

# Bimba Metric Position Sensing Solutions

## Switch Selection Chart

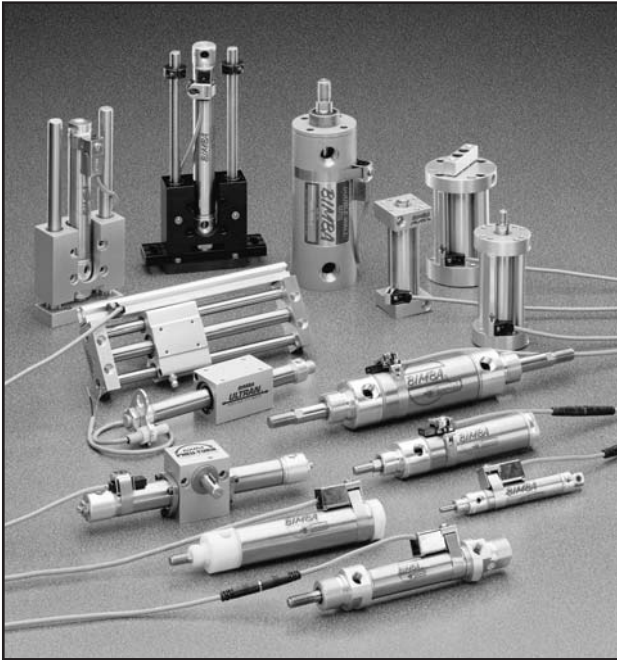
Switch Type				Original Line ISO 6432	ISO 6431	Flat-1 Square Flat-1 Flat-II Square Flat-II	PneuTurn	Ultran	Ultran Slide	Page
Reed Switch	MRS-.027	2 wire (track)	28 V max AC/DC	x						7.8
	MRS-.087	2 wire (track)	200 V max AC/DC	x						7.8
	MRS-.087-B	2 wire (band)	200 V AC/DC	x			x			7.8
	MRS-.087-BL	3 wire (LED, band)	6 to 24 V AD/DC	x			x			7.8
	MRS-.087-PBL	2 wire (LED, band)	3 to 120 V AC (6 to 24 V DC)	x			x			7.8
	MRS-1.5-S	2 wire (track)	12 to 230 V AC only (100 mA min)	x						7.8
	MRS-1.5-B	2 wire (band)	12 to 230 V AC only (100 mA min)	x			x			7.8
	MRS-1.5	2 wire (track)	12 to 230 V AC only	x						7.8
	MR	2 wire (LED, 4mm round)	3 to 120 V AC or 3 to 24 V DC	x			x <sup>1</sup>		x <sup>2</sup>	7.12
	MRS-AB	2 wire (track)	10 to 110 V AC/DC		x					7.14
	RSU-1, RSUM-1	2 wire (threaded barrel)	200 V max AC/DC					x	x	7.8
Solid State Switch	HSK	NPN (LED, band)	4.5 to 30 V DC	x			x			7.4
	HSC	PNP (LED, band)	4.5 to 30 V DC	x			x			7.4
	HK	NPN (LED, track)	4.5 to 30 V DC			x			x <sup>2</sup>	7.5
	HC	PNP (LED, track)	4.5 to 30 V DC			x			x <sup>2</sup>	7.5
	HS-AB	3 wire (track)	10 to 27 V DC		x					7.14
GMR Switch	MSC	PNP (LED, 4mm round)	5 to 24 V DC	x			x <sup>1</sup>		x <sup>2</sup>	7.12
	MSK	NPN (LED, 4mm round)	5 to 24 V DC	x			x <sup>1</sup>		x <sup>2</sup>	7.12
	MS	Autoconfigure (LED, 4mm round)	5 to 24 V DC	x			x <sup>1</sup>		x <sup>2</sup>	7.12
Inductive Proximity Sensor	PCQ	PNP (threaded barrel)	10 to 30 V DC					x	x	7.15
	PKQ	NPN (threaded barrel)	10 to 30 V DC					x	x	7.15

<sup>1</sup>For Pneu-turn (-T option required).

<sup>2</sup>For Ultran Slide (-U option required).

<sup>3</sup>For Ultran Slide (-T option required, -U option is recommended).

For Band Mounted Switches, part number must include bore size for band to be included. See catalog section for details.



Bimba offers pre-tested position sensing solutions for Bimba actuators. Our solutions provide a cost effective interface between the pneumatic actuators and electrical control systems. Our pre-tested solutions also eliminate costly, time-consuming design and fabrication required if switches are purchased separately and provide an aesthetically pleasing installation.

In this catalog section you will find both traditional Bimba switches as well as newer generations of Bimba switches to allow for maximum flexibility to fit your application.

The switches perform the same functions as conventional limit switches. They can be used as position indicators, cycle counters, or to confirm operation.

All Bimba switches are designed to sense a magnet that is incorporated into the piston of the cylinder. Magnets are standard in Bimba MRS cylinders, but must be purchased as an option on other Bimba actuators.

A variety of outputs are offered for each switch family including PNP (transistor sourcing), NPN (transistor sinking), normally open contacts, and higher power triac.

Actuator application data such as electrical specifications, operating window and hysteresis for actuator/switch combinations is offered on page 7.16 of this catalog.

A Sensing Application section concerning how the switches work, helpful application tips, and sensing terms is located on page 7.22.

The Switch Selection Chart on page 7.1 can be used to choose switches for an actuator to insure mounting and sensing compatibility.

## Benefits of the Magnetic Reed Switch

- Compact
- Lower cost
- Easy to mount on a variety of Bimba actuators
- Able to mount several switches on one actuator
- LED available in many models for ease of positioning and troubleshooting
- Many models:
  - Low, medium and high current models, AC or DC, and triac-type switches for inductive kickback or inrush current.
  - Track- and band-mounted models
  - Choice of pigtail leads in 2 lengths or quick connect with two cable length options.

## Benefits of the Solid State Switch

- Compact
- Solid state reliability — no moving parts means longer life, no contact bounce
- Easy to mount on a variety of Bimba actuators
- Able to mount several switches on one actuator
- LED for ease of positioning and troubleshooting
- Reverse polarity and overvoltage protection
- Available with pigtail leads (in 2 lengths) or quick connect (with two cable length options)
- Faster signal speeds

	Programmable Controllers	Relays	Solenoids	Indicator Lights		Motors	Time Counters
				Bulbs	Solid State		
Reed Switch	Yes	<5VA*	<5VA*	<5VA*	Yes	<5VA*	<5VA*
Triac Reed Switch**	No	Yes	Yes	Yes	No	Yes	Yes
Solid State Switch	Yes	<150mA	No	<150mA	Yes	No	<150mA
GMR Switch	Yes	<50mA	No	<50mA	Yes	No	<50mA

\* Use resistor-capacitor protection

\*\* Minimum current = 100mA

## Bimba Quick Connect Cables

Switch Type	Cable Type	Description/Specification
MRSQ, HKQ, HCQ, HSKQ, HSCQ	<p><b>C4</b> (2 Meter Snap Tight)</p> <p><b>C4X</b> (5 Meter Snap Tight)</p>	<p><b>Straight 8mm snap style connector (non-shielded)</b>  <b>Connection:</b> Snap Tight connector  <b>Contact carrier material:</b> PA 6-GV (Nylon)  <b>Molded connector head:</b> Polyurethane (PUR)  <b>Contact Material:</b> gold plated brass  <b>Current Rating:</b> 4.0 A  <b>Voltage Rating:</b> 125 V @ 4A  <b>Jacket Material:</b> Polyvinyl Chloride (PVC)  <b>Conductors:</b> 3 x 24 AWG  <b>Temperature Range:</b> -40° F to 200° F (-40° C to 90° C)  <b>Protection Class:</b> NEMA 1, 3, 4, 6, 13 and IEC IP67  <b>Insulation Resistance:</b> ≥ 10<sup>9</sup> Ω  <b>Where Used:</b> Standard cables for most quick connect switch applications. Switch Models using the C4 standard series include the MRS series (.087/.027) and Hall Effect switches (HKQ, HCQ, HSKQ, HSCQ)</p>
MSQ, MRQ, MSKQ, MSCQ, MRS-ABQ, HS-ABQ	<p><b>C4-T</b> (2 Meter Threaded Coupling Nut)</p> <p><b>C4X-T</b> (5 Meter Threaded Coupling Nut)</p>	<p><b>Straight 8mm threaded style connector (non-shielded)</b>  <b>Connection:</b> Threaded connector  <b>Contact carrier material:</b> PA 6-GV (Nylon)  <b>Coupling Nut:</b> Polyurethane (PUR)  <b>Contact Material:</b> nickel plated brass  <b>Current Rating:</b> 4.0 A  <b>Voltage Rating:</b> 125 V @ 4A  <b>Jacket Material:</b> Polyvinyl Chloride (PVC)  <b>Conductors:</b> 3 x 24 AWG  <b>Temperature Range:</b> -40° F to 200° F (-40° C to 90° C)  <b>Protection Class:</b> NEMA 1, 3, 4, 6, 13 and IEC IP67  <b>Insulation Resistance:</b> ≥ 10<sup>9</sup> Ω  <b>Where Used:</b> Standard cables on the Mini-Switch quick connect products (i.e., MSQ, MRQ, MSKQ, MSCQ). The threaded coupling nut allows easier interconnection to the mini switch products.</p>

**Notes:**

- All quick connect products use a universal male connector that can use either a threaded or snap connector.
- All accessory cables can be ordered separately, (i.e., for MRS or Hall Effect quick connect switch applications where customers prefer a threaded coupling between the switch and the cable, or require shielded cable.)

### Wire Color Codes

**Switch Wire Codes**

All switch wiring conforms to the **CENELEC EN 50 044** wiring standard, which designates the following:

**Important Note:** 2 wire switches only use the Blue and Brown wires. Do not connect the Blue and Brown wires across the power supply, as the switch will short out. For Sinking Circuits, connect the Blue wire to ground (negative), and the Brown wire to the PLC Sinking Input. For Sourcing Circuits, connect the Brown wire to (+) Positive, and the Blue wire to the PLC Sourcing Input.

# How to Order

Original Line, Pneu-Turn and Linear Thruster  
 HSK and HSC Switches

## HSK QCX - 04

SWITCH TYPE
24" (0.6m) pigtail lead HSC-Current Sourcing (PNP) HSK-Current Sinking (NPN)

OPTIONAL
X = Include if 144" (3.66m) pigtail lead needed (Not applicable with Quick Connect) Omit = 24" pigtail lead

OPTIONAL
Q = Quick Connect without cable
QC = 2 meter mating cable accompanies switch
QCX = 5 meter mating cable accompanies switch

BAND SIZE	
Bore Size	Band Size
No Band	Blank
10mm	M10
12mm	M12
16mm	M16
20mm	M20
25mm	M25

See page 7.3 to order  
 Cable Connectors separately

Base Model	Base Model 24" (0.6m) pigtail lead*	OPTIONS			
		144" (3.66m) pigtail lead	Quick Connect		
			(no cable)	(2m cable)	(5m cable)
HSC - <input type="checkbox"/>	Blank	X	Q	QC	QCX
HSK - <input type="checkbox"/>					

\* Bands are included in the price.

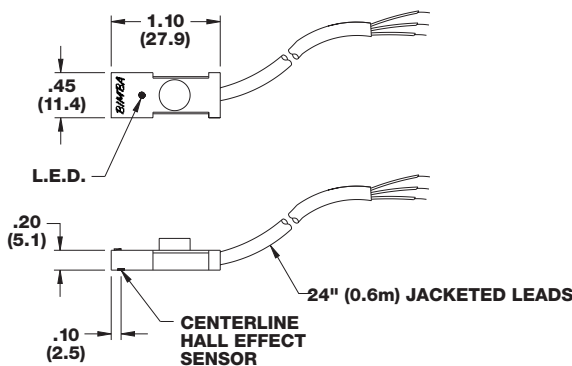
Sample Part Numbers:

HSK – sensor with NPN (current sinking) output and 24" pigtail lead.

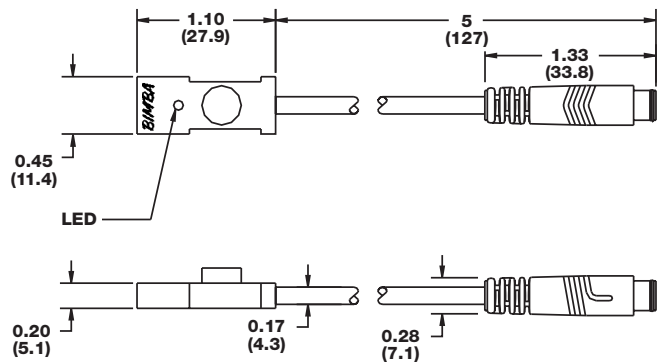
HSCQCX – sensor with PNP (current sourcing) output with male 8mm connector and female 8mm cable, 5 meters long.

## Dimensions

**HSC, HSK Solid State Switches**  
 (inches shown, mm in parentheses)



**HSC, HSK**

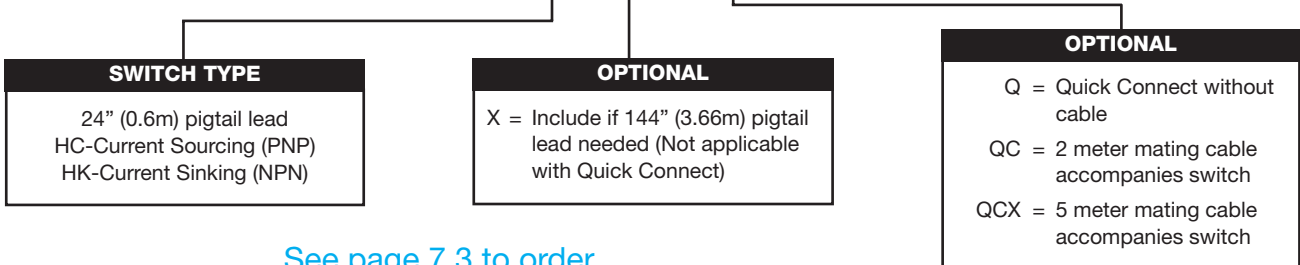


**HSCQ, HSKQ**

# How to Order

## Flat Series and Ultran HC and HK Switches

### HC QCX



See page 7.3 to order  
Cable Connectors separately

Base Model	Where Used	Base Model 24" (0.6m) pigtail lead	OPTIONS			
			X 144" (3.66m) pigtail lead	Quick Connect		
				Q (no cable)	QC (2m cable)	QCX (5m cable)
HC	Ultran Slide, High Load Ultran, Flat-1 and Flat-II Square Flat-1, Square Flat-II (63 to 101mm)	Blank	X	Q	QC	QCX
HK						

\* Note: 0.38 minimum stroke required for Flat-1 cylinders.

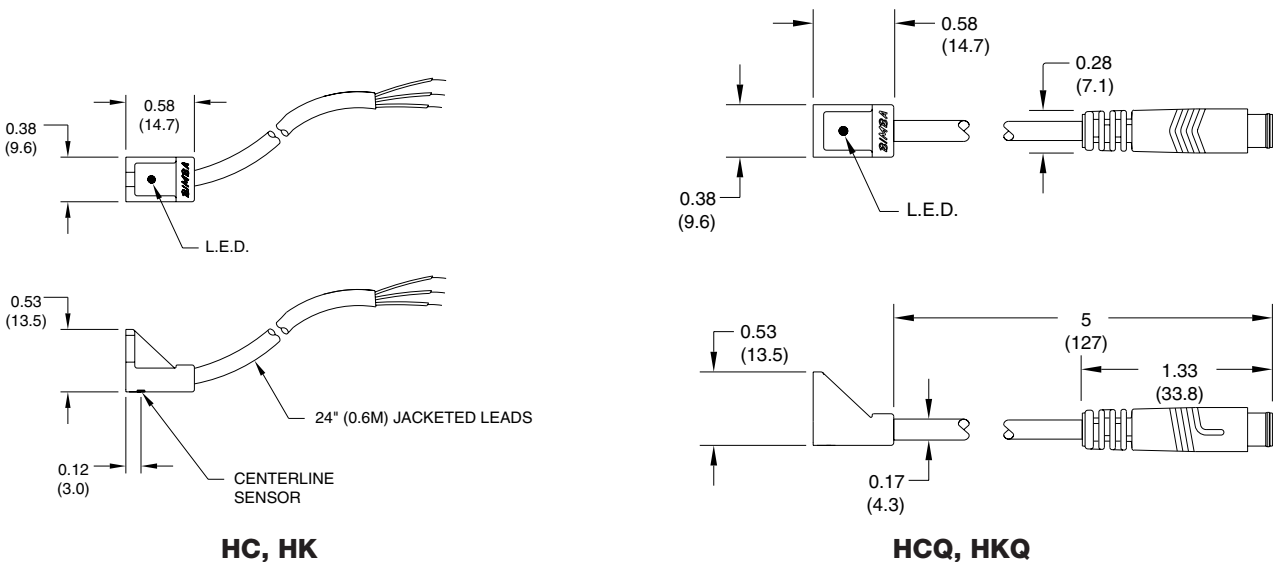
Sample Part Numbers:

HC – sensor with PNP (current sourcing) output and 24" pigtail lead.

HKQCX – sensor with NPN (current sinking) output with male 8mm connector and female 8mm cable. 5 meters long.

## Dimensions

### HC, HK Solid State Switches (inches shown, mm in parentheses)



ISO 6431

ISO 6432

Flat

Pneu-Turn

Ultran

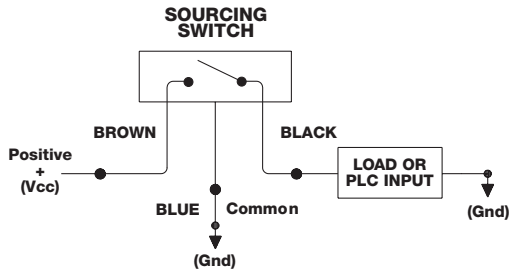
Flow Control

Position Sensing Solutions

# Electrical Circuit Diagrams

## HC, HK, HSC, and HSK Switches

**Typical Solid State Sourcing Configuration for HSC Models (PNP)**

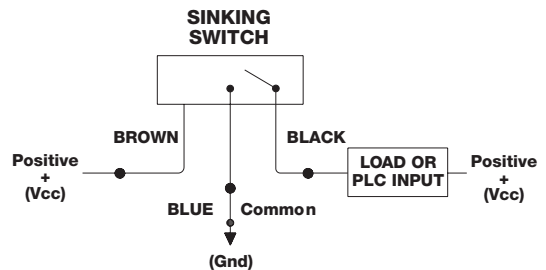


**HSC, HC**

Basic Circuit Layout for Programmable Logic Controllers (PLC) and Normally Off Relays and Solenoids

**CAUTION:** Shorting black wire to ground will damage switch

**Typical Solid State Sinking Configuration for HSK Models (NPN)**

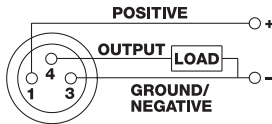


**HSK, HK**

Basic Circuit Layout for Programmable Logic Controllers (PLC) and Normally Off Relays and Solenoids

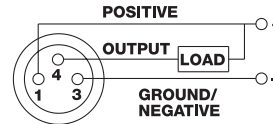
**CAUTION:** Shorting black wire to supply voltage will damage switch

**8mm Male Connector Sourcing Solid State Switch**



**HSCQ, HCQ**

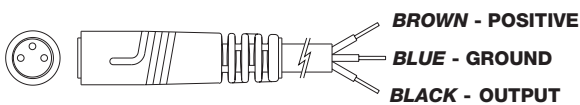
**8mm Male Connector Sinking Solid State Switch**



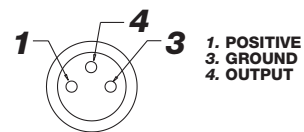
**HSKQ, HKQ**

## Pin and Wire Assignments for Quick Connect

**8mm Female Connector**



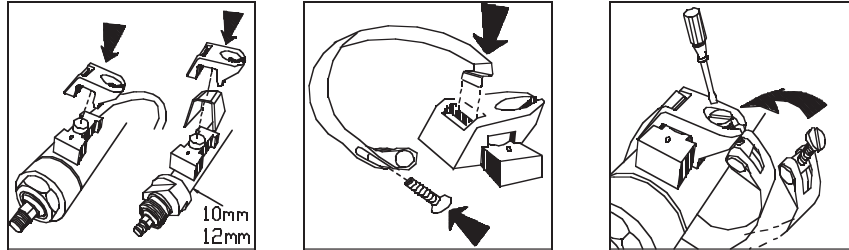
**Face View of Male Connector**



# Mounting

## Original Line Cylinders and Pneu-Turn Rotary Actuators HC, HK, HSC, and HSK Switches

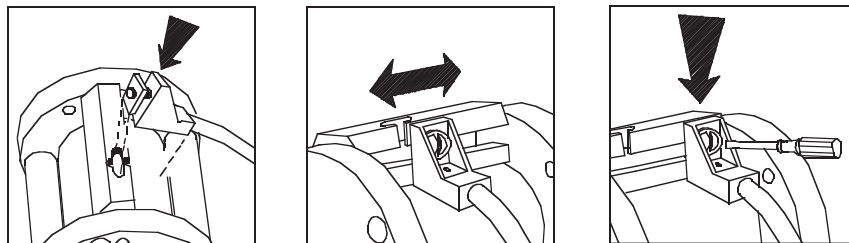
The switch can be mounted anywhere along the length and circumference of the actuator body. Mounting hardware includes the switch, a presized stainless steel band, a chrome-plated zinc die cast housing and a ball head screw. 2-3 in.-lbs. of torque recommended for mounting.



Note: Mount with LED face up.

## HC, HC □ Q, HK, HK □ Q Flat-1, Flat-II, Square Flat-1 2-1/2" to 4" (63 mm to 101mm) FO2 and FOP Cylinders and Ultram Slide Rodless Cylinders

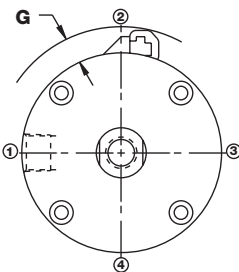
Flat-1 models ordered for position sensing (-M option) and Ultram Slide rodless cylinders ordered with track (-T option) include a special switch track. The switch includes a washer, screw and nut.



Note: Hold switch firmly against cylinder body to avoid air gaps.

## Mounted Dimensions Round Flat-1 and Square Flat-1 Cylinders

The switch mounting causes an extension outside of the cylinder diameter as shown.

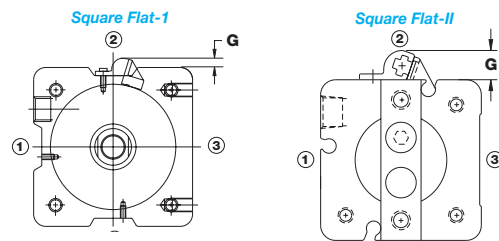


For Round Flat-1 Series Cylinders  
(inches shown, mm in parentheses)

Bore Designator	Bore	G
02	9/16" (14mm)	0.29 (7.4)
04	3/4" (19mm)	0.25 (6.4)
09	1-1/16" (27mm)	0.07 (1.8)
17	1-1/2" (38mm)	0.02 (.5)
31	2" (50mm)	0.03 (.8)
50	2-1/2" (63mm)	0.02 (.5)
70	3" (76mm)	0.03 (.8)
125	4" (101mm)	0.00 (0)

### Switch Location

For the M Option, the switch mounting post will be located in Position 2. To locate the post in other positions, or to order more than one post, specify options M1, M3, or M4, or T1, T3, or T4.



For Square Flat-1 Series Cylinders  
(inches shown, mm in parentheses)

Bore Designator	Bore	G
04	3/4" (19mm)	0.365" (9.3)
09	1-1/16" (27mm)	0.365" (9.3)
17	1-1/2" (38mm)	0.365" (9.3)
31	2" (50mm)	0.365" (9.3)
50	2-1/2" (63mm)	0.270" (6.9)
70	3" (76mm)	0.300" (7.6)
125	4" (101mm)	0.160" (4.1)

### Switch Location

For the M option, the switch mounting track will be located in Position 2. To locate the track in other positions, specify M1 or M4. To include additional track, specify T1 or T4.

ISO 6431

ISO 6432

Flat

Pneu-Turn

Ultram

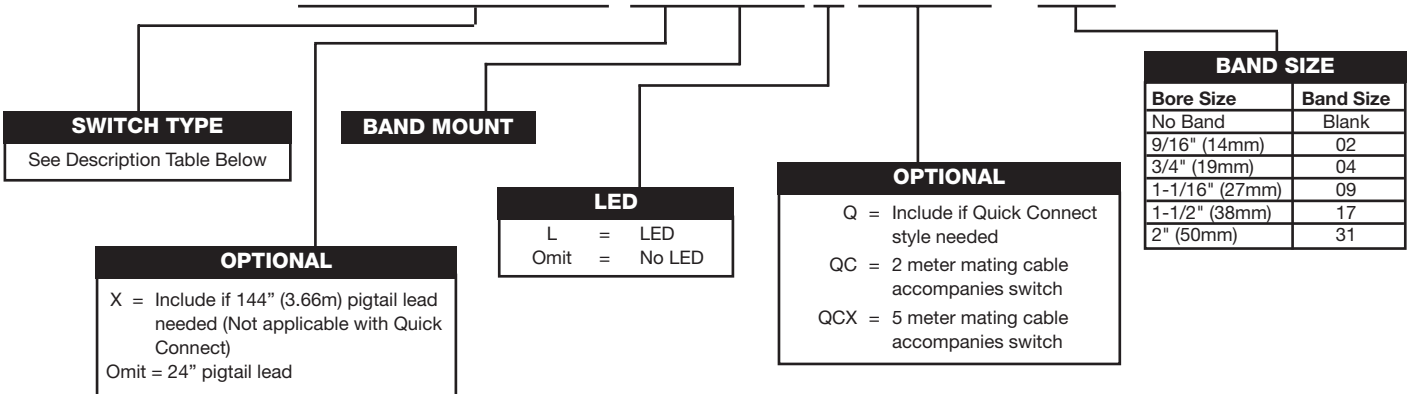
Flow Control

Position Sensing Solutions

# How to Order

Original Line, Double-Wall, Ultran Slide Rodless Cylinders, and Pneu-Turn Rotary Actuators  
MRS and RSU Switches

## MRS -.087 -P □ B L Q C X - 04



**NOTE: Before ordering, reference switch selection chart on page 7.1 for compatibility.**

	MRS-.027 3/4" & 9/16" Track Mount	MRS-.087-BL MRS-.087-BLQ	MRS-.087-PBL MRS-.087-PBLQ	MRS-.087-BQ MRS-.087-Q	MRS-1.5 MRS-1.5-S MRS-1.5-B	MRS-.087 MRS-.087-B
	2 wire switch	3 wire switch	2 wire switch	2 wire switch	2 wire switch	2 wire switch
Contacts*	SPST Form A	SPST Form A	SPST Form A	SPST Form A	SPST Form A	SPST Form A
Contact Rating	3 Watts max.	9 Watts max.	2.5 Watts max.	10 Watts max.	—	10 Watts max.
Switch Voltage	28 max. AC or DC	6 to 24 AC or DC	3 to 120 AC or DC	120 AC or DC	12 to 230 AC only	200 max. AC or DC
Maximum Current	250 mA (Resistive)	500 mA (Resistive)	20 mA (Resistive)	500 mA (Resistive)	1.5 amps @ 50°F (10°C) 0.5 amps @ 200°F (93°C)	500 mA (Resistive)
Minimum Current	—	—	10 mA AC or DC	—	0.1 amps	—
Initial Contact Resistance	0.10 ohms max.	0.10 ohms max.	0.10 ohms max.	0.10 ohms max.	—	0.10 ohms max.
Actuating Time Average	1.0 millisecond	1.0 millisecond	1.0 millisecond	1.0 millisecond	2.0 millisecond	1.0 millisecond
LED Indicator	No	Yes	Yes	No	No	No
Applications	Reed-9/16" & 3/4" bore low wattage	Reed-24 VDC 3-wires w/LED	Reed-24 VDC or 120 VAC, 2-wires bi-polar, low current, good for PLC	Reed-24 VDC or 120 VAC, 2-wires No LED, quick connect	Titan: Reed-AC only, up to 230 VAC, Inductive Inrush OK, 100mA min.	Reed-24 VDC or 200 VAC, 2-wires No LED, quick connect

\* (Normally Open) <sup>1</sup> (1-1/16" to 2-1/2") <sup>2</sup> (9/16" to 3/4")

Base Model	Base Model 24" (0.6m) pigtail lead	OPTIONS			
		X 144" (3.66m) pigtail lead	Quick Connect		
			Q (no cable)	QC (2m cable)	QCX (5m cable)
MRS-.027 <sup>1</sup>	Blank	X	Q	QC	QCX
MRS-.087 <sup>1</sup>	Blank	X	Q	QC	QCX
MRS-.087-B- □ <sup>2</sup>	Blank	X	Q	QC	QCX
MRS-.087-BL- □ <sup>2</sup>	Blank	X	Q	QC	QCX
MRS-.087-PBL- □ <sup>2</sup>	Blank	X	Q	QC	QCX
MRS-1.5	Blank	X	Q	QC	QCX
MRS-.1.5-S	Blank	X	Q	QC	QCX
MRS-1.5-B- □ <sup>2</sup>	Blank	X	Q	QC	QCX
RSU-1	Blank	X	Q	QC	QCX
RSUM-1	Blank	X	Q	QC	QCX

<sup>1</sup> Track mount switches.

<sup>2</sup> Bands are included in the price.

<sup>3</sup> Pigtail leads 12" (305m) for RSU-1 and RSUM-1. These switches are for Ultran Rodless Cylinders.

Sample Part Numbers:

MRS-.087 – sensor with 9 watt normally open contact and 24" pigtail lead.

MRS-.087-BLQCX-02 – sensor with 1.5amp normally open contact output, 8mm male quick connect, and 8mm female cable 5 meters long.

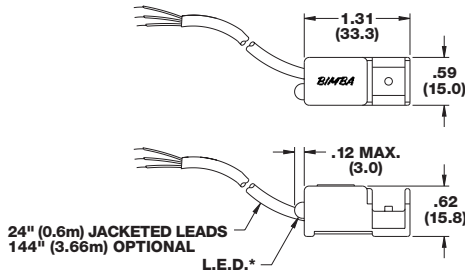


# Dimensions

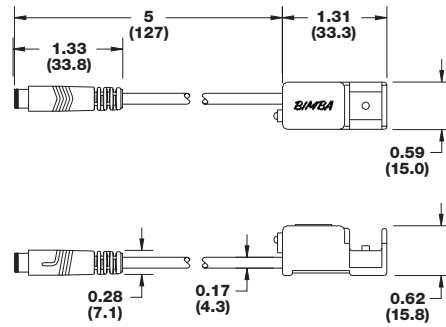
(inches shown, mm in parentheses)

## MRS and RSU Switches

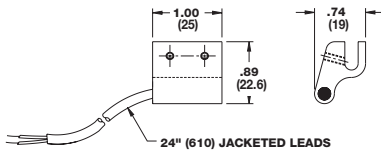
**MRS-.087-B**  
**MRS-.087-BL**  
**MRS-.087-PBL**  
**MRS-1.5-B**



**MRS-.087-BQ**  
**MRS-.087-BLQ**  
**MRS-.087-PBLQ**

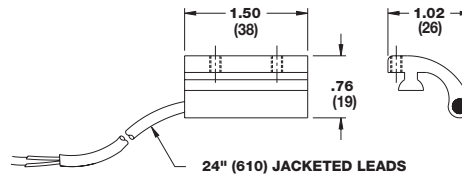


**MRS-.027**



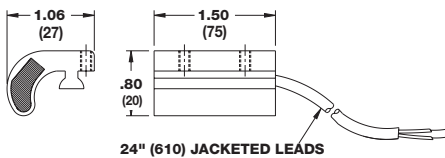
To order longer leads, specify D-12660-A-lead length in inches. Consult BIMBA distributor or factory for prices.

**MRS-.087**



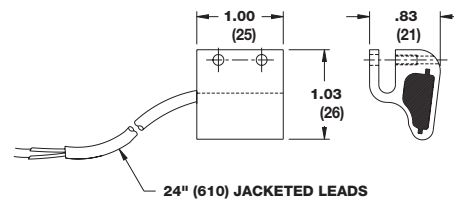
To order longer leads, specify D-7000-A-lead length in inches. Consult BIMBA distributor or factory for prices.

**MRS-1.5**



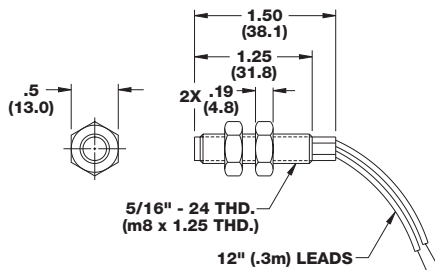
To order longer leads, specify D-7001-A-lead length in inches. Consult BIMBA distributor or factory for prices.

**MRS-1.5-S**



To order longer leads, specify D-16312-A-lead length in inches. Consult BIMBA distributor or factory for prices.

**RSU-1, RSUM-1**



ISO 6431

ISO 6432

Flat

Pneu-Turn

Ultran

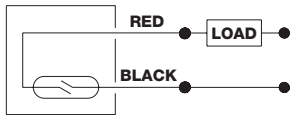
Flow Control

Position Sensing Solutions

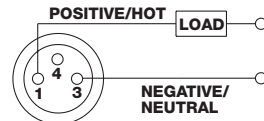
## Electrical Circuit Diagrams

### MRS and RSU Switches

**MRS-.027**  
**MRS-.087**  
**MRS-.087-B**  
**RSU-1**  
**RSUM-1**

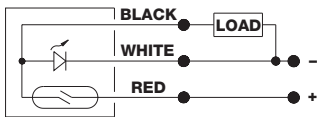


**MRS-.087-BQ**  
**MRS-.087-PBLQ**

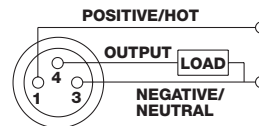


8mm Male Connector

**MRS-.087-BL**

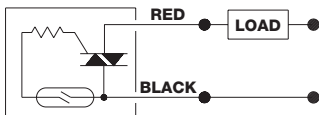


**MRS-.087-BLQ**

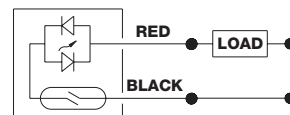


8mm Male Connector

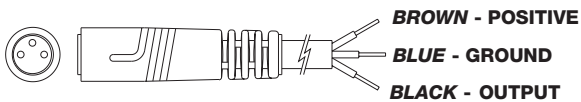
**MRS-1.5**  
**MRS-1.5-S**  
**MRS-1.5-B**



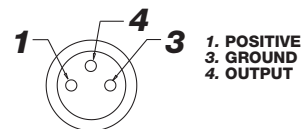
**MRS-.087-PBL**



### Pin and Wire Assignments for Quick Connect



8mm Female Connector



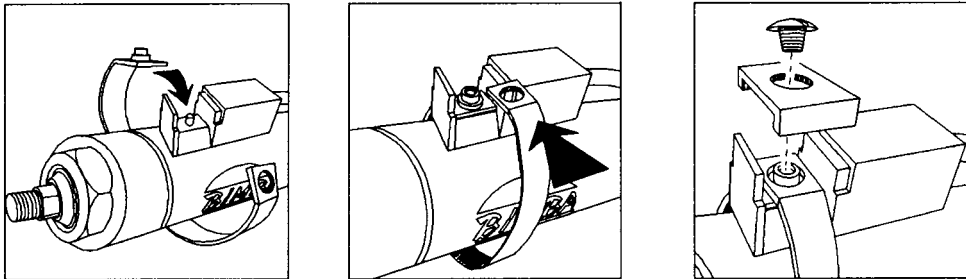
Face View of Male Connector

**Note:** On Quick Connect reed switch models, connect only the Blue and Brown wires on the mating cable and cut back the Black wire. **Do Not** connect switch to a mating cable that has been previously wired for a 3 wire solid state switch, as it will short the MRQ switch.

# Mounting

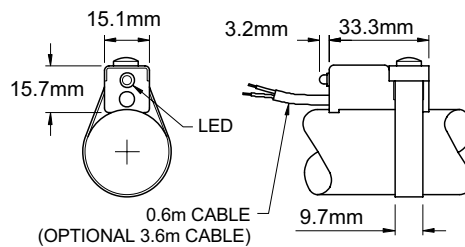
## Band-style (MRS)

The switch can be mounted anywhere along the length and circumference of the actuator body. Mounting hardware includes the switch, a band, a U-shaped bracket and a screw (included). 2-3 in.- lbs. of torque recommended for mounting

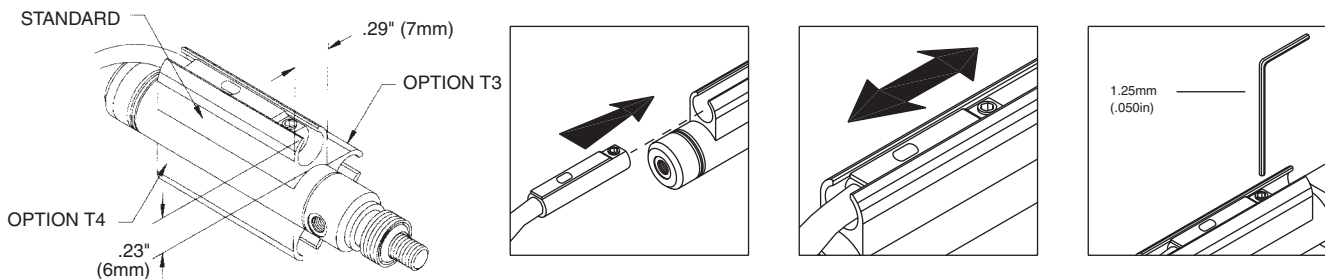


The Bimba Magnetic Reed switches are band mounted to the actuator. For all band-style switches, a pre-sized band is ordered by adding a bore size designation as the last three digits of the basic switch model number.

Bore Designator	Bore (mm)
M10	10
M12	12
M16	16
M20	20
M25	25



## Track-style (MRS)



Miniature Position Sensing track lengths can now be purchased separately for field mounting of custom track locations. Simply Specify the length of track desired after the part number.

**Mounting recommendations:**

- Clean body with acetone. Remove all oil from body surface.
- Avoid mounting track over rolled construction. Locate edge of track 0.175" from rolled construction.
- Use a solid continuous bead of glue for the entire length of track used. Bead should fill center channel of track.
- Adhere to recommended cure times as specified by the glue manufacturer.

Bores (mm)	Part Number
10-20	D-74168-A-length
25-50	D-78527-A-length

Loctite U-05FL or similar adhesive is recommended (not included).

ISO 6431

ISO 6432

Flat

Pneu-Turn

Ultram

Flow Control

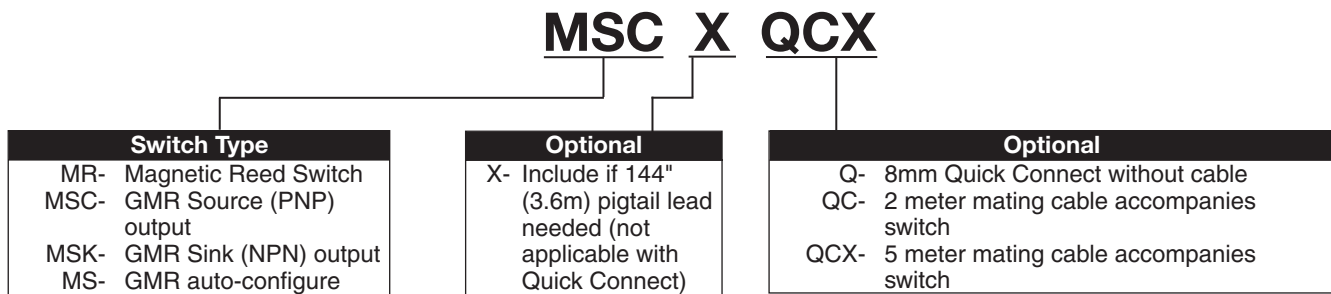
Position Sensing Solutions

## How to Order

### EF, Twin Bore, Pneu-Moment, Pneu-Turn, Ultran Slide and Linear Thruster MR, MS, MSC, MSK Switches

The Model Number for all extruded track mount switches consists of three alphanumeric clusters. These designate switch type and lead length. Please refer to the chart below for an example of Model Number

MSCQCX. This is a Solid State switch with PNP output including a Quick Connect cable attachment and a 5 meter mating cable.



Base Model	Base Model with Options			
MR (Magnetic Reed)	MRX (3.6m leads)	MRQ (Quick Connect)	MRQC (2m mating cable)	MRQCX (5m mating cable)
MSC (GMR Source output)	MSCX (3.6 leads)	MSCQ (Quick Connect)	MSCQC (2m mating cable)	MSCQCX (5m mating cable)
MSK (GMR Sink output)	MSKX (3.6m leads)	MSKQ (Quick Connect)	MSKQC (2m mating cable)	MSKQCX (5m mating cable)
MS (Auto-configure)	MSX (3.6m leads)	MSQ (Quick Connect)	MSQC (2m mating cable)	MSQCX (5m mating cable)

Sample Part Numbers:

MR – Sensor with Normally open contact and 24” pigtails

MSKQCX – Sensor with NPN (Current sinking) output and 8mm male quick connect and cable with 8mm female connector, 5 meters long

[See page 7.3 to order Cable Connectors separately](#)

## Mounting

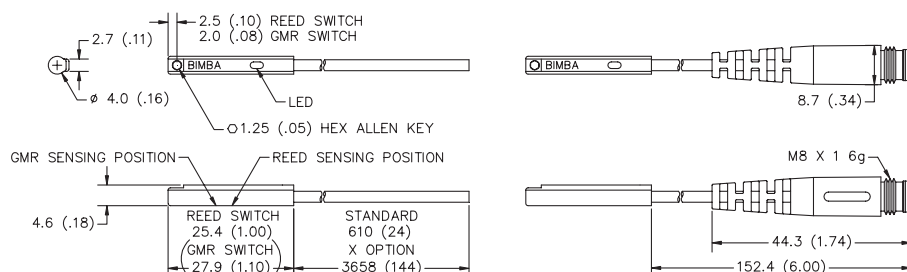
### To Install:

Slide the switch into the cylinder's switch track. Extend and retract the cylinder while positioning the switch until the switch's operating window is correct. Secure the switch in the cylinder track by turning the set screw with a hex driver. Cycle the cylinder (both extending and retracting) a number of times to confirm correct operation and adjust as required.

**Note: Maximum torque on set screw is .170 N-m (1.5 in.-lbs.). Do not overtighten.**

## Dimensions

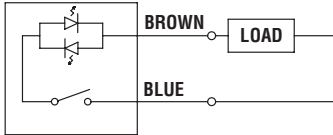
MR, MRX, MRQ, MS, MSX, MSQ, MSC, MSCX, MSCQ, MSK, MSKX, MSKQ mm (in.)



# Electrical Circuit Diagrams

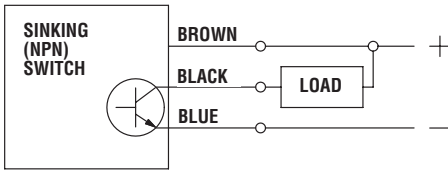
## MR, MS, MSC, MSK Switches

### MR, MRX, MRQ (Reed Switch)

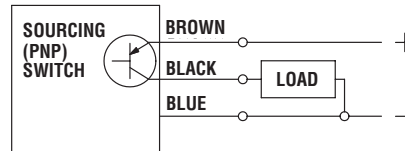


**Note:** On Quick Connect reed switch models, connect only the Blue and Brown wires on the mating cable and cut back the Black wire. **Do Not** connect switch to a mating cable that has been previously wired for a 3 wire solid state switch, as it will short the MRQ switch.

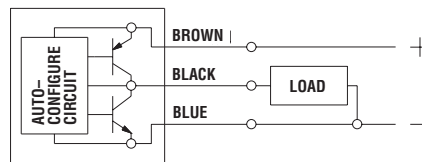
### MSK, MSKX, MSKQ (Sinking, Solid State)



### MSC, MSCX, MSCQ (Sourcing, Solid State)



### MS, MSX, MSQ



Color Codes	
Brown	(+) Positive
Black	Output
Blue	(-) Negative

ISO 6431

ISO 6432

Flat

Pneu-Turn

Ultran

Flow Control

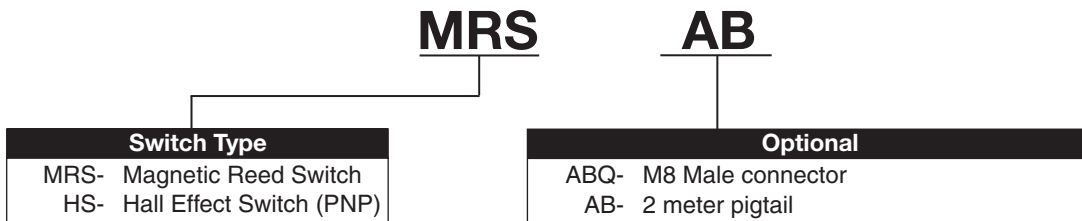
Position Sensing Solutions

## How to Order

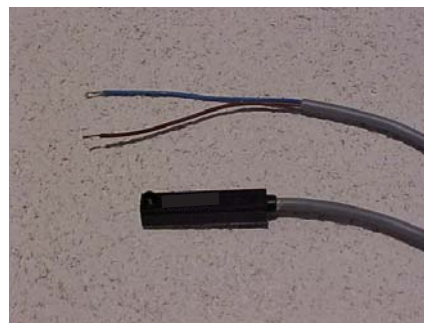
### ISO 6431, MRS-AB and HS-AB Switches

The Model Number for all extruded track mount switches consists of three alphanumeric clusters. These designate switch type and lead length. Please refer to the chart below for an example of Model

Number MSCQCX. This is a Solid State switch with PNP output including a Quick Connect cable attachment and a 5 meter mating cable.



Model	Pigtail (2m)	MRS-AB	HS-AB
	M8 Male Connector (0.3m)	MRS-ABQ	HS-ABQ
Operation (normally open)		Reed contact (2 wire)	Hall effect PNP (3 wire)
Voltage		10-110 V AC/DC	10-27 V DC
Protection Rating	IP 67		
Max. current	250 mA inductive		
Max. load		8 W, 10 VA	6 W
Circuit Protection		none	Reverse polarity reverse spikes
Switch time		<1,8 ms	<1 ms
Operating temperature	-10°C - 80°C		



See page 7.3 to order Cable Connectors separately

**Inductive Proximity Sensor**

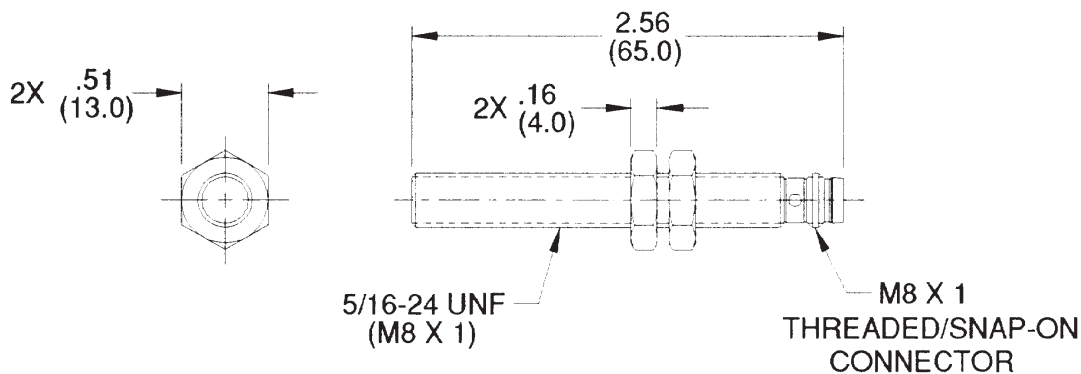


Introducing Bimba Inductive Proximity Sensors for use on Ultram products. Use it on the Ultram product line for end of stroke detection where inductive solid state sensing is preferred. The sensor can also be used on other applications where inductive proximity sensing is required. Sensor threads into Ultram end blocks.

Model Number	Description
PCQ	<b>5/16-24</b> Threaded Barrel type Inductive Proximity Sensor with <b>Sourcing</b> Output
PKQ	<b>5/16-24</b> Threaded Barrel type Inductive Proximity Sensor with <b>Sinking</b> Output
PCQC	<b>5/16-24</b> Threaded Barrel type Inductive Proximity Sensor with PNP (sourcing output) with 2m mating cable
PKQC	<b>5/16-24</b> Threaded Barrel type Inductive Proximity Sensor with NPN (sinking output) with 2m mating cable
PCMQC	<b>8mm</b> Threaded Barrel type Inductive Proximity Sensor with PNP (sourcing output) with 2m mating cable
PKMQC	<b>8mm</b> Threaded Barrel type Inductive Proximity Sensor with PNP (sinking output) with 2m mating cable
PCQCX	<b>5/16-24</b> Threaded Barrel type Inductive Proximity Sensor with PNP (sourcing output) with 5m mating cable
PKQCX	<b>5/16-24</b> Threaded Barrel type Inductive Proximity Sensor with PNP (sinking output) with 5m mating cable
PCMQCX	<b>8mm</b> Threaded Barrel type Inductive Proximity Sensor with PNP (sourcing output) with 5m mating cable
PKMQCX	<b>8mm</b> Threaded Barrel type Inductive Proximity Sensor with PNP (sinking output) with 5m mating cable

See page 7.3 to order Cable Connectors separately

**Dimensions**



ISO 6431

ISO 6432

Flat

Pneu-Turn

Ultram

Flow Control

Position Sensing Solutions

# Actuator Application Data

## Hysteresis and Operating Windows

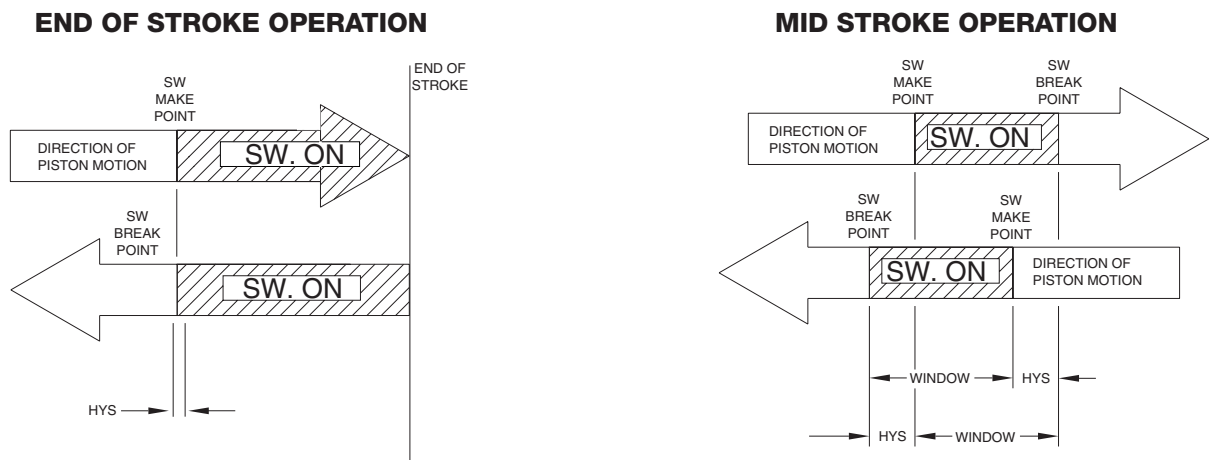
### Hysteresis

Bimba Solid State switches are subject to hysteresis. Hysteresis is the difference in magnetic field strength needed to initiate switch operation versus the field strength needed to sustain switch operation. The effect is that the switch break point will be different from the switch make point in the piston travel.

### Operating Window

The operating window is the distance the piston travels while the switch is in the "ON" state, and includes the hysteresis action. For the Solid State Switch, hysteresis is greater on one side of the operating window because this switch is sensitive to only one side of the magnet.

For high speed equipment, the time duration of the switch signal may be critical. The time duration is a function of the operating window length and the speed of operation of the actuator. It is calculated by dividing the minimum travel in the operating window by the piston speed, taking into account the hysteresis effect. The illustrations and chart below show the operating windows for the Solid State Switch.



### MRS Switches MRS-.087

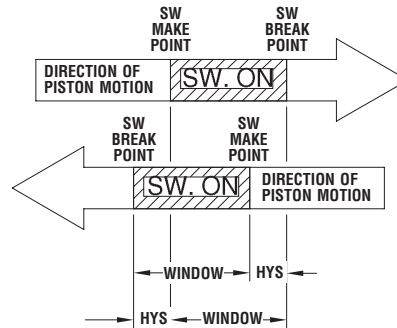
Cylinder		Operating Window	Hysteresis Maximum	Repeatability
Type	Bore			
Pneu-Turn	9/16" (14mm)	62°	9°	± 3°
	3/4" (19mm)	51°	7°	± 2°
	1-1/16" (27mm)	54°	9°	± 2°
	1-1/2" (38mm)	40°	6°	± 2°
	2" (50mm)	30°	5°	± 1°
Ultran	All types and bores	0.320 (8.1mm)	0.040 (1.0mm)	± .015" (.4mm)



# Actuator Application Data

## MR, MS, MSC, MSK Switches

Original Line Cylinder Window Switch Comparisons for Mini GMR and Mini Reed Switches						
Bore		Window		Maximum Hysteresis	Repeatability	
		MS, MSK, MSC, Mini Reed MR	Mini Reed			
007	5/16"	8mm	.250" (6mm)	.350" (9mm)	.040" (1mm)	±.010" (.3mm)
01	7/16"	10-12mm	.275" (7mm)	.375" (10mm)	.040" (1mm)	±.010" (.3mm)
02	9/16"	16mm	.350" (9mm)	.450" (11mm)	.040" (1mm)	±.010" (.3mm)
04	3/4"	20mm	.375" (10mm)	.475" (12mm)	.045" (1mm)	±.010" (.3mm)
09	1-1/16"	25mm	.425" (11mm)	.550" (14mm)	.045" (1mm)	±.010" (.3mm)
17	1-1/2"		.450" (11mm)	.575" (15mm)	.050" (1mm)	±.010" (.3mm)
31	2"		.450" (11mm)	.575" (15mm)	.050" (1mm)	±.010" (.3mm)



Pneu-Turn Cylinder Window for Mini GMR and Mini Reed Switches						
Bore	Window		Maximum Hysteresis		Repeatability	
	MS/MSK/MSK	Mini Reed MR	MS/MSK/MSK	Mini Reed MR	MS/MSK/MSK	Mini Reed MR
9/16" (14mm)	73	93	8	9	2	4
3/4" (19mm)	57	75	7	8	1.5	3
1-1/16" (27mm)	57	75	6	7	1.5	3
1-1/2" (38mm)	47	60	5	6	1	2
2" (50mm)	33	42	4	5	.75	1.5

## HSK, HK, HSC, HC Switches

### Ultran Slide Rodless Cylinders (inches shown, mm in parentheses)

Cylinder		Operating Window		Hysteresis		Repeatability
Type	Bore	W1	W2	H1	H2	
Ultran Rodless Cylinders*		0.25 to 0.5 (6.4 to 12.70), depending on individual assembly				± 0.015 (.4)

\*Any ferrous materials within an inch of the Ultran carriage may reduce the magnetic flux and affect switch operation.

### HSK and HSC for Pneu-Turn Rotary Actuators

Pneu-Turn Model	Operating Windows				Hysteresis				Repeatability
	Switch Mounted on Side 1		Switch Mounted on Side 2		Switch Mounted on Side 1		Switch Mounted on Side 2		
	CW	CCW	CW	CCW	CW	CCW	CW	CCW	
9/16" (14mm)	84°	46°	46°	84°	47°	7°	7°	47°	3°
3/4" (19mm)	61°	34°	34°	61°	34°	5°	5°	34°	2°
1-1/16" (27mm)	55°	30°	30°	55°	31°	5°	5°	31°	2°
1-1/2" (38mm)	41°	23°	23°	41°	23°	4°	4°	23°	2°
2" (50mm)	29°	16°	16°	29°	16°	3°	3°	16°	1°

## Flat Products

Bore	Flat Products - Track-Mounted	
	Operating Window	Maximum Hysteresis
9/16" (14mm)	.250" (6mm)	.050" (1mm)
3/4" (19mm)	.300" (8mm)	.050" (1mm)
1-1/16" (27mm)	.300" (8mm)	.050" (1mm)
1-1/2" (38mm)	.300" (8mm)	.050" (1mm)
2" (50mm)	.325" (8mm)	.050" (1mm)

ISO 6431

ISO 6432

Flat

Pneu-Turn

Ultran

Flow Control

Position Sensing Solutions

# Actuator Application Data

## Electrical Specifications

### MRS Switches

	MRS-.027 3/4" & 9/16" Track Mount	MRS-.087-BL MRS-.087-BLQ	MRS-.087-PBL MRS-.087-PBLQ	MRS-.087-BQ MRS-.087-Q	MRS-1.5 MRS-1.5-S MRS-1.5-B	MRS-.087 MRS-.087-B
	2 wire switch	3 wire switch	2 wire switch	2 wire switch	2 wire switch	2 wire switch
<b>Contacts*</b>	SPST Form A	SPST Form A	SPST Form A	SPST Form A	SPST Form A	SPST Form A
<b>Contact Rating</b>	3 Watts max.	9 Watts max.	2.5 Watts max.	10 Watts max.	—	10 Watts max.
<b>Switch Voltage</b>	28 max. AC or DC	6 to 24 AC or DC	3 to 120 AC or DC	120 AC or DC	12 to 230 AC only	200 max. AC or DC
<b>Maximum Current</b>	250 mA (Resistive)	500 mA (Resistive)	20 mA (Resistive)	500 mA (Resistive)	1.5 amps @ 50°F (10°C) 0.5 amps @ 200°F (93°C)	500 mA (Resistive)
<b>Minimum Current</b>	—	—	10 mA AC or DC	—	0.1 amps	—
<b>Initial Contact Resistance</b>	0.10 ohms max.	0.10 ohms max.	0.10 ohms max.	0.10 ohms max.	—	0.10 ohms max.
<b>Actuating Time Average</b>	1.0 millisecond	1.0 millisecond	1.0 millisecond	1.0 millisecond	2.0 millisecond	1.0 millisecond
<b>LED Indicator</b>	No	Yes	Yes	No	No	No
<b>Applications</b>	Reed-12mm & 19mm bore low wattage	Reed-24 VDC 3-wires w/LED	Reed-24 VDC or 120 VAC, 2-wires bi-polar, low current, good for PLC	Reed-24 VDC or 120 VAC, 2-wires No LED, quick connect	Triac Reed-AC only, up to 230 VAC, Inductive Inrush OK, 100mA min.	Reed-24 VDC or 200 VAC, 2-wires No LED, quick connect

\* (Normally Open) <sup>1</sup> (27mm to 50mm) <sup>2</sup> (12mm to 19mm)

### HC, HK, HSC, HSK Switches

Input Voltage: . . . . . 4.5 to 30 VDC	Operational Temperature Range: . . . . . -20°F to +185°F (-25°C to 85°C), minimum
Load Current: . . . . . 150 mA, maximum	Insulation Resistance: 100 megohms, lead to case with a 500 volt AC and or DC source
Sensor Element: . . . . . Solid-State	Flammability Rating: . . . . . UL 94 VO
Off-State Leakage: . . . . . 10 microamperes, maximum	Packaging: . . . . . IEC 529-1989, Category IP 67 Tests
Reverse Battery: . . . . . 40 VDC, minimum	Vibration: . . . . . Mil-Std-810E, Method 514.1, Category 10
Transient Protection: . . . . . 500 Watts of peak power, minimum	Welding Field Immunity: . . . Immune to welding fields to 4000 amperes, minimum at a minimum distance of 0.25" (7mm)
Overvoltage Protection: . . . . . 37 VDC maximum with up to 12 amperes	CE Mark: . . . . . CE Compliance per engineering evaluation to certified circuits
Sensor Operation Indicator: . . . . . Red LED for Sinking, Yellow LED for Sourcing	Cable: . . . . . 3 conductor, 24 to 26 AWG, Gray PVC outer jacket
Turn-on Time: . . . . . 1 microsecond, maximum	Repeatability: . . . . . +/- .005" (.13mm)
Turn-off Time: . . . . . 1 microsecond, maximum	
"On" Voltage Drop: . . . 0.4 VDC, maximum, for a Sinking Circuit 1.5 VDC, maximum for a Sourcing Circuit	

# Actuator Application Data

## Electrical Specifications

### MR, MRX, MRQ, MSC, MSCX, MSCQ, MSK, MSKX, MSKQ, MS, MSC, MSQ Switches

#### Reed Switch (Models: MR, MRX, MRQ)

Circuit	2 Wire, Normally Open, Sinking (NPN) or Sourcing (PNP)
Input Voltage	3 to 120 VAC / 3 to 24 VDC
Current Rating	25mA max.
Contact Rating	3 Watts
Voltage Drop	2.3 V
Shock	10-2000 Hz, 10g
Vibration	11ms, 1/2 Sine Wave, 150g
Turn ON/OFF Time	1.0 millisecond
Operating Temperature	-25° to 85°C (-13° to 185°F)
Enclosure	IEC IP 67
Flammability	94VO
LED Indicator	Red CE Compliant

#### GMR Switch (Models: MSC, MSCX, MSCQ)

Circuit	3 Wire, Normally Open, Sourcing (PNP)
Input Voltage	5 to 24 VDC
Current Rating	50mA max.
Voltage Drop	1.5 V
Off State Leakage	10µA max.
Quiescent Current	5mA max.
Turn ON/OFF Time	0.10 millisecond
Operating Temperature	-20° to 85°C (-4° to 185°F)
Enclosure	IEC IP 67
Flammability	94VO
LED Indicator	Yellow CE Compliant Over Voltage, Reverse Polarity and Transient Protected

#### GMR Switch (Models: MSK, MSKX, MSKQ)

Circuit	3 Wire, Normally Open, Sinking (NPN)
Input Voltage	5 to 24 VDC
Current Rating	50mA max.
Voltage Drop	0.5 V
Off State Leakage	10µA max.
Quiescent Current	5mA max.
Turn ON/OFF Time	0.10 millisecond
Operating Temperature	-20° to 85°C (-4° to 185°F)
Enclosure	IEC IP 67
Flammability	94VO
LED Indicator	Red CE Compliant Over Voltage, Reverse Polarity and Transient Protected

#### GMR Switch (Models: MS, MSC, MSQ)

Circuit	3 Wire, Normally Open, Sinking (NPN) or Sourcing (PNP)
Input Voltage	5 to 24 VDC
Input Current	25mA max.
" ON" Voltage Drop	
Sinking	0.4 Volts max.
Sourcing	1.5 Volts max.
Output Current	25µA max.
Power Dissipation	300 mW max.
Turn ON/OFF Time	0.10 millisecond
Operating Temperature	-20° to 85°C (-20° to 185°)
Off State Leakage	10 microamp max.
Signal Repeatability	± 0.4mm (.015")
LED Indicator	Red
Transient Protection	500 Watts of Peak Power
Over Voltage Protection	27 VDC max 16A max CE Compliant Reverse Polarity Protection

Note--Ensure load is on at power up. Autoconfiguration circuit will reset to proper output after each cycle.

### PCQ, PKQ, PCMQ, PKMQ Switches

<b>Output:</b>	Transistor, Normally Open
<b>Load Current:</b>	100mA max
<b>Leakage Current:</b>	10uA max
<b>Voltage Drop:</b>	2VDC
<b>Short Circuit and Overload Protection:</b>	Yes
<b>Reverse Polarity Protection:</b>	Yes
<b>Supply Voltage:</b>	10-30VDC
<b>LED:</b>	Yes
<b>Current Consumption:</b>	15mA
<b>Repeatability:</b>	0.010" (.25mm)
<b>Hysteresis:</b>	5%
<b>Sensing Range:</b>	2mm
<b>Response Time:</b>	330uS
<b>Electromagnetic Compatibility Compliance:</b>	NEMAICS5-1996
<b>Protection Class:</b>	IP67
<b>Ambient Temperature:</b>	-14F to 158F (-25C to 70C)
<b>Housing Material:</b>	Nickel-plated brass
<b>Sensing Face:</b>	Crastin
<b>Connector:</b>	3 pin 8mm DIN Std
<b>Approvals:</b>	UL-general purpose CSA-general purpose FM-nonincendive CE Certification

ISO 6431

ISO 6432

Flat

Pneu-Turn

Ultram

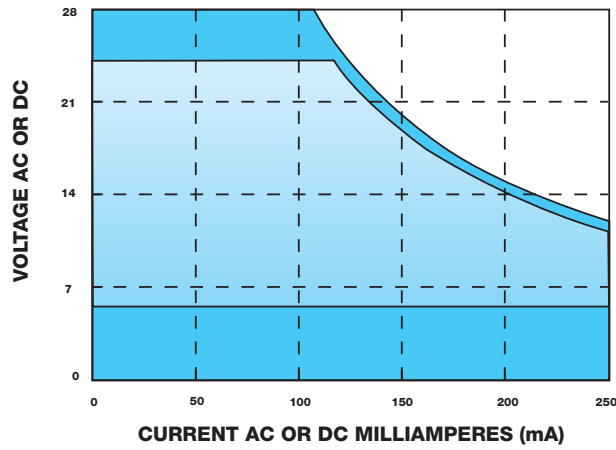
Flow Control

Position Sensing Solutions

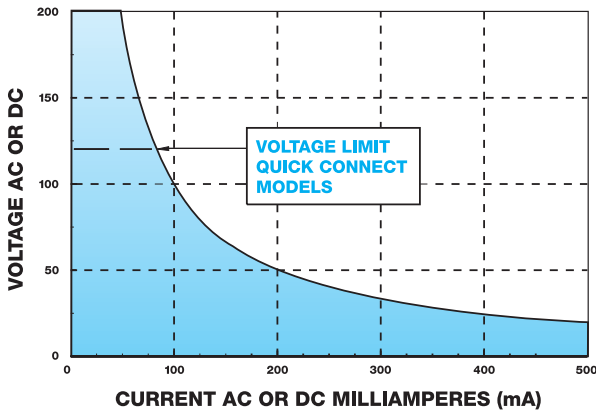
# Electrical Specifications

## Load Current Derating Curves

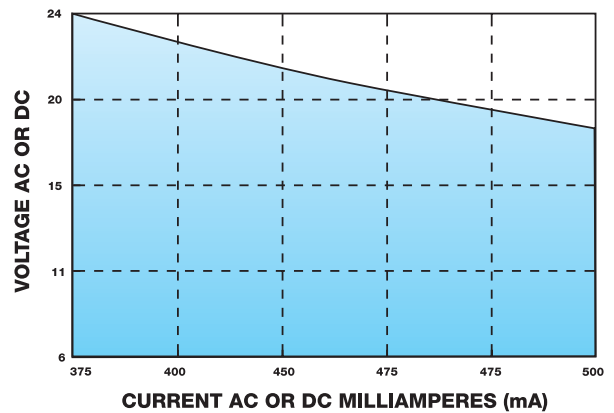
**MRS-.027**



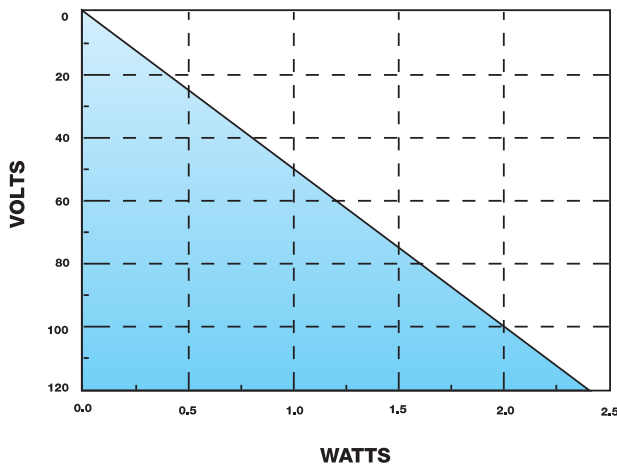
**MRS-.087 MRS-.087-B MRS-.087-BQ  
RSU-1 RSUM-1**



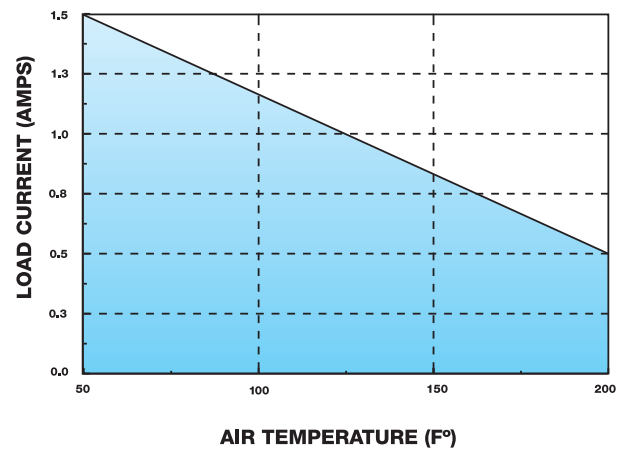
**MRS-.087-BL MRS-.087-BLQ**



**MRS-.087-PBL MRS-.087-PBLQ**  
VOLTS vs WATTS @ MAX. CURRENT (20mA)



**MRS-1.5 MRS-1.5-B MRS-1.5-S**



# Electrical Specifications

ISO 6431

**MRS-.027**  
**(2 wire switch)**

Contacts.....SPST Form A (Normally Open)  
 Contact Rating.....3 Watts max.  
 Switch Voltage.....28 Volts max.  
 Maximum Current 250 mA max. (Resistive)  
 Actuating Time Average.....1.0 millisecond

ISO 6432

**MRS-.087**  
**MRS-.087-B**  
**(2 wire switch)**

Contacts.....SPST Form A (Normally Open)  
 Contact Rating.....10 Watts max.  
 Switch Voltage .....200 Volts max. AC/DC  
 Maximum Current 500 mA max. (Resistive)  
 Initial Contact Resistance 0.10 ohms max.  
 Actuating Time Average.....1.0 millisecond

**MRS-.087-BQ**  
**(2 wire switch)**

Contacts.....SPST Form A (Normally Open)  
 Contact Rating.....10 Watts max.  
 Switch Voltage .....120 Volts AC or DC  
 Maximum Current:.....500 mA (Resistive)  
 Actuating Time Average.....1.0 millisecond

**MRS-1.5 (1-1/16" to 2-1/2")**  
**MRS-1.5-S (9/16" to 3/4" bore)**  
**MRS-.1.5-B**  
**(2 wire switch)**

Contacts.....SPST Form A (Normally Open)  
 Voltage Rating .....12 to 230 Volts (AC only)  
 Minimum Current .....0.1 amps  
 Maximum Current ..1.5 amps @ 50°F(10°C)  
 0.5 amps @ 200°F(93°C)  
 Actuating Time Average....2.0 milliseconds

Flat

**MRS-.087-BL**  
**MRS-.087-BLQ**  
**(3 wire switch)**

Contacts.....SPST Form A (Normally Open)  
 Contact Rating.....9 Watts max.  
 Switch Voltage .....6 to 24 Volts  
 Maximum Current 500 mA max. (Resistive)  
 Initial Contact Resistance 0.10 ohms max.  
 Actuating Time Average.....1.0 millisecond  
 LED Indicator

**MRS-.087-PBL**  
**MRS-.087-PBLQ**  
**(2 wire switch)**

Contacts.....SPST Form A (Normally Open)  
 Contact Rating.....2.5 Watts max.  
 Switch Voltage.....3 to 120 Volts AC or DC  
 Minimum Current .....10mA AC or DC  
 Maximum Current.....20 mA AC or DC  
 Initial Contact Resistance 0.10 ohms max.  
 Actuating Time Average.....1.0 millisecond  
 LED Indicator

**RSU-1**  
**RSUM-1**  
**(2 wire switch)**

Contacts.....SPST Form A (Normally Open)  
 Contact Rating.....10 Watts max.  
 Switching Voltage ...200 Volts Max. AC/DC  
 Breakdown Voltage .....250 Volts min.  
 Switching Current .....500 mA max.  
 Initial Contact Resistance ...0.2 ohms max.  
 Actuating Time Average.....1.0 millisecond

Pneu-Turn

Ultran

*NOTE: See page 7.16 for Repeatability and Hysteresis*

Flow Control

Position Sensing Solutions

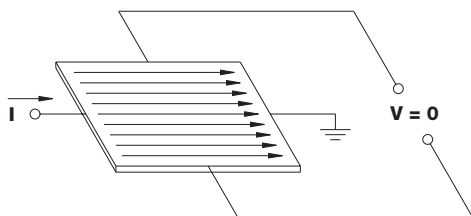
# Switch Application Information

## Bimba Solid State Switch

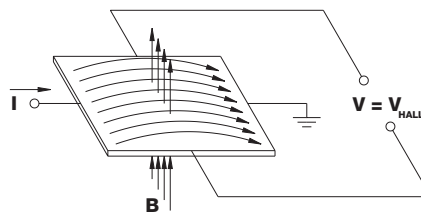
This is a three-wire, solid state device recommended for low current DC loads such as interfacing with a programmable controller. It provides compact, reliable sensing for virtually infinite life. An LED indicator light illuminates when switching occurs. Models are available in current sinking (NPN) and current sourcing (PNP) models. Either can be used for loads such as counters and solid state relays. Selection of sinking or sourcing models depends on the requirements of the programmable controller.

### How it works:

The Bimba Solid State Switch is based on giant magnetoresistive (GMR) technology, which was first developed in 1988. It includes 4 Solid State resistors (2 active, 2 shielded), each of which has many thin layers of magnetoresistive material. In each layer, the electrons are oriented opposite the adjacent layer, providing a great deal of resistance to electrical flow. The presence of a magnetic field overcomes the magnetic coupling between the adjacent layers, causing parallel alignment of magnetic moments between layers, and resistance drops significantly. By connecting the 4 resistors in a classic Wheatstone bridge configuration, the voltage across a single resistor is doubled, providing a linear output. This voltage is then amplified, and sent to a comparator that switches the sensor output when it detects that a minimum magnetic field strength is present. High voltage transistors provide TTL-compatible output rated at 25 milliamps. The switch includes reverse polarity, overvoltage and transient protection.



PRINCIPLE OF SOLID STATE (NO MAGNETIC FIELD)



PRINCIPLE OF SOLID STATE (MAGNETIC FIELD PRESENT)

### Sinking vs. Sourcing

Bimba offers both sinking and sourcing Solid State Switch models.

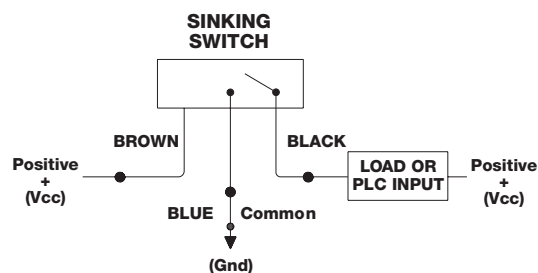
**Sinking switches** are applied to the **negative** side of a load. When the switch is activated, the negative (ground) is connected, completing the circuit.

**Sourcing switches** are applied to the **positive** side of a load. When the switch is activated, power is connected, completing the circuit.

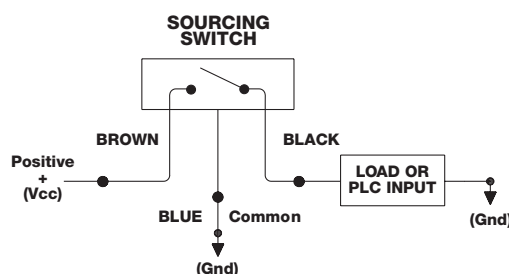
The model needed will be determined by a number of factors, including:

- Company standards.
- PLC input cards. (You may have sinking input cards available or your PLC only has a sinking type. Be aware that for some PLC manufacturers, sourcing input cards require a sinking switch or sinking input cards require a sourcing switch; check the specifications to clarify.)
- Type of circuit. PLC manufacturers typically filter input modules that use sourcing field devices and use unfiltered input modules with sinking field devices.

### Typical Solid State Sinking Configuration (NPN)



### Typical Solid State Sourcing Configuration (PNP)



# Switch Application Information

## Helpful Hints

- Be sure your actuator has a magnet option.
- Be sure to match your Solid State Switches to the proper circuits, i.e., sinking switches for sinking circuits and sourcing switches for sourcing circuits.
- Be sure to choose the correct input voltage for the switch ratings.
- Don't try to use a switch with a low current output to drive a high power circuit.
- If you have a high speed application, be sure your load circuitry doesn't have a high signal delay (some circuits have filters which cause signal delays).

**Bimba has technical bulletins that describe the following situations:**

1. Contact Protection (transient suppression for Reed Switches) for inductive or capacitive load switching.
2. "Or" logic operation for Solid State Switches connected in Parallel.
3. "And" logic operation for Solid State Switches connected in Series.

**Visit our website at [www.bimba.com](http://www.bimba.com) and click Tech Center.**

## Glossary

<b>Actuating Time Average</b>	Average time to close contacts on a reed switch.	<b>Operating Window</b>	See charts. The active window that the sensor will be in the "on" state.
<b>Solid State</b>	Solid State switching device activated by magnetic field.	<b>R-C Network</b>	A filter network that combines a resistor and capacitor in series across a reed switch, that filters the switch from inductive kickback or transients.
<b>Hysteresis</b>	The difference (in distance) between the spot where the switch turns "on" when the piston moves in one direction, and when the switch turns "off" when the piston moves in the opposite direction. This difference occurs because it takes more magnetic force to turn the switch "on" than it does to <u>keep</u> it on.	<b>Response</b>	Same as turn on/off time or actuating time average.
<b>Inductive Load</b>	The characteristic of an electrical load or device that enables it to store energy while operating and to return that energy to the circuit, as electricity, when the current is turned off, i.e., solenoids.	<b>Reverse Polarity Protection</b>	Protects switch damage caused by switching the positive and negative leads.
<b>Input Current</b>	The amount of current needed to power switch.	<b>Self-Commutation</b>	A condition inherent in triac switching devices. Self-commutation occurs when transients cause the triac to momentarily turn on, even though a magnetic field is not present.
<b>Inrush Current</b>	Initial current draw from inductive loads. May be two or three times the rated holding current for such devices.	<b>Signal Repeatability</b>	Range at which switch will turn on or off, given the same physical switching point.
<b>Kickback, Inductive</b>	Occurs when inductive loads are switched off. This may cause transients that can damage reed switches.	<b>Sinking</b>	Term used for device that switches a load to ground (NPN).
<b>MRS</b>	Magnetic Reed Switch is a mechanical switch activated by magnetic field.	<b>Sourcing</b>	Term used for device that switches power supply to load (PNP).
<b>Off-state Leakage</b>	Amount of current flow to output in the off state.	<b>Triac</b>	A solid state device used to switch inductive AC loads.
		<b>Turn On/Off Time</b>	The amount of time it takes to turn on or off a Solid State device.

ISO 6431

ISO 6432

Flat

Pneu-Turn

Ultram

Flow Control

Position  
Sensing Solutions

