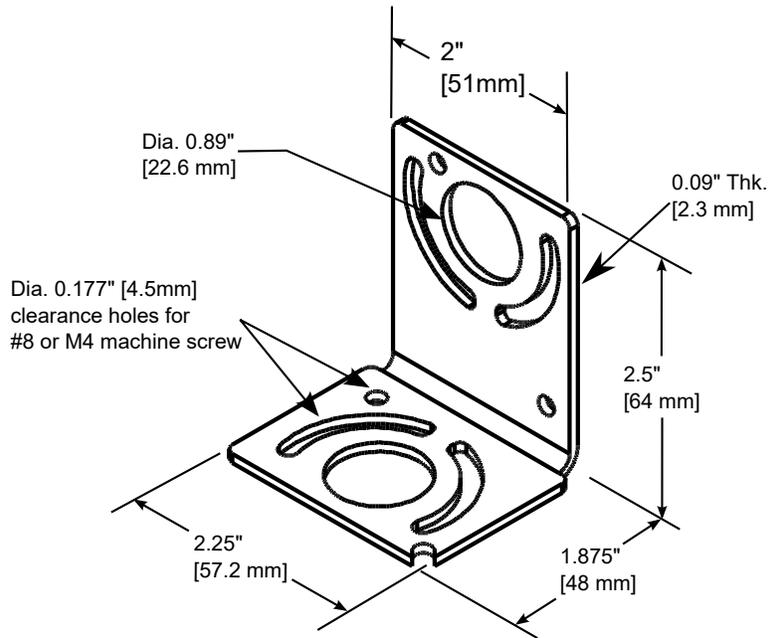
**2 SWITCHES IN PARALLEL**



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# T1/T3 Tilt Switch Universal L-Bracket - P/N: 1608 Product Sheet

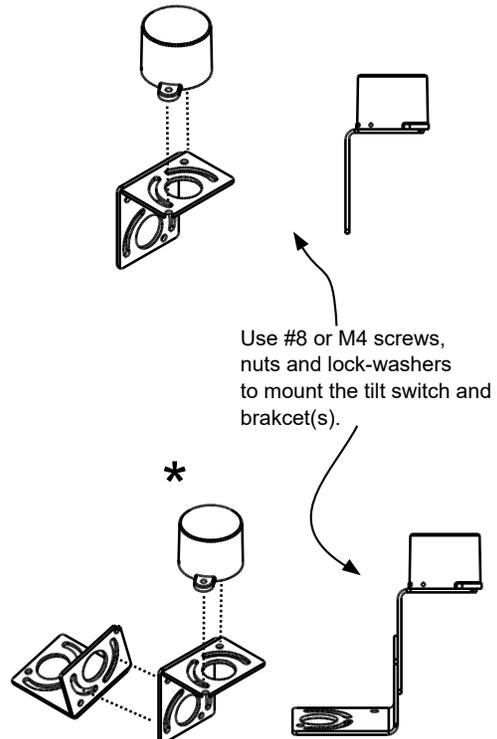
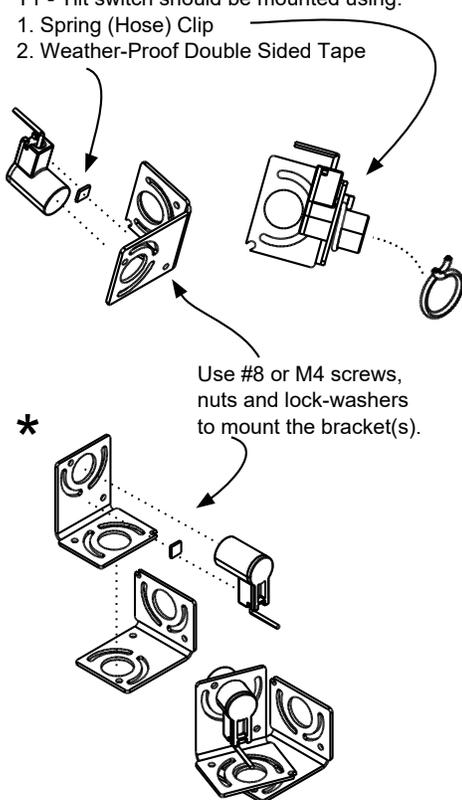


## T1 Unidirectional Tilt Switch Application Notes

## T3 Omnidirectional Tilt Switch Application Notes

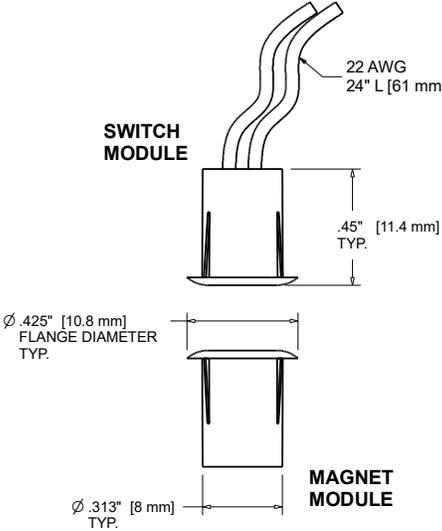
For complex mounting scenarios use universal brackets. \* Two brackets can be used to achieve rotation in 3 axes, to nearly any compound angle.

T1 - Tilt switch should be mounted using:  
1. Spring (Hose) Clip  
2. Weather-Proof Double Sided Tape



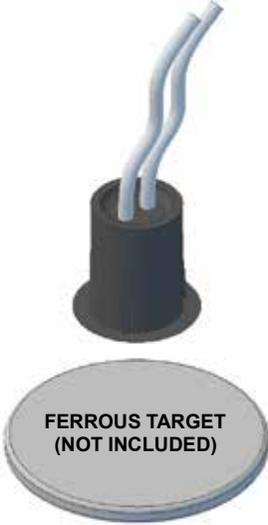
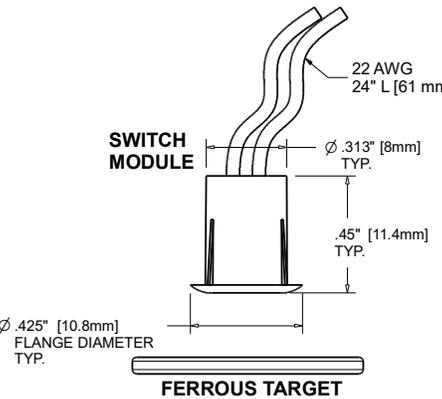
**Magnasphere - 1597 L24 - 5/16" Dia. [8mm] - Proximity Switch and Magnet**



<p><b>P/N: 1597 - L24</b></p> 	<p><b>SIZE</b></p> 	<p><b>Mechanical and Electrical Specifications</b>                  Electrical Configuration: Open Circuit With Target In Place (FORM B / N.C. Switch)                  Max Current: <b>0.25A</b> Max                  Voltage: <b>30 VDC</b> Resistive                  Max Power: <b>.25 W</b></p> <p><b>Typical Actuation Distance:</b>                  .47" [12mm] (w/ Included Magnet Module)</p> <p><b>Mounting:</b>                  Recessed / Press Fit</p> <p><b>Color(s)</b>                  Black ABS                  (Flame Rated: 94HB min)</p> <p><b>Wire Leads</b>                  JACKETED 22 AWG x 24" L [61cm]</p>
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**Magnasphere - 1597 L24 Switch Only - 5/16" Dia. [8mm] - Ferrous Proximity Switch**



<p><b>P/N: 1597 L24 Switch Only</b></p>  <p><b>FERROUS TARGET (NOT INCLUDED)</b></p>	<p><b>SIZE</b></p> 	<p><b>Mechanical and Electrical Specifications</b>                  Electrical Configuration: Open Circuit With Target In Place (FORM B / N.C. Switch)                  Max Current: <b>0.25A</b> Max                  Voltage: <b>30 VDC</b> Resistive                  Max Power: <b>.25 W</b></p> <p><b>Typical Actuation Distance:</b>                  .063" [1.6mm]                  (w/ 1"Dia. [25.4mm] x 1/16" [1.6mm] Steel Target)                  Note: Larger actuation gap can be achieved by using a larger ferrous target.</p> <p><b>Mounting:</b>                  Recessed / Press Fit</p> <p><b>Color(s)</b>                  Black ABS                  (Flame Rated: 94HB min)</p> <p><b>Wire Leads</b>                  JACKETED 22 AWG x 24" L [61cm]</p>
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**Note: 1597 Switch and Magnet/Ferrous Target pair can be mounted at any angle in all axes.**

