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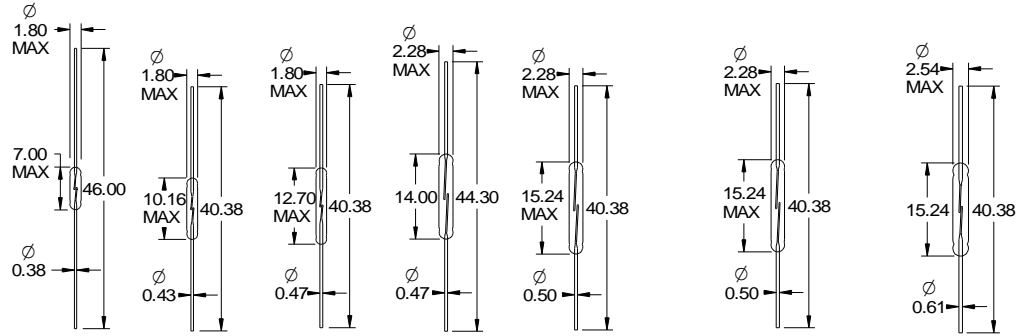
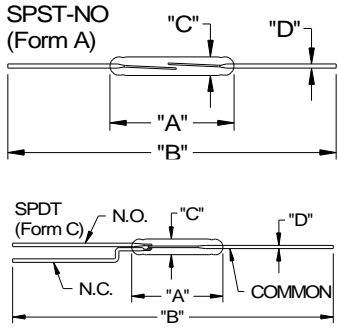
Reed Switch Catalog

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Switch Type	MITI-3V1	MDSR-10	MDSR-7	FLEX-14	MDCG-4	HA15-2	MLRR-4
Contact Form	A (SPST)	A (SPST)	A (SPST)	A (SPST)	A (SPST)	A (SPST)	A (SPST)
UL Recognized, File E47258 (see note 1)							
"A" Glass Body Length Max [mm[inch]]	7.00 [.276]	10.16 [.400]	12.70 [.500]	14.00 [.551]	15.24 [.600]	15.24 [.600]	15.24 [.600]
"B" Overall Length Wires Nominal [mm[inch]]	46.00 [1.810]	40.38 [1.590]	40.38 [1.59]	44.30 [1.744]	40.38 [1.590]	40.38 [1.590]	40.38 [1.590]
"C" Glass Body Diameter Max [mm[inch]]	1.80 [.071]	1.80 [.071]	1.80 [.071]	2.28 [.090]	2.28 [.090]	2.28 [.090]	2.54 [.100]
"D" Wire Diameter Nominal [mm[inch]]	0.38 [.015]	0.43 [.017]	0.47 [.019]	0.47 [.019]	0.50 [.020]	0.50 [.020]	0.61 [.024]
Available in Surface Mount Form (see page 3)	MISM-3V1	MDSM-10			MDSM-4		MLSM-4

ELECTRICAL RATINGS

Power, Switching Contact Rating (2)	Watt - max.	10	10	10	10	10	20/10 (7)	20/10 (7)	20
Voltage	Switching	Vdc - max.	170	200	200	200	200	200	200
	Switching	Vac - max.	120	140	140	140	140	265	140
	Breakdown	Vdc - max.	175	250	250	250	250	400	250
Current	Switching	Adc - max.	0.5	0.5	0.5	0.5	0.4	0.5	1.0
	Switching	Aac - max.	0.35	0.35	0.35	0.35	0.3	0.35	0.7
	Carry	A - max.	0.5	1.0	0.8	1.0	1.2	1.4	1.0
Resistance	Contact, Initial	Ω - max.	0.150	0.120	0.100	0.100	0.100	0.100	0.100
	Insulation	Ω - min.	10 ¹²	10 ¹²	10 ¹²	10 ¹⁰	10 ¹⁰	10 ¹⁰	10 ¹⁰
Capacitance	Contact	pF - typ.	0.3	0.2	0.3	0.2	0.2	0.2	0.4
Temperature	Operating	°C	-40 to +125	-40 to +125	-40 to +125	-40 to +125	-40 to +125	-20 to +125	-40 to +125
	Storage (6)	°C	-65 to +125	-65 to +125	-65 to +125	-65 to +125	-65 to +125	-65 to +125	-65 to +125

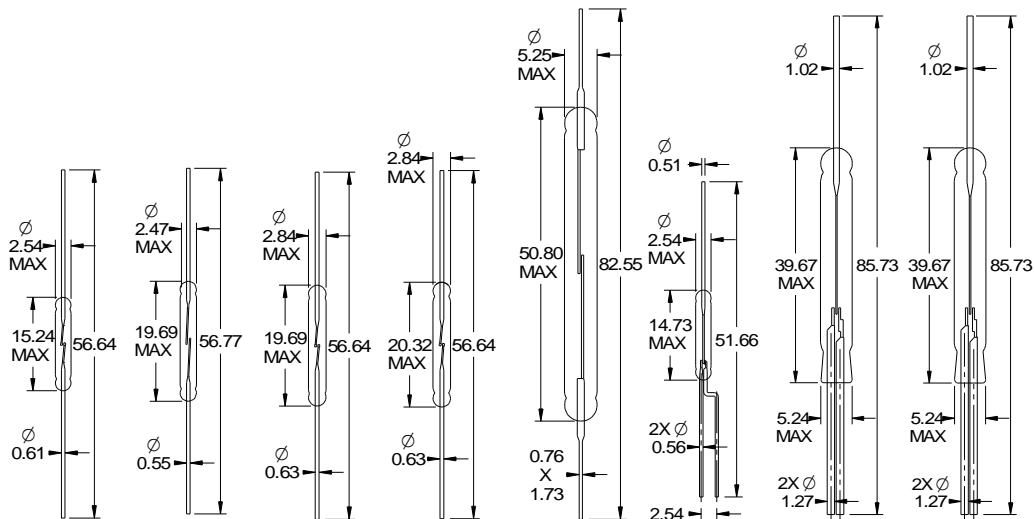
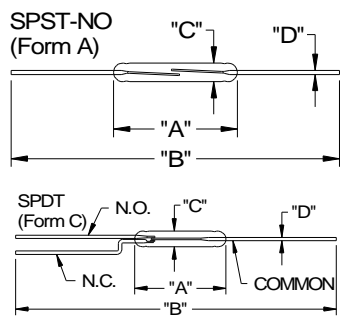
OPERATING CHARACTERISTICS

Operate Time (3)	ms - max.	0.45	0.5	0.6	0.55	0.6	0.6	0.6
Release Time (3)	ms - max.	0.2	0.1	0.2	0.2	0.2	0.2	0.2
Shock	G - max.	150	100	100	100	100	100	100
Vibration	G - max.	30	30	30	30	30	30	30
Resonant Frequency	Hz - typ.	18000	8500	5500	5200	3900	4000	6200

MAGNETIC CHARACTERISTICS

Pull-In Range (4)	Ampere Turns	6-10	10-25	10-25	10-30	12-38	17-23	22+	17-38
Rating Sensitivity (5)	Ampere Turns	12	15	20	20	20	17	22	20
Test Coil		L4991	L4989	L4989	L4989	L4989	L4989		L4989

- Notes:
- For details on electrical specifications, contact Hamlin.
 - Contact rating: product of the switching voltage and current should never exceed the wattage rating.
 - Operate (incl. Bounce) / release time per EIA/NARM RS421A, diode suppressed coil.
 - Pull-In range: contact Hamlin for tolerances available within this range.
 - Rating Sensitivity: The value at which contact ratings and operating characteristics are determined. Derating may be required below this value.
 - Storage Temperature: Long term exposure at elevated temperature may degrade solderability of the leads.
 - HA15-2, 20 Watts for 100-265 VAC loads, 10 Watts for all other loads.
 - DRT-DTH contact resistance measured with 36 Vdc 100mA load. DRT-DTH is not recommended for light loads (<6Vdc, <3W).



Switch Type	MLRR-3	MARR-5	MRPR-3	MRPR-8	DRR-129	MDRR-DT	DRR-DTH	DRT-DTH
Contact Form	A (SPST)	A (SPST)	A (SPST)	A (SPST)	A (SPDT)	C (SPDT)	C (SPDT)	C (SPDT)
UL Recognized, File E47258 (see note 1)								
"A" Glass Body Length Max [mm[inch]]	15.24 [.600]	19.69 [.775]	19.69 [.775]	20.32 [.800]	50.80 [2.000]	14.73 [.580]	39.67 [1.562]	39.67 [1.562]
"B" Overall Length Wires Nominal [mm[inch]]	56.64 [2.230]	56.77 [2.235]	56.64 [2.230]	56.64 [2.230]	82.55 [3.250]	51.66 [2.034]	85.73 [3.375]	85.73 [3.375]
"C" Glass Body Diameter Max [mm[inch]]	2.54 [.100]	2.66 [.105]	2.84 [.112]	2.84 [.112]	5.25 [.207]	2.54 [.100]	5.33 [.210]	5.33 [.210]
"D" Wire Diameter Nominal [mm[inch]]	0.61 [.024]	0.55 [.022]	0.63 [.025]	0.63 [.025]	Flattened	0.51 & 0.56 [.020 & .022]	1.02 & 1.27 [.040 & .050]	1.02 & 1.27 [.040 & .050]
Available in Surface Mount Form (see page 3)	MLSM-3					MDSM-DT		

ELECTRICAL RATINGS

Power, Switching Contact Rating (2)	Watt - max.	20	10	50	50	100	5	30	50	
Voltage	Switching	Vdc - max.	200	1000	200	250	400	175	500	500
	Switching	Vac - max.	140	700	140	265	280	120	350	350
	Breakdown	Vdc - max.	250	2000	300	750	600	200	1200	1000
Current	Switching	Adc - max.	1.0	0.5	1.5	1.0	3.0	0.25	0.5	1.5
	Switching	Aac - max.	0.7	0.35	1.1	0.7	2.1	0.18	0.35	1.0
	Carry	A - max.	1.2	1.3	3.0	2.5	6.0	1.5	3.0	2.0
Resistance	Contact, Initial	Ω - max.	0.100	0.100	0.100	0.100	0.100	0.100	0.125	0.500 (8)
	Insulation	Ω - min.	10 ¹⁰	10 ¹²	10 ¹⁰	10 ¹⁰	10 ¹⁰	10 ⁹	10 ⁹	10 ⁹
Capacitance	Contact	pF - typ.	0.4	0.2	0.2	0.2	0.6	1.0	2.0	2.0
Temperature	Operating	°C	-40 to +125	-75 to +125	-40 to +125	-20 to +125	-40 to +125	-40 to +125	-20 to +125	-20 to +125
	Storage (6)	°C	-65 to +125	-75 to +125	-65 to +125	-65 to +125	-65 to +125	-65 to +125	-65 to +125	-65 to +125

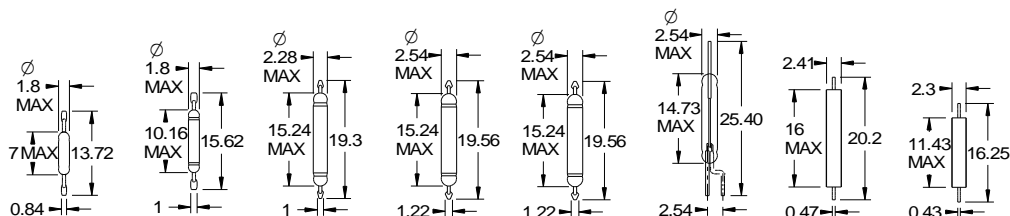
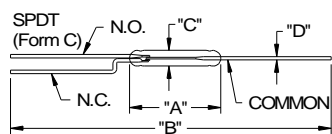
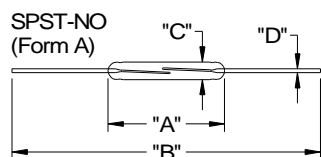
OPERATING CHARACTERISTICS

Operate Time (3)	ms - max.	0.7	0.75	0.75	0.75	4.5	0.7	4.5	5.5
Release Time (3)	ms - max.	0.2	0.3	0.3	0.3	2.5	1.0	7.0	8.0
Shock	G - max.	100	100	100	100	100	50	10	10
Vibration	G - max.	30	30	30	30	30	30	15	15
Resonant Frequency	Hz - typ.	6200	3200	2100	2100	850	11000	2750	2750

MAGNETIC CHARACTERISTICS

Pull-In Range (4)	Ampere Turns	17-38	17-38	22-43	22-43	42-83	15-30	50-80	50-80
Rating Sensitivity (5)	Ampere Turns	20	35	22	22	60	20	60	60
Test Coil		L4989	L4989	L4989	L4989	L4988	L4989	L4988	L4988

- Notes:
- For details on electrical specifications, contact Hamlin.
 - Contact rating: product of the switching voltage and current should never exceed the wattage rating.
 - Operate (incl. Bounce) / release time per EIA/NARM RS421A, diode suppressed coil.
 - Pull-In range: contact Hamlin for tolerances available within this range.
 - Rating Sensitivity: The value at which contact ratings and operating characteristics are determined. De-rating may be required below this value.
 - Storage Temperature: Long term exposure at elevated temperature may degrade solderability of the leads.
 - HA15-2, 20 Watts for 100-265 VAC loads, 10 Watts for all other loads.
 - DRT-DTH contact resistance measured with 36 Vdc 100mA load. DRT-DTH is not recommended for light loads (<6Vdc, <3W).



Switch Type	MISM-3V1	MDSM-10	MDSM-4	MLSM-4	MLSM-3	MDSM-DT	59165	59170
Contact Form	A (SPST)	A (SPST)	A (SPST)	A (SPST)	A (SPDT)	C (SPDT)	A (SPST)	A (SPST)
UL Recognized, File E47258 (see note 1)								
"A" Body Length Max [mm[inch]]	7.00 [.276]	10.16 [.400]	15.24 [.600]	15.24 [.600]	15.24 [.600]	14.73 [.580]	16.00 [.630]	11.43 [.450]
"B" Overall Length Nominal [mm[inch]]	13.72 [.540]	15.62 [.615]	19.30 [.760]	19.56 [.770]	19.56 [.770]	25.40 [1.00]	20.20 [.795]	16.25 [.640]
"C" Body Width Max [mm[inch]]	1.80 [.071]	1.80 [.071]	2.28 [.090]	2.54 [.100]	2.54 [.100]	2.54 [.100]	2.41 [.095]	2.30 [.091]
"D" Pad Width Nominal [mm[inch]]	0.84 [.033]	1.00 [.039]	1.00 [.039]	1.22 [.048]	1.22 [.048]	0.51 & 0.56 [.020 & .022]	.47 [.019]	0.43 [.017]
Base Reed Switch	MITI-3V1	MDSR-10	MDCG-4	MLRR-4	MLRR-3	MDRR-DT	MDSR-7	MDSR-10

ELECTRICAL RATINGS

Power, Switching Contact Rating (2)	Watt - max.	10	10	10	20	20	5	10	10
Voltage	Switching	Vdc - max.	170	200	200	200	175	200	200
	Switching	Vac - max.	120	140	140	140	120	140	140
	Breakdown	Vdc - max.	175	250	250	250	200	250	250
Current	Switching	Adc - max.	0.5	0.5	0.5	1.0	1.0	0.25	0.5
	Switching	Aac - max.	0.35	0.35	0.35	0.7	0.7	0.18	0.35
	Carry	A - max.	0.5	1.0	1.2	1.0	1.2	1.5	0.8
Resistance	Contact, Initial	Ω - max.	0.150	0.120	0.100	0.100	0.100	0.100	0.2
	Insulation	Ω - min.	10 ¹²	10 ¹²	10 ¹⁰	10 ¹⁰	10 ¹⁰	10 ⁹	10 ¹⁰
Capacitance	Contact	pF - typ.	0.3	0.2	0.2	0.4	0.4	1.0	0.3
Temperature	Operating	°C	-40 to +125	-40 to +125	-40 to +125	-40 to +125	-40 to +125	-40 to +125	-40 to +125
	Storage (6)	°C	-65 to +125	-65 to +125	-65 to +125	-65 to +125	-65 to +125	-65 to +125	-65 to +125

OPERATING CHARACTERISTICS

Operate Time (3)	ms - max.	0.45	0.5	0.6	0.6	0.7	0.7	1.0	1.0
Release Time (3)	ms - max.	0.2	0.1	0.2	0.2	0.2	1.0	1.0	0.5
Shock	G - max.	150	100	100	100	100	50	100	100
Vibration	G - max.	30	30	30	30	30	30	30	30
Resonant Frequency	Hz - typ.	18000	8500	3900	6000	6000	11000		

MAGNETIC CHARACTERISTICS

Pull-In Range Of Base Switch (4)	Ampere Turns	6-10	10-25	12-38	17-38	17-38	15-30	10-25	10-25
Rating Sensitivity (5)	Ampere Turns	12	15	20	20	20	20	20	15
Test Coil of Base Switch		L4991	L4989	L4989	L4989	L4989	L4989	L4989	L4989

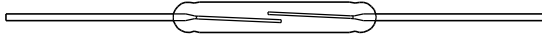
Notes:

- For details on electrical specifications, contact Hamlin.
- Contact rating: product of the switching voltage and current should never exceed the wattage rating.
- Operate (incl. Bounce) / release time per EIA/NARM RS421A, diode suppressed coil.
- Pull-In range: contact Hamlin for tolerances available within this range.
- Rating Sensitivity: The value at which contact ratings and operating characteristics are determined. De-rating may be required below this value.
- Storage Temperature: Long term exposure at elevated temperature may degrade solderability of the leads.
- HA15-2, 20 Watts for 100-265 VAC loads, 10 Watts for all other loads.
- DRT-DTH contact resistance measured with 36 Vdc 100mA load. DRT-DTH is not recommended for light loads (<6Vdc, <3W).

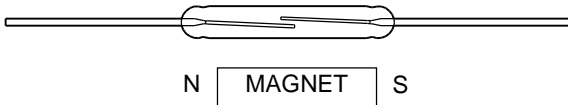
Basic Theory and Construction

The basic SPST-NO (Form A) reed switch has two ferromagnetic (nickel-iron) reeds which are hermetically sealed into a glass capsule. This capsule may contain either inert gases or a vacuum. The flattened reeds overlap and are separated by a small gap in the contact area. The contact surfaces are precious or semiprecious metal.

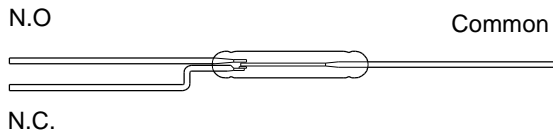
In the presence of a magnetic field from either a magnet or an electromagnetic coil, the reeds become magnetic flux carriers and attractive polarities are set up between the contacts. Closure occurs when the magnetic force exceeds the reed's spring force. Contacts open when the magnetic force is reduced to less than the reed's restoring force.



A SPST-NC (Form B) switch is not produced. However, this configuration can be achieved by using a biasing magnet to hold a Form A switch closed. Operation occurs by using a second magnet field of opposite polarity. You can also achieve a Form B configuration by using the normally-closed contact of the Form C switch.



The SPDT-CO (Form C) has common and normally-open (N.O.) reeds which are ferromagnetic and act the same as in a Form A switch. The normally-closed (N.C.) contact is non-ferrous and does not conduct flux. Transfer to the normally-open contact occurs when the magnetic attractive force exceeds the spring rate of the back-loaded common reed. The common reed re-closes to the normally-closed contact position when the magnetic field is reduced.



Permanent Magnet Operation

At Hamlin, we stock a variety of permanent magnet solutions. For more information, contact your local Hamlin representative.

ACTIVATING MAGNETS				
Type	Gauss, Typical*	mT, Typical*	Dimensions (in)	mm
CM-1	800	80	.200 x .500 d	5.08 x 12.7 d
H-31	45	4.5	.500 x .062 sq.	12.7 x 1.6 sq.
H-32	200	20	1.00 x .190 sq.	25.4 x 4.8 sq.
H-33	135	13.5	.750 x .120 sq.	19.1 x 3.2 sq.
H-34	260	26	1.00 x .250 sq.	25.4 x 6.35 sq.
H-36	155	15.5	1.00 x .182 d	25.4 x 4.6 d
315	120	12	.590 x .118 d	15.0 x 3.0 d
420	175	17.5	.787 x .157 d	20.0 x 4.0 d
625	235	23.5	.984 x .236 d	25.0 x 6.0 d

* Measured equidistant between poles (.115) 2.9 air gap from magnet except CM-1 is (.115) 2.9 air gap from pole end.

Load and Life Characteristics

Life Expectancy - Depending mostly upon the load characteristics, life expectancy can vary from less than one million to more than 200 million operations. Catalog ratings are based upon resistive loads. AC ratings are typically 0.7 times the DC rating because of the relationship between RMS and peak AC. Life test data is available from Hamlin upon request.

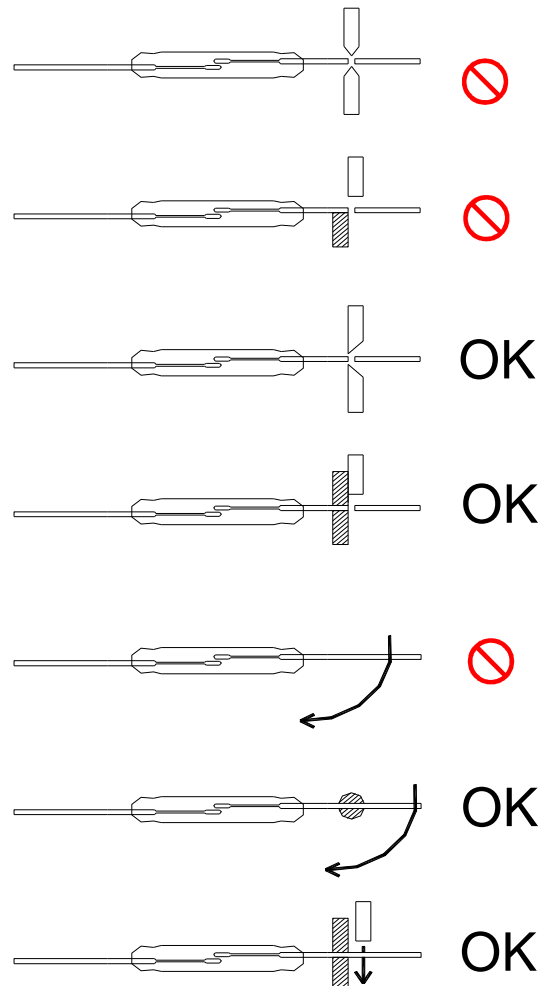
Inductive Load Switching - Arc suppression is recommended to maximize life for inductive loads. For DC loads, a diode should be used. For AC loads, a TVS, MOV, or RC suppression may be used. Note that MOV and RC suppression should not have too much capacitive inrush current as described below.

Capacitive Load Switching - Capacitance in the load circuit or long cables may cause permanent or intermittent contact sticking. Contact protection is recommended if the energy stored in the capacitor ($E = \frac{1}{2}CV^2$) is greater than 1 μ J. Contact protection usually takes the form of a small value resistor in series with the reed switch. See Hamlin application note *AN107 Capacitive Loads* on www.hamlin.com for further information.

Tungsten Incandescent Lamp Loads - These will have an initial inrush current which is as much as 12 times the steady state current. Under these conditions, most reed switches will have a very short life. However, Hamlin offers the MLRR-4 with contacts to handle lamp loads.

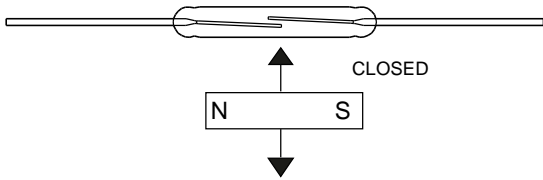
Special Precautions

If correct clamping and cutting tools are not used, lead cutting and forming may damage switch seals. Avoid using cutting blades with V-shaped edges since this will transmit a shock into the seals. Cutting edges slanted away from the switch minimize shock. Clamping between the switch and the cutting or forming is recommended. To eliminate the hazards of switch modification, contact Hamlin to perform cutting and bending operations.

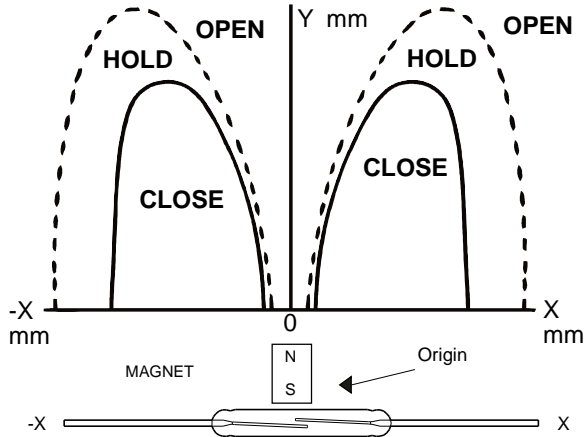


Activation

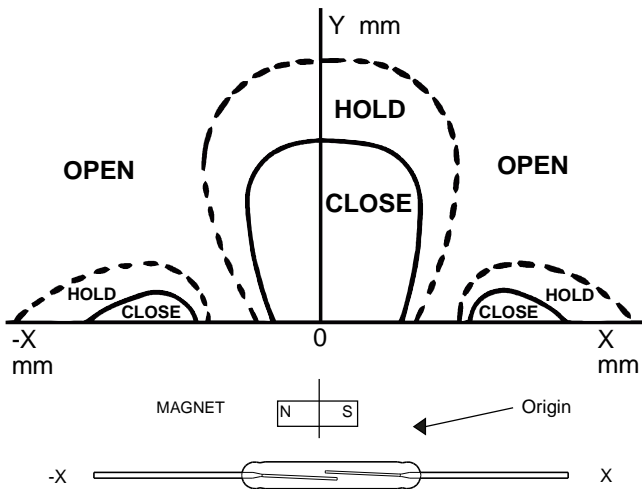
To operate the switch with a magnet, there are several useful magnet orientations. All require a magnet pole to be near one end of the reed switch. In all cases, the magnet position must generate a magnetic attractive force between the two contacts in order to close the switch.



Activation can be done by placing one magnetic pole near one end of the reed switch body.



Activation can also be done by using both magnet poles, one near each end of the switch, as shown in the middle activation lobe of this diagram.



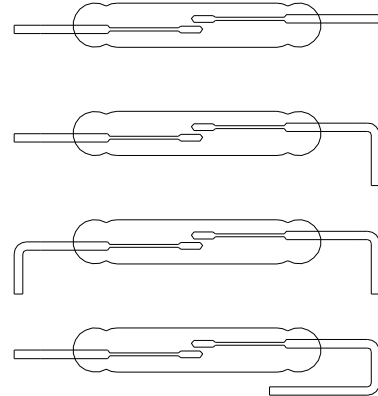
Using both magnet poles activates the switch with the largest gap between magnet and switch. The magnet movement can be linear, angular or rotary. Movement of a ferromagnetic part such as low carbon steel can be sensed. Sensing a ferromagnetic part is most effective when the part moves between a fixed magnet and the switch.

Applications Assistance and Custom Switch Modification

Hamlin offers complete application engineering assistance in selecting the correct switch, sensitivity, and configuration. Switch life is affected by electrical load and other operating conditions. Hamlin offers load / life information per customer request.

Lead Modifications

Hamlin can cut and/or form the reed switch leads to meet your dimensional requirements. Most lead modifications can be done by Hamlin with no additional tooling costs.



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