

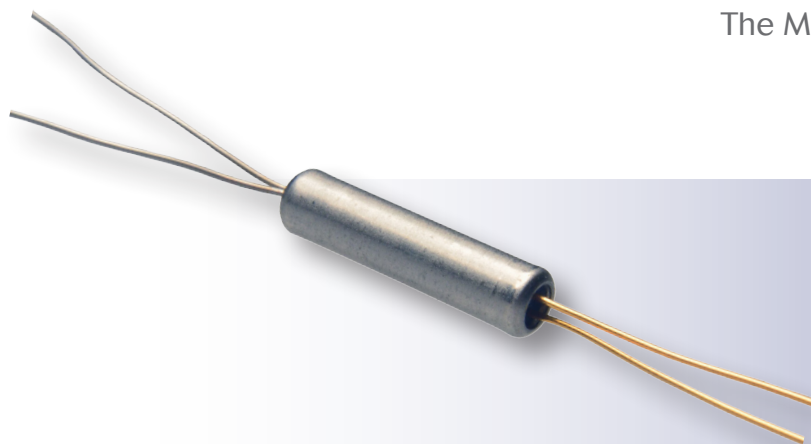
## Switches

These small, lightweight devices use pyrotechnic generated gas pressure to open or close one or more electrical circuits instantaneously, or with delays of up to six seconds. Each switch is hermetically sealed, preventing any leakage of pyrotechnic reaction products.

Applications include:

- Emergency power cut off
- Delay arming of fuses
- Sequencing a series of events from a single initiation
- Aborting ignition or detonation
- Triggering an alarm.

# MMS Micro-Miniature Switches



The Micro-Miniature Switch (MMS) is a pyrotechnic-actuated device that can close one electrical circuit on a one-time basis.

*It is the smallest, lightest, fastest and least expensive device of its type. The normally open switch closes a circuit when gas pressure from the burning pyrotechnic mixture breaks an insert piece in its specially designed shear section.*

## Variations

The two halves of the switch element telescope tightly together, making excellent electrical contact.

Each MMS is hermetically sealed so that no products of the pyrotechnic reaction can escape from the housing. Several squibs are available for variations in firing characteristics.

MMS have been used in many missile and spacecraft applications because of their light weight, small size, high reliability and low power consumption (as little as 1 amp pulse for 2 milliseconds).

## Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

## Specifications

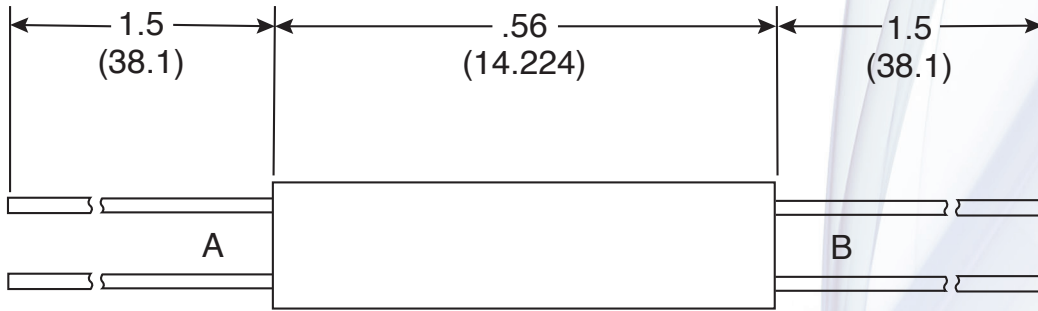
Electrical			
Squib Type	Bridge Resistance* @70°F (21°C) Ohm	All-Fire Current @ -65°F (-54°C) 10 ms Amp	No-Fire Current @ 160°F (71°C) 5 min Amp
A	6.0 ± 1	0.30	0.03
C	1.8 ± 0.2	1.00	0.10
F	0.35 ± 0.06	4.50	1.00
G	25.0 ± 5.0	0.10	0.01
Contact Resistance @ 1.0 amp, Measured 1/8" (3.17 mm) from Case	0.04 ohm Max.		
Insulation Resistance @ 500 Vdc	Before firing, either end, shunted leads to case: 50 megohm min Before firing, contact lead to lead: 50 megohm min		
Contact Current Carrying Capacity @ 160°F (71°C) (worst case)	1.0 amp for 6 hr 1.5 amp for 2 hr 5 amp for 100 msec		

\*1/4" (6.35 mm) from ends of leads, with test current limited to 0.010 amp.

# MMS Micro-Miniature Switches

Specifications Continued	
<b>Mechanical</b>	
Size	See drawing
Weight, Max.	0.6 gm
Function Time	All units will fire within 10 ms at designated all-fire currents. See Firing Characteristics of Pyrotechnic-Actuated Devices for effect of current on ignition time.
<b>Environmental</b>	
Temperature	Operating range: -65° to +160°F (-54° to + 71°C) Cycling: MIL-STD-202, Method 102A, Condition D
Humidity	MIL-STD-202, Method 103B, Condition D
Vibration	5-2000-5 Hz, 30 g's or 0.34" (8.64 mm) d.a.
Acceleration	200 g's
Shock	2000 g's, 1.5 ms, 1/2 sine wave

Specifications Continued	
<b>Chemical</b>	
Ignition Compound	KDNBF
<b>Freight Classification</b>	
Shipping Name	Release Device, Explosive
Identification Number	UN0173
Hazard Classification	1.4S
<b>Ordering Information</b>	
Order switches by part number as follows:	
Normally Open	MMS-1.0-0-*
*Specify squib type A, C, F or G.	



A) GOLD PLATED  
SQUIB LEADS  
.015 (.381) DIA

B) NICKEL PLATED  
SWITCH LEADS  
.015 (.381) DIA

DIMENSIONS IN ( ) ARE IN MM

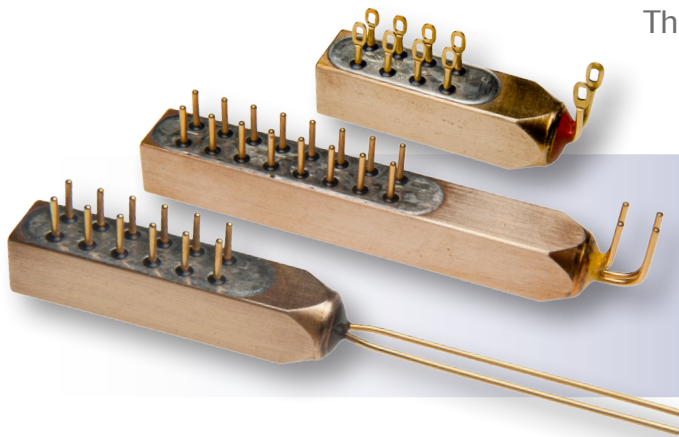


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# Miniature Switches



The Miniature Switch (MS Series) is a pyrotechnic-actuated device that can open or close up to eight electrical circuits on a one-time basis.

*It is compact, lightweight, highly reliable and consumes very little power. This has led to widespread use of the Miniature Switches in the aerospace industry.*

## Variations

Each unit is hermetically sealed so that no products of the pyrotechnic actuation can escape from the housing. For more information, see the Micro-Miniature Switches Data Sheet.

Miniature Switches are available with 2 to 8 poles, with 0 to 8 close contacts before firing. They can be set for instantaneous action or for delays of up to 1 second.

Standard round or flattened/pierced end pins can be specified. Several squibs are available for variations in firing characteristics.

## Characteristics

Some of the characteristics listed here are nominal; others are levels to which the units have been tested. There are no limits on design capabilities. Please consult an EaglePicher representative before using this data as a specification.

Specifications						
Electrical						
Squib Type			Bridge Resistance* @ 70°F (21°C)	All-Fire Current @ -65°F (-54°C)	No-Fire Current @ 160°F (71°C)	
2-pin	3-pin	4-pin	Ohm	Amp, Min.	Amp, Max.	
A	A3	A4	6.0 ± 1	0.30	0.03	
B	B3	B4	4.5 ± 0.5	0.56	0.10	
C	C3	C4	1.8 ± 0.2	1.00	0.10	
F	F3	F4	0.12 ± 0.03	4.50	1.00	
G	G3	G4	25.0 ± 5.0	0.10	0.01	
H	H3	H4	0.28 ± 0.12	2.00	0.500	
Y	Not available		1.0 ± 0.2	3.50	1.00	
Contact Resistance @ 1.0 amp			0.008 ohm max			
Insulation Resistance @ 500 Vdc			Before firing, between shunted squib leads and case: 100 megohm min Before firing, between each contact terminal and case: 100 megohm min Before firing, between each contact terminal and every other isolated terminal: 100 megohm min After firing, between each contact terminal and case: 20 megohm min After firing, between each contact terminal and every other isolated terminal: 20 megohm min			
Contact Current Carrying Capacity @ 70°F (21°C)			6.0 amp for 4 hr			

\*1/4" (6.35 mm) from ends of leads, with test current limited to 0.010 amp.

# MS Series Miniature Switches

## Specifications Continued

### Mechanical

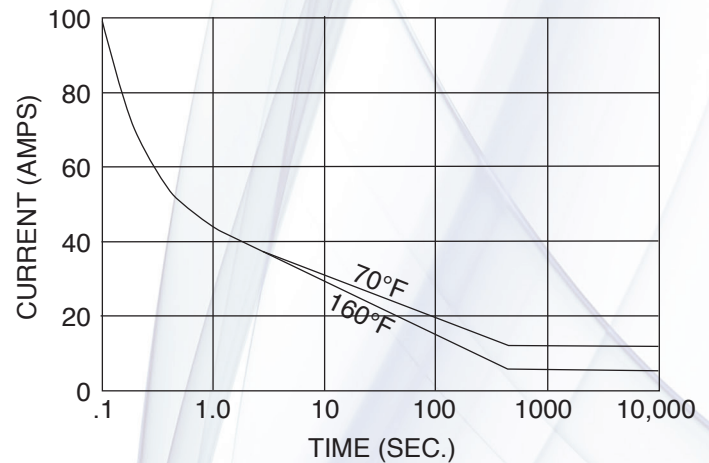
Delay (sec)	No. of Poles			
	2	4	6	8
0	16 g	20 g	24 g	28 g
0.015 - 1.0	24 g	28 g	32 g	36 g
Size	See drawing			
Function Time	2.0 ms to 6.0 sec			

See Firing Characteristics of Pyrotechnic-Actuated Devices for the effect of current on ignition times.

## Specifications Continued

### Environmental

Temperature	Operating range: -65° to +160°F (-54° to + 71°C)  MIL-STD-202, Method 102A, Condition D (temperature cycling)  MIL-STD-202, Method 103B, Condition D (humidity, steady state)  MIL-STD-810B
Vibration	5-2000-5 Hz, 30 g's or 0.34" (8.64 mm) d.a.
Shock	2000 g's, 1.5 ms, 1/2 sine wave 30 g's or 0.34" (8.64 mm) d.a.  Sinusoidal: 0-2000 Hz, 30 g's or 0.34" (8.64 mm) d.a.  Random: 100-2000 Hz, 1.0 g <sup>2</sup> /cps; overall 51.0 g's rms
Acoustic Noise	160 dB, 37.5-9600 Hz
Acceleration	200 g's
<b>Chemical</b>	
Ignition Compound	KDNBF
<b>Freight Classification</b>	
Shipping Name	Release Device, Explosive
Identification Number	UN0173
Hazard Classification	Unregulated



MS Series Miniature Switch Current Carrying Capacity

# MS Series Miniature Switches

## Ordering Information

Order switches by part number as follows

### Example:

MS 4.2-0.0-CRT1

MS = Switch series

4 = Number of poles (2 to 8)

2 = Number of closed contacts before firing (0 to 8)

0.0 = Delay time in seconds

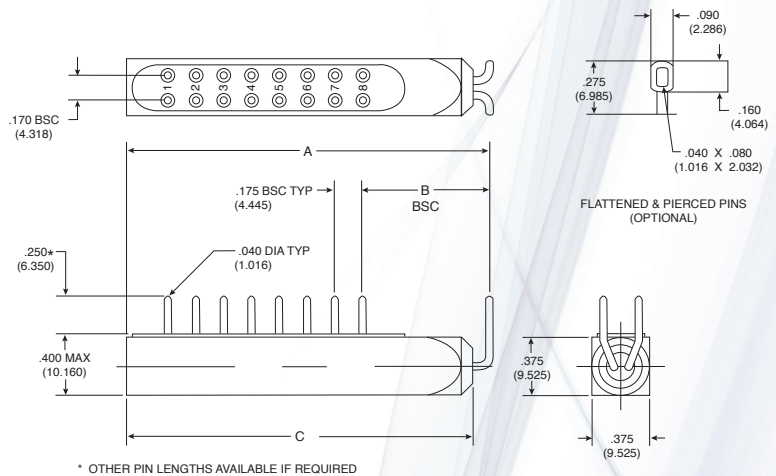
C = Squib type (see table)

R = Contact arrangement\*

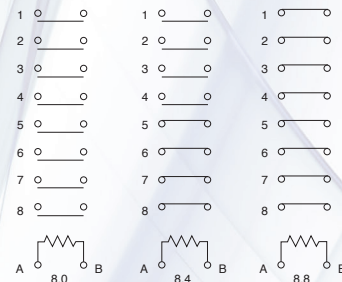
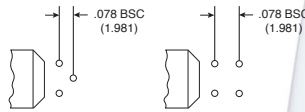
T1 = Flattened and pierced pins\*\*

\*When both open and closed contacts (before firing) are furnished, the closed contacts are nearest the squib. This is indicated by the suffix "R".

\*\*If T1 is not designated, standard rounded end pins will be furnished.



3RD & 4TH PIN LOCATIONS:



TYPICAL CONTACT ARRANGEMENT

DIMENSIONS IN PARENTHESIS ( ) ARE IN MM.

DELAY (SECONDS)	NOMINAL DIMENSIONS, INCHES AND (MM)									
	ALL	2-POLE		4-POLE		6-POLE		8-POLE		
	B	A	C	A	C	A	C	A	C	
0	0.723 (18.364)	1.116 (28.346)	1.046 (26.568)	1.466 (37.236)	1.396 (35.458)	1.816 (46.126)	1.746 (44.348)	2.166 (55.016)	2.096 (53.238)	
0.015-2.9	1.227 (31.166)	1.622 (41.199)	1.552 (39.421)	1.972 (50.089)	1.902 (48.311)	0.723 (58.979)	2.252 (57.201)	2.672 (67.869)	2.602 (66.091)	
3.0-6.0	1.627 (41.326)	2.022 (51.359)	1.952 (49.581)	2.372 (60.249)	2.302 (58.471)	2.722 (69.139)	2.652 (67.361)	3.072 (78.029)	3.002 (76.251)	

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