

# General Specifications

## Electrical Capacity (Resistive Load)

|                                                  |                                                                                   |
|--------------------------------------------------|-----------------------------------------------------------------------------------|
| <b>Power Level (silver):</b>                     | 6A @ 125V AC or 3A @ 250V AC                                                      |
| <b>Logic Level (gold):</b>                       | 0.4VA maximum @ 28V AC/DC maximum<br>(Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V) |
| <b>Logic/Power Level:<br/>(gold over silver)</b> | Combines silver & gold ratings                                                    |

Note: Find additional explanation of dual rating & operating range in Supplement section.

## Other Ratings

|                               |                                                                                                                            |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Contact Resistance:</b>    | 10 milliohms maximum for silver; 20 milliohms maximum for gold                                                             |
| <b>Insulation Resistance:</b> | 1,000 megohms minimum @ 500V DC                                                                                            |
| <b>Dielectric Strength:</b>   | 1,000V AC minimum between contacts for 1 minute minimum;<br>1,500V AC minimum between contacts & case for 1 minute minimum |
| <b>Mechanical Life:</b>       | 100,000 operations minimum                                                                                                 |
| <b>Electrical Life:</b>       | 25,000 operations minimum for silver; 50,000 operations minimum for gold                                                   |
| <b>Contact Timing:</b>        | Nonshorting (break-before-make)                                                                                            |
| <b>Total Travel:</b>          | On-None-On circuit .087" (2.2mm); all other circuits .138" (3.5mm)                                                         |

## Materials & Finishes

|                             |                                                                                                                                     |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Actuator:</b>            | Glass fiber reinforced PBT resin (UL94V-0)                                                                                          |
| <b>Frame:</b>               | Stainless steel for panel & PCB mount; phosphor bronze with tin plating for bracket mount                                           |
| <b>Dust Cover:</b>          | Phosphor bronze with nickel plating                                                                                                 |
| <b>Case:</b>                | Glass fiber reinforced diallyl phthalate resin (UL94V-0)                                                                            |
| <b>Movable Contacts:</b>    | Silver alloy (code W); copper with gold plating (code G);<br>or silver alloy with gold plating (code A)                             |
| <b>Stationary Contacts:</b> | Silver capped copper with silver plating (code W); copper with gold plating (code G);<br>or silver alloy with gold plating (code A) |
| <b>Terminals:</b>           | Copper or brass with silver or gold plating                                                                                         |

## Environmental Data

|                              |                                                                                                                                              |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Operating Temp Range:</b> | -30°C through +85°C (-22°F through +185°F)                                                                                                   |
| <b>Humidity:</b>             | 90 ~ 95% humidity for 96 hours @ 40°C (104°F)                                                                                                |
| <b>Vibration:</b>            | 10 ~ 55Hz with peak-to-peak amplitude of 1.5mm traversing the frequency range & returning in 1 minute; 3 right angled directions for 2 hours |
| <b>Shock:</b>                | 50G (490m/s <sup>2</sup> ) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)                               |

## Processing

|                   |                                                                                                                                       |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Soldering:</b> | Wave Soldering recommended (PC Mount). See Profile A in Supplement section.<br>Manual Soldering: See Profile A in Supplement section. |
| <b>Cleaning:</b>  | These devices are not process sealed. Hand clean locally using alcohol based solution.                                                |

## Standards & Certifications

|                                |                                                                                                                                                                                                                                                             |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Flammability Standards:</b> | UL94V-0 rated actuator & case                                                                                                                                                                                                                               |
| <b>UL:</b>                     | <b>File No. E44145 - Recognized only when ordered with marking on switch.</b><br>Add "/U" or "/CUL" to end of part number to order UL recognized switch.<br>All Single & Double Pole Double Throw models recognized at 6A @ 125V AC & 3A @ 250V AC.         |
| <b>CSA:</b>                    | <b>File No. 023535_0_000 - Certified only when ordered with marking on switch.</b><br>Add "/C" to end of part number to order CSA certified switch.<br>All Double Throw & 3 Throw models certified at 6A @ 125V AC, 3A @ 250V AC, & 0.4VA maximum @ 28V DC. |

# Distinctive Characteristics

Available in flat frame and bracketed PC mounting types.

Over-center actuator block and plunger design gives crisp actuation with clear indication of circuit status; this design also diminishes sparking and increases operating life.

Guide interlocked with actuator block prevents window locking and maintains correct plunger alignment to assure contact stability.

Antijamming design protects contacts from damage due to excessive downward force on the actuator.

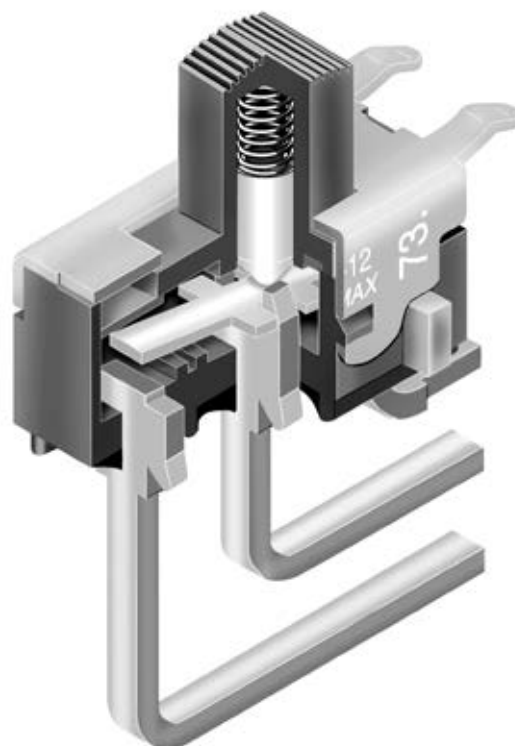
High internal barriers between poles and insulating sheet between case and actuator block give added protection to contacts.

Specially composed silver alloy contacts for power applications or gold contacts for logic level applications give high contact reliability.

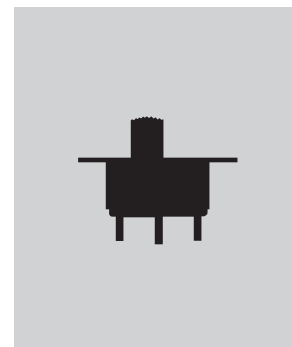
Prominent external insulating barriers increase insulation resistance and dielectric strength.

Epoxy sealed terminals prevent entry of flux, solvents, and other contaminants.

Clinching of frame to case well above base and terminals provides 1,500V dielectric strength.



Actual Size



Toggles

Rockers

Pushbuttons

Illuminated PB

Programmable

Keylocks

Rotaries

**H**  
Slides

Tactiles

Tilt

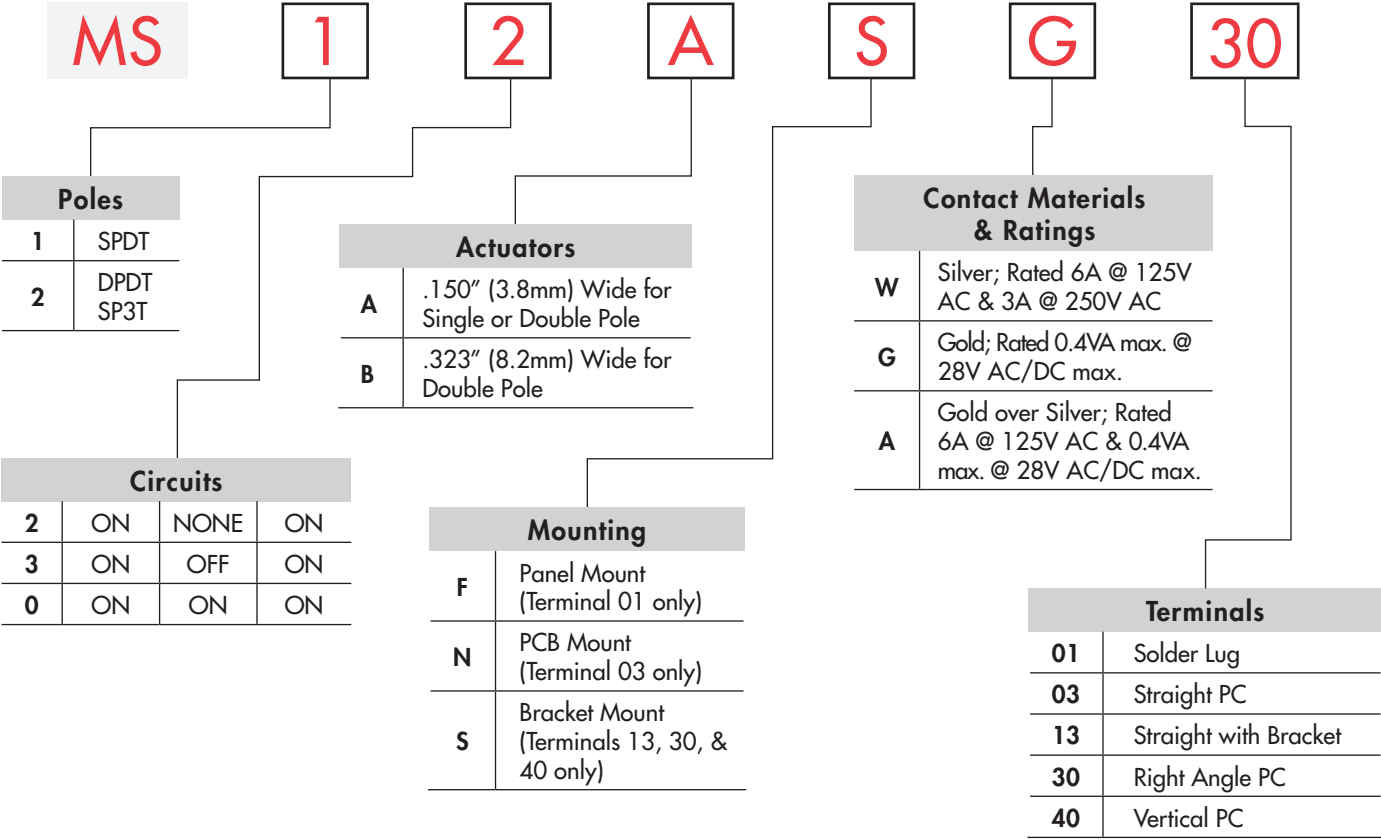
Touch

Indicators

Accessories

Supplement

TYPICAL SWITCH ORDERING EXAMPLE



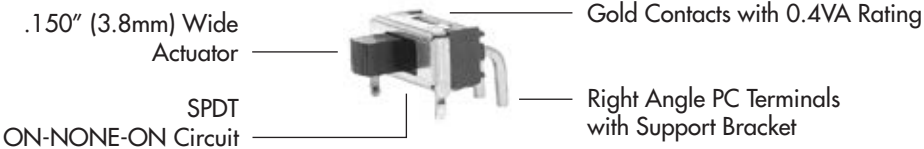
IMPORTANT:



Switches are supplied without UL, cULus & CSA marking unless specified.  
**UL, cULus & CSA recognized only when ordered with marking on the switch.**  
Specific models, ratings, & ordering instructions are noted on the General Specifications page.

DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

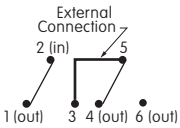
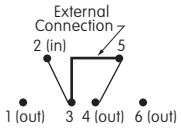
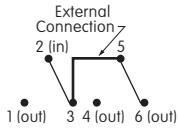
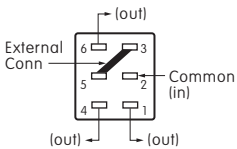
MS12ASG30



POLES & CIRCUITS

|      |              | Slide Position                                                                    |                                                                                   |                                                                                   | Connected Terminals                                                               |                                                                                   |                                                                                   | Throw & Schematics                                     |
|------|--------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------|
| Pole | Model        | Left                                                                              | Center                                                                            | Right                                                                             | Left                                                                              | Center                                                                            | Right                                                                             | Note: Terminal numbers are not actually on the switch. |
|      |              |  |  |  |  |  |  |                                                        |
| SP   | MS12<br>MS13 | ON<br>ON                                                                          | NONE<br>OFF                                                                       | ON<br>ON                                                                          | 2-1                                                                               | OPEN                                                                              | 2-3                                                                               | SPDT                                                   |
| DP   | MS22<br>MS23 | ON<br>ON                                                                          | NONE<br>OFF                                                                       | ON<br>ON                                                                          | 2-1 5-4                                                                           | OPEN                                                                              | 2-3 5-6                                                                           | DPDT                                                   |

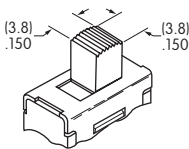
For 3 Throw (3-On)

| Pole | Model | Connected Terminals & Schematics                                                                   |                                                                                                    |                                                                                                    | External Connection                                                                                                                                                                                     |
|------|-------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |       | Left                                                                                               | Center                                                                                             | Right                                                                                              |                                                                                                                                                                                                         |
| SP   | MS20  | ON<br><br>2-1 5-4 | ON<br><br>2-3 5-4 | ON<br><br>2-3 5-6 | The SP3T model utilizes a double pole base.<br><br>External connections must be made during field installation.<br> |

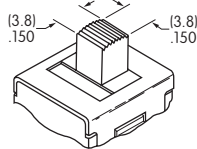
ACTUATORS

A

.150" (3.8mm) Wide for Single Pole

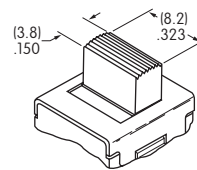


.150" (3.8mm) Wide for Double Pole



B

.323" (8.2mm) Wide for Double Pole Only



CONTACT MATERIALS & RATINGS

W

Silver over Silver

Power Level

6A @ 125V AC & 3A @ 250V AC

G

Gold over Brass or Copper

Logic Level

0.4VA maximum @ 28V AC/DC maximum

Note: Complete explanation of operating range in Supplement section.

A

Gold over Silver

Power Level or Logic Level

6A @ 125V AC or 0.4VA maximum @ 28V AC/DC maximum

Note: This dual rated option is suitable when two or more identical switches are used in logic and in power circuits within the same application. See Supplement section for complete explanation of dual rating and operating range.

Toggles  
Rockers  
Pushbuttons  
Illuminated PB  
Programmable  
Keylocks  
Rotaries  
Slides  
Tactiles  
Tilt  
Touch  
Indicators  
Accessories  
Supplement

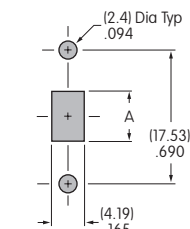
## MOUNTING TYPES & TERMINALS

### F Panel Mount (Combines with Solder Lug Terminal 01 only)

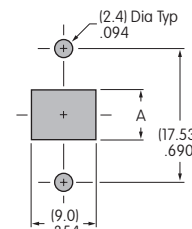


Dimension A =  
 .268" (6.8mm) for on-none-on  
 .319" (8.1mm) for on-off-on & on-on-on

Maximum Panel Thickness: .197" (5.0mm)



SP or DP with .150"  
(3.8mm) Actuator



DP only with .323"  
(8.2mm) Actuator

### N Straight PC Mount (Combines with Straight PC Terminal 03 only)

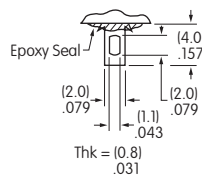


### S Support Bracket Mount (For Terminals 13, 30, & 40)

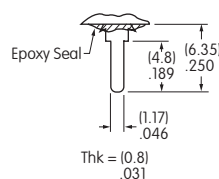
Maximum Panel Thickness:  
 For Straight PC with Bracket Terminal 13: .197" (5.0mm)  
 For Angle Mount Terminals 30 & 40: .177" (4.5mm)



### 01 Solder Lug



### 03 Straight PC



### 13 Straight PC with Bracket

### 30 Right Angle PC

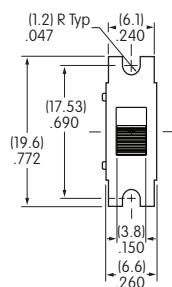
### 40 Vertical PC

## TYPICAL SWITCH DIMENSIONS

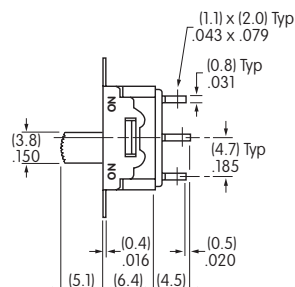
### Solder Lug Terminals



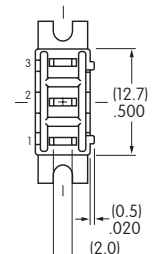
MS12AFW01



### Single Pole



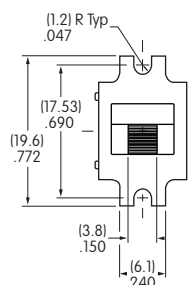
Actuator in LEFT Position



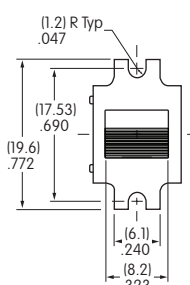
### Solder Lug Terminals



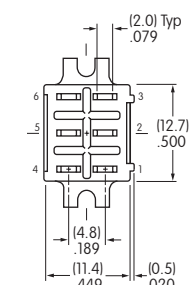
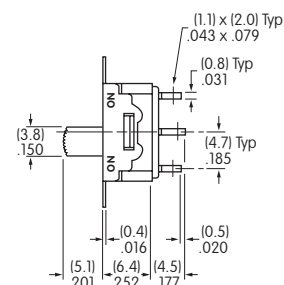
MS22BFW01



### Double Pole



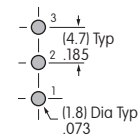
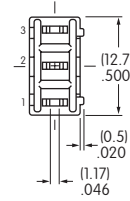
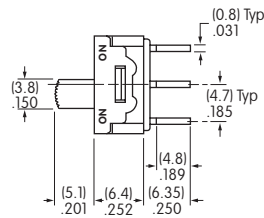
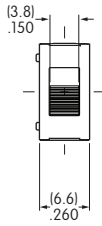
Actuator in LEFT Position



## TYPICAL SWITCH DIMENSIONS

### Single Pole

### Straight PC Terminals

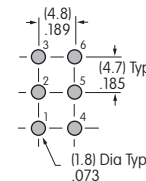
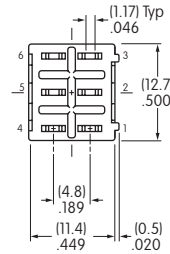
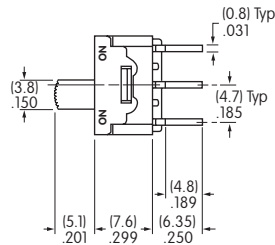
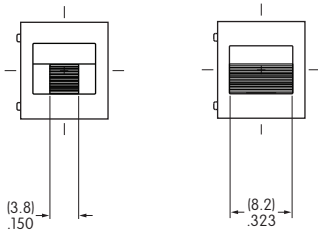


Actuator in LEFT Position

**MS12ANG03**

### Double Pole

### Straight PC Terminals

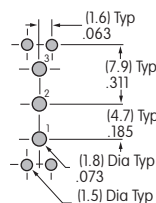
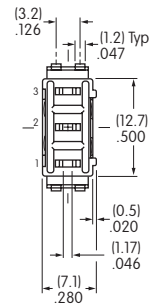
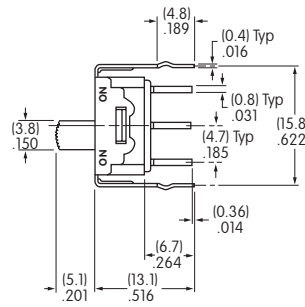
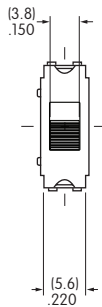


Actuator in LEFT Position

**MS22BNG03**

### Single Pole

### Straight PC Terminals with Bracket

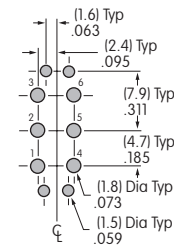
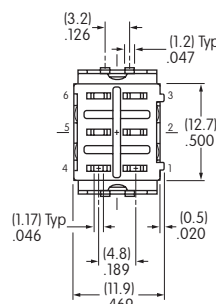
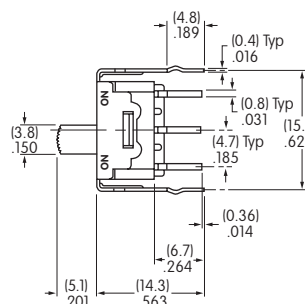
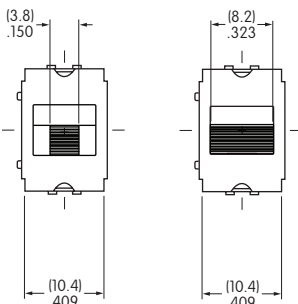


Actuator in LEFT Position

**MS12ASG13**

### Double Pole

### Straight PC Terminals with Bracket



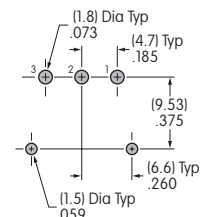
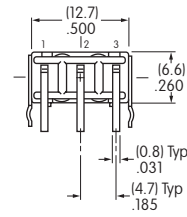
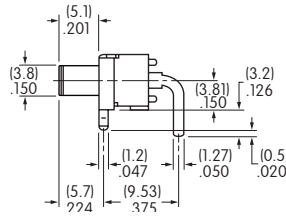
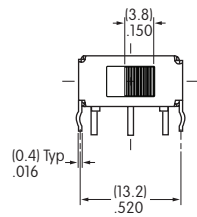
Actuator in LEFT Position

**MS22BSG13**

## TYPICAL SWITCH DIMENSIONS

### Right Angle PC Terminals

### Single Pole

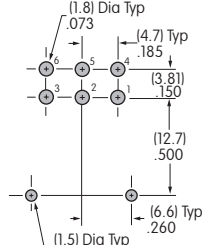
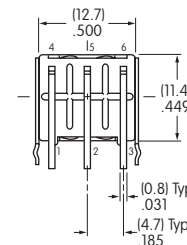
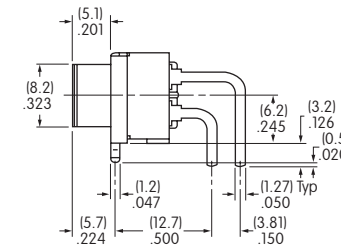
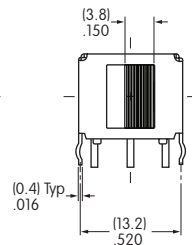
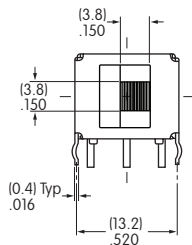


MS12ASG30

Actuator in LEFT Position

### Right Angle PC Terminals

### Double Pole

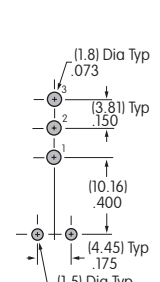
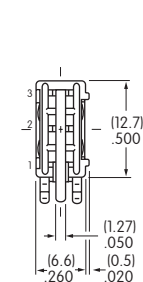
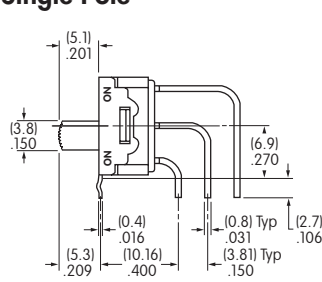
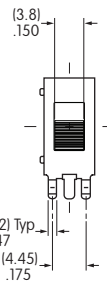


MS22BSG30

Actuator in LEFT Position

### Vertical PC Terminals

### Single Pole

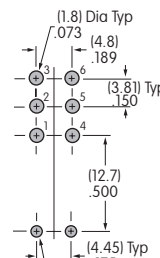
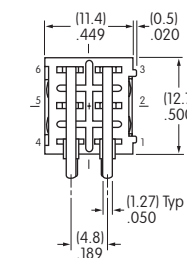
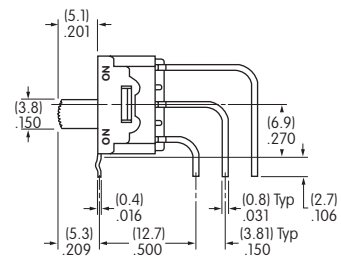
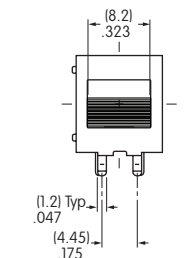
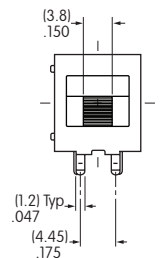


MS12ASG40

Actuator in LEFT Position

### Vertical PC Terminals

### Double Pole



MS22BSG40

Actuator in LEFT Position

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

## NKK Switches:

[MS13ANW03](#) [MS13ASG30-RO](#) [MS23AFW01](#) [MS13AFW01](#) [MS23BFW01](#) [MS22ANG03](#) [MS12ANG03](#)  
[MS22BNG03](#) [MS12AFG01](#) [MS13AFG01](#) [MS13ANA03](#) [MS13ANG03](#) [MS20BNW03](#) [MS22AFG01](#) [MS22ANA03](#)  
[MS22BFG01](#) [MS23ANA03](#) [MS23ANW03](#) [MS23BFG01](#) [MS23BNG03](#) [MS12ASA13](#) [MS22ANA03/UC](#)  
[MS22ANG03/U](#) [MS22BSW40](#) [MS20ANG03](#) [MS20ANA03](#) [MS20ANW0](#) [MS23BNW03](#) [MS20ASW30](#) [MS20AFW01](#)  
[MS20ASW13-RO](#) [MS22ASW13/C](#) [MS23ANG03](#) [MS23BNW03/UC](#) [MS23AFA01](#) [MS22ASA13/U](#) [MS12ANW03](#)  
[MS12ASW30](#) [MS22BNW03](#) [MS23ASG40](#) [MS20ASW13](#) [MS13ASG30](#) [MS12ASG13](#) [MS13ASW30](#) [MS20BSG40](#)  
[MS23ASG30](#) [MS12ASG30](#) [MS22ASG30](#) [MS22AFW01](#) [MS22ASG40](#) [MS22BSG40](#) [MS22ASW30](#) [MS12AFW01](#)  
[MS23ASW30](#) [MS22ANW03](#) [MS12ASG40](#) [MS22BSG30](#) [MS22ASW40](#) [MS12ANA03](#) [MS22ASW13](#) [MS12ASW13](#)  
[MS22BFW01](#) [MS13ASG40](#) [MS23BSG30](#) [MS22ASA13](#) [MS20BFW01](#) [MS12ASW40](#) [MS12ASA30](#) [MS13ASW13](#)