

A General Specifications

Electrical Capacity (Resistive Load)

- Power Level (silver):** 6A @ 125V AC & 3A @ 250V AC
4A @ 30V DC for On-None-On & On-None-Off; 3A @ 30V DC for all other circuits
- Logic Level (gold):** 0.4VA maximum @ 28V AC/DC maximum (Applicable Range 0.1mA ~ 0.1A @ 20mV ~ 28V)
- Logic/Power Level (gold over silver):** Combines silver & gold ratings
Note: Find additional explanation of dual rating & operating range in Supplement section.

Other Ratings

- Contact Resistance:** 10 milliohms maximum for silver; 20 milliohms maximum for gold
- Insulation Resistance:** 1,000 megohms minimum @ 500V DC
- Dielectric Strength:** 1,000V AC minimum between contacts for 1 minute minimum;
1,500V AC minimum between contacts and case for 1 minute minimum
- Mechanical Life:** 100,000 operations minimum; 50,000 operations minimum for flat, locking & splashproof devices
- Electrical Life:** 25,000 operations minimum for silver; 50,000 operations minimum for gold;
50,000 operations minimum for silver at 3A @ 125V AC
- Angle of Throw:** 25°

Materials & Finishes

- Toggle:** Brass with chrome plating
- Bushing:** Brass with nickel plating
- Case:** Diallyl phthalate resin (UL94V-0)
- Movable Contactor:** Phosphor bronze with silver or gold plating
- Movable Contacts:** Silver alloy (code W); copper with gold plating (code G); or silver alloy with gold plating (code A)
- Stationary Contacts:** Silver with silver plating (code W); copper or brass with gold plating (code G);
or silver with gold plating (code A)
- Terminals:** Copper or brass with silver plating; or copper or brass with gold plating
- Frame:** Stainless steel
- Support Bracket:** Brass with tin plating

Environmental Data

- Operating Temp Range:** -30°C through +85°C (-22°F through +185°F)
- Humidity:** 90 ~ 95% humidity for 96 hours @ 40°C (104°F)
- Vibration:** 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
- Shock:** 50G (490m/s²) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)
- Sealing:** Splashproof bushing options B3, D3, D8, L3, & L8, which have o-rings inside & outside the bushing, meet IP67 of IEC60529 Standards.

Installation

- Mounting Torque:** 3.0Nm (26.55 lb•in) double nut for large bushing;
1.5Nm (13 lb•in) double nut & 0.7Nm (6 lb•in) single nut for all other bushings

Processing

- Soldering:** Wave Soldering (PC version) for Gold: See Profile A in Supplement section.
Manual Soldering for Gold: See Profile A in Supplement section.
Wave Soldering (PC version) for Silver: See Profile B in Supplement section.
Manual Soldering for Silver: See Profile B in Supplement section.
Note: Lever must be in OFF (center) position while soldering.
- Cleaning:** These devices are not process sealed. Hand clean locally using alcohol based solution.

Standards & Certifications

- Flammability Standards:** UL94V-0 for case
- UL:** File No. E44145 - Recognized only when ordered with marking on switch.
Add "/U" or "/CUL" before dash in part number to order UL recognized switch.
All models recognized at 6A @ 125V AC, 3A @ 250V AC or 0.4VA maximum @ 28V DC maximum.
- CSA:** File No. 023535_0_000 - Certified only when ordered with marking on switch.
Add "/C" before dash in part number to order CSA certified switch.
All models certified at 6A @ 125V AC or 3A @ 250V AC or 0.4VA maximum @ 28V maximum.

Distinctive Characteristics

Antirotation design, standard on noncylindrical levers, mates toggle and bushing; bottom of toggle has two flattened sides which fit into a complementary opening inside bushing.

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

High torque bushing construction prevents rotation or separation from frame during installation.

High insulating barriers increase isolation of circuits in multipole devices and provide added protection to contact points.

Molded diallyl phthalate case has a UL flammability rating of 94V-0.

Epoxy sealed terminals prevent entry of solder flux and other contaminants.

Prominent external insulating barriers increase insulation resistance and dielectric strength.

Interlocked actuator block, lever, and interior guide prevent switch failure due to biased lever movement.

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



Actual Size



Bushing Mount

Page A48



Bracket PC Mount

Page A60



Angle PC Mount

Page A66

A
Toggles

Rockers

Pushbuttons

Programmable
Illuminated PB

Keylocks

Rotaries

Slides

Tactiles

Tilt

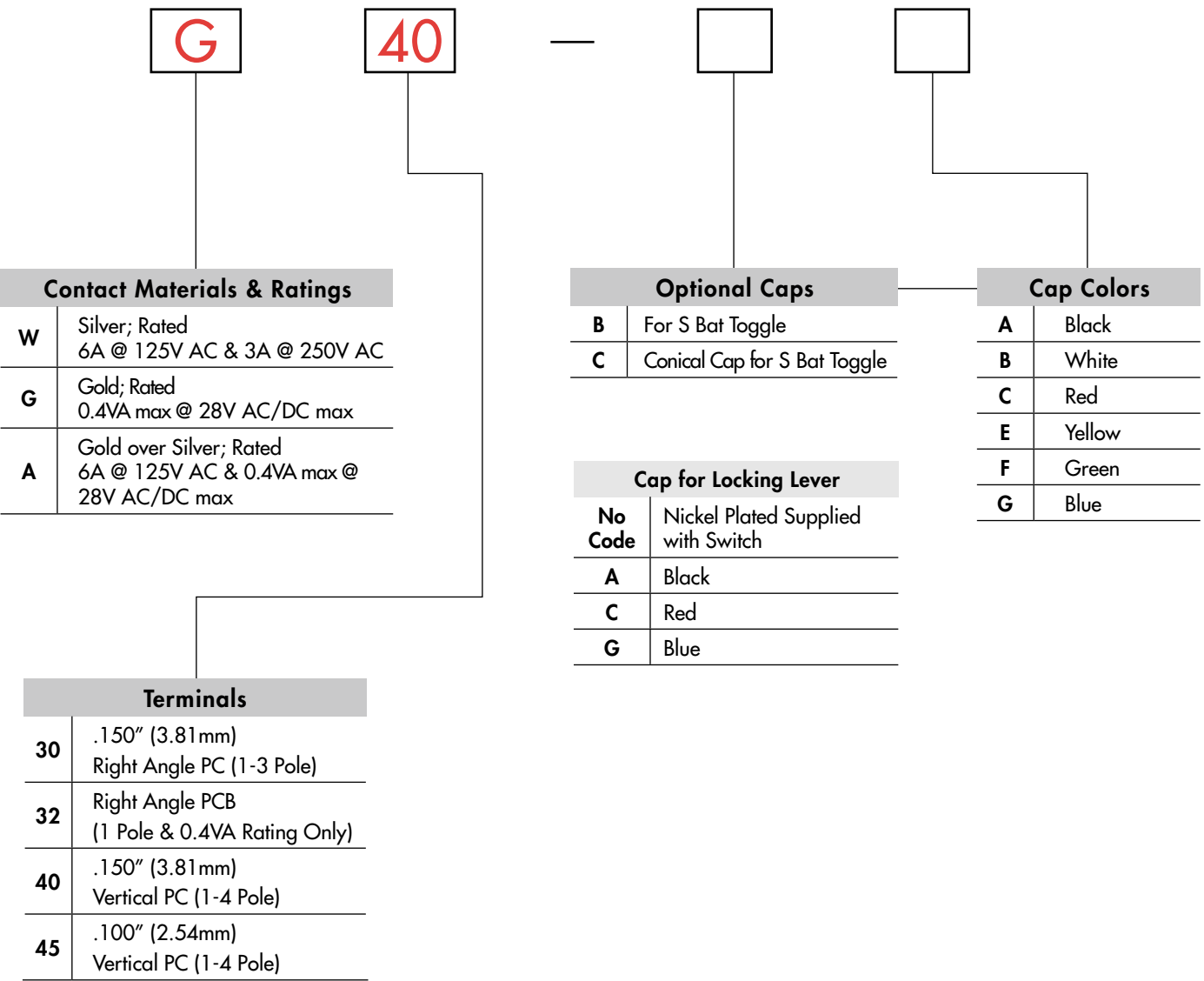
Touch

Indicators

Accessories

Supplement

TYPICAL SWITCH ORDERING EXAMPLE



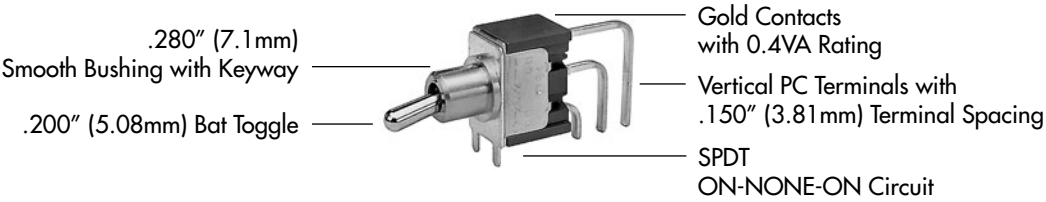
DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

M2012S2A2G40

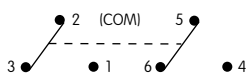
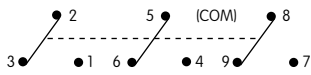
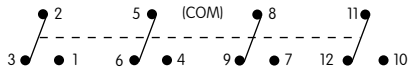


IMPORTANT:

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 General Specifications page.

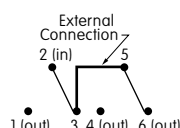
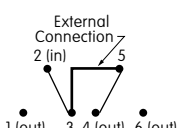
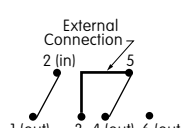
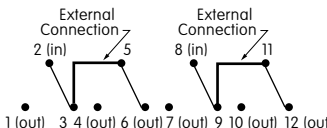
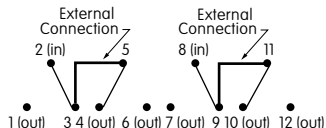
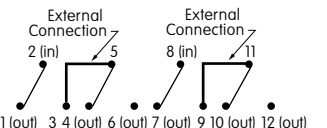


POLES & CIRCUITS

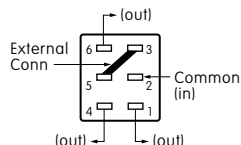
Pole	Model	Toggle Position () = Momentary			Connected Terminals			Throw & Schematics
		Down 	Center 	Up 	Down 	Center 	Up 	
SP	* M2012	ON	NONE	ON				Note: Terminal numbers are not actually on the switch. * Reverse circuits available for vertical mount SP & DP upon request.
	M2013	ON	OFF	ON				
	M2015	ON	NONE	(ON)	2-3	OPEN	2-1	
	* M2018	(ON)	OFF	(ON)				
	M2019	ON	OFF	(ON)				
DP	* M2022	ON	NONE	ON				
	M2023	ON	OFF	ON				
	M2025	ON	NONE	(ON)	2-3 5-6	OPEN	2-1 5-4	
	* M2028	(ON)	OFF	(ON)				
	M2029	ON	OFF	(ON)				
3P	M2032	ON	NONE	ON				
	M2033	ON	OFF	ON				
	M2035	ON	NONE	(ON)	2-3 5-6 8-9	OPEN	2-1 5-4 8-7	
	M2038	(ON)	OFF	(ON)				
	M2039	ON	OFF	(ON)				
4P	M2042	ON	NONE	ON				
	M2043	ON	OFF	ON				
	M2045	ON	NONE	(ON)	2-3 5-6 8-9 11-12	OPEN	2-1 5-4 8-7 11-10	
	M2048	(ON)	OFF	(ON)				
	M2049	ON	OFF	(ON)				

For 3 Throw (3-On)

Connected Terminals & Schematics

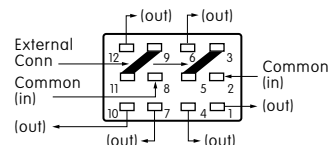
Pole	Model	Down	Center	Up	Down	Center	Up
SP	M2024	ON	ON	ON			
	M2026	(ON)	ON	(ON)			
	M2027	ON	ON	(ON)			
DP	M2044	ON	ON	ON			
	M2046	(ON)	ON	(ON)			
	M2047	ON	ON	(ON)			

The SP3T model utilizes a double pole base.



External connection must be made during field installation.

The DP3T model utilizes a four pole base.



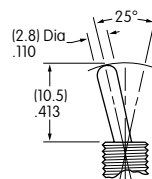
External connection must be made during field installation.

SMALL TOGGLES

Important:

Toggle length changes based on bushing selected. All illustrations are shown with .350" (8.9mm) long bushing. When using a .280" (7.1mm) long bushing, toggle length increases .070" (1.78mm).

S .413" (10.5mm) Bat



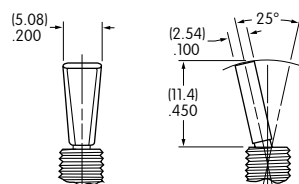
S2 .200" (5.08mm) Bat



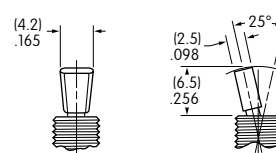
S3 .256" (6.5mm) Bat



E .450" (11.4mm) Flatted



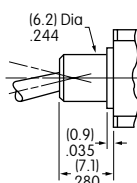
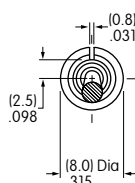
E2 .256" (6.5mm) Flatted



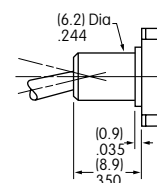
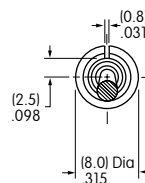
Standard Material & Finish: Brass with Bright Chrome
Contact factory for optional finishes.

SMALL BUSHINGS

A2 .280" (7.1mm) Smooth with Keyway

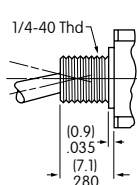
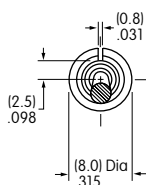


S2 .350" (8.9mm) Smooth with Keyway

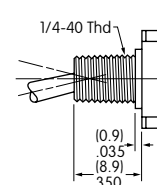
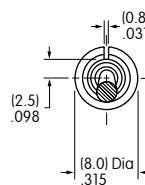


When using this bushing, toggle length is increased by .070" (1.78mm).

A1 .280" (7.1mm) Threaded with Keyway



S1 .350" (8.9mm) Threaded with Keyway

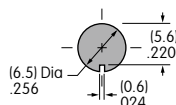


When using this bushing, toggle length is increased by .070" (1.78mm). Maximum Panel Thickness with Standard Hardware: .031" (0.8mm)

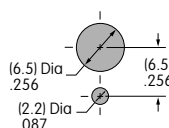
Maximum Panel Thickness with Standard Hardware: .102" (2.6mm)

Panel Cutouts

For A2, S2, A1 or S1 Bushing with Keyway



For A1 or S1 Bushing with Locking Ring



Standard Hardware:

- 2 Hex Nuts (AT513H)
- 1 Lockwasher (AT509)
- 1 Locking Ring (AT507H)

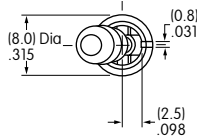
For dimensions, see Accessories & Hardware section.

LOCKING LEVER & BUSHING

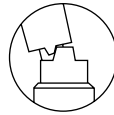
LL2

Smooth with Keyway

Locking Mechanism



on-none-on



2 positions lock

on-none-(on)



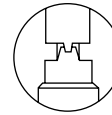
1 position locks

on-off-(on)
on-on-(on)



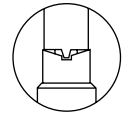
2 positions lock

on-off-on
on-on-on



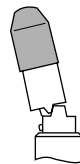
3 positions lock

(on)-off-(on)
(on)-on-(on)



1 position locks

No Code



Cap for Locking Lever

Supplied with Cap AT427
Material & Finish:

Brass with Nickel Plating

Lever Material & Finish:

Brass with Chrome Plating

Color Codes for Optional
Anodized Aluminum Caps



Black



Red



Blue

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: See Supplement section to find complete explanation of operating range.

A

Gold over Silver

Power Level
or Logic Level

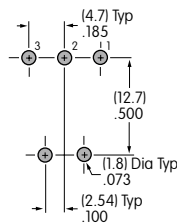
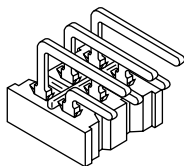
6A @ 125V AC
or 0.4VA maximum @ 28V AC/DC maximum

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 to find complete explanation of dual rating and operating range.

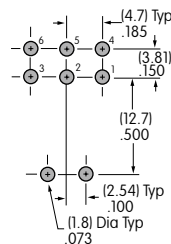
TERMINALS

30

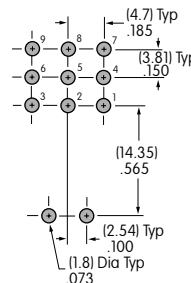
.150" (3.81mm)
Right Angle PC (1-3 Pole)



Single Pole



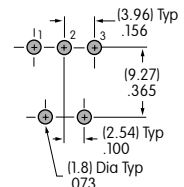
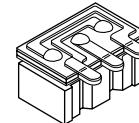
Double Pole



Three Pole

32

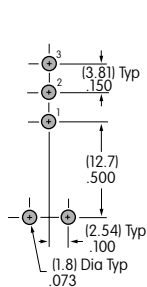
Right Angle PCB
with Reverse Circuit
(1 Pole & 0.4VA Rating Only)



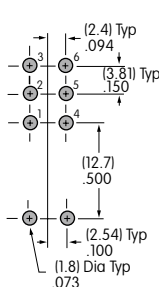
Terminal dimensions are shown on the Typical Switch Dimensions pages which follow.

TERMINALS (Continued)

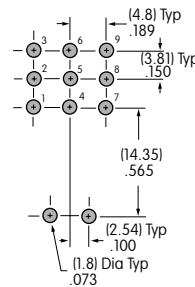
40 .150" (3.81mm) Vertical PC (1-4 Pole)



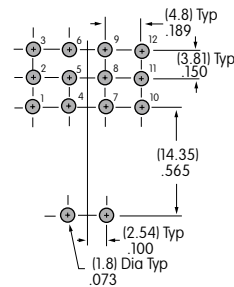
Single Pole



Double Pole

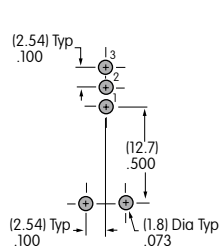


Three Pole

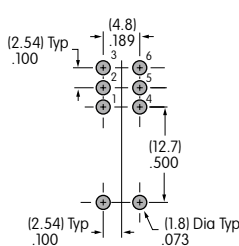


Four Pole

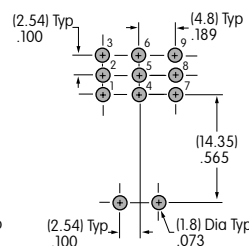
45 .100" (2.54mm) Vertical PC (1-4 Pole)



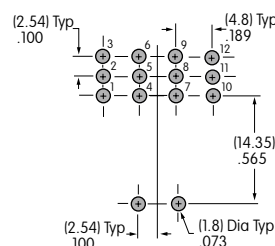
Single Pole



Double Pole



Three Pole



Four Pole

Terminal dimensions are shown on the Typical Switch Dimensions pages which follow.

OPTIONAL CAPS & CAP COLORS

B AT415 for S Bat Toggle

Material:
Polyethylene



C AT444 Conical Cap for S Bat Toggle

Material:
Polyethylene

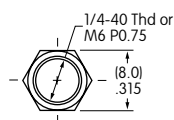


Colors Available

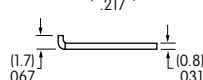
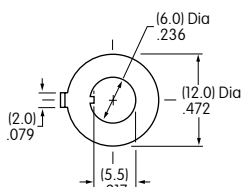
A Black	E Yellow
B White	F Green
C Red	G Blue

STANDARD HARDWARE

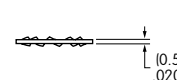
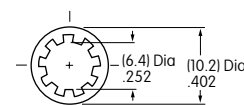
AT513H for Inch
AT513M for Metric
Hex Nut (2 per switch)
Brass/Nickel



AT507H for Inch
AT507M for Metric
Locking Ring (1 per switch)
Steel with Zinc/Chromate



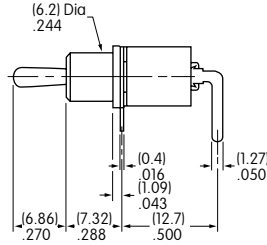
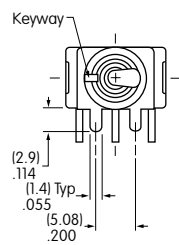
AT509
Lockwasher (1 per switch, none
with splashproof)
Steel with Zinc/Chromate



TYPICAL SWITCH DIMENSIONS

.150" (3.81mm) Right Angle PC

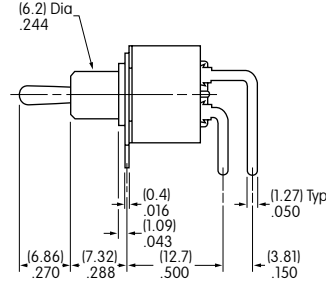
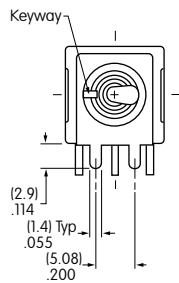
Single Pole



M2012S2A2G30

.150" (3.81mm) Right Angle PC

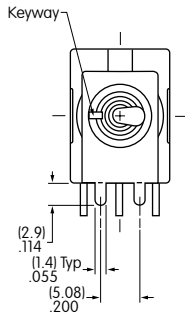
Double Pole



M2022S2A2G30

.150" (3.81mm) Right Angle PC

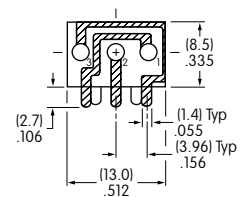
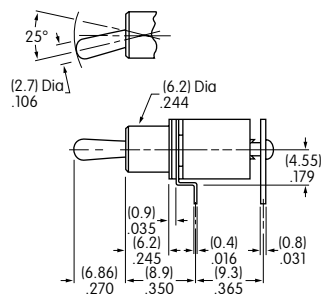
Three Pole



M2032S2A2G30

Right Angle PCB

Single Pole • Reverse Circuit

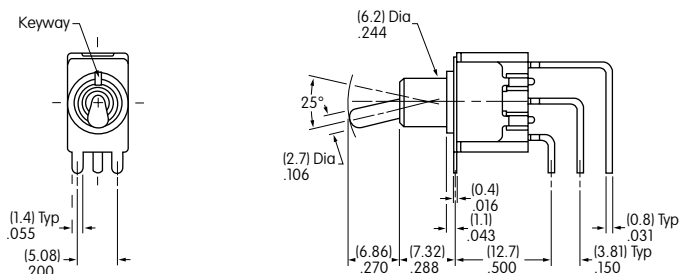


M2012S2A2G32

TYPICAL SWITCH DIMENSIONS

Single Pole

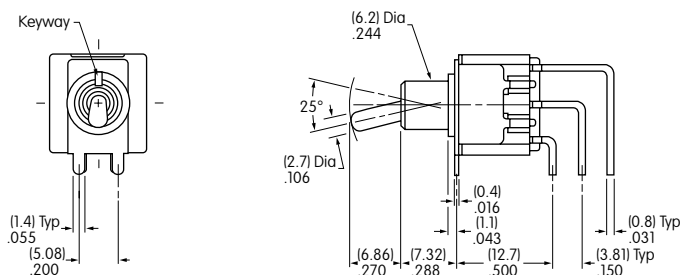
.150" (3.81mm) Vertical PC



M2012S2A2G40

Double Pole

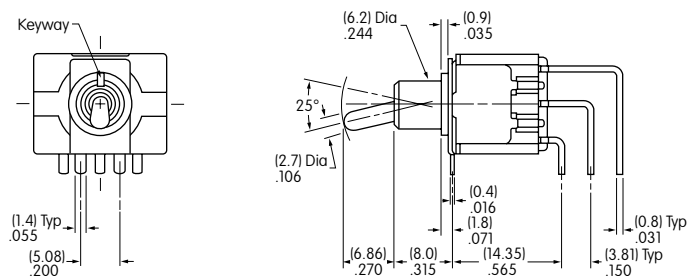
.150" (3.81mm) Vertical PC



M2022S2A2G40

Three Pole

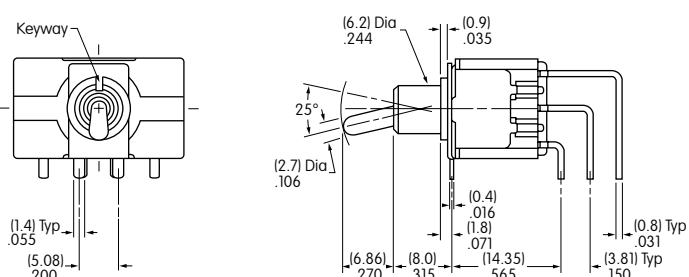
.150" (3.81mm) Vertical PC



M2032S2A2G40

Four Pole

.150" (3.81mm) Vertical PC



M2042S2A2G40

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

TYPICAL SWITCH DIMENSIONS

.100" (2.54mm) Vertical PC

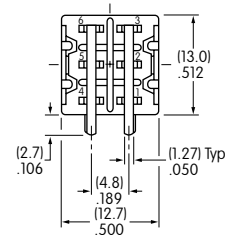
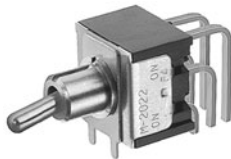
Single Pole



M2012S2A2G45

.100" (2.54mm) Vertical PC

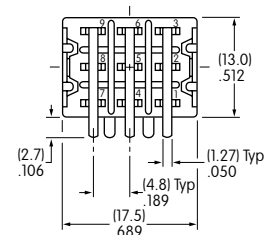
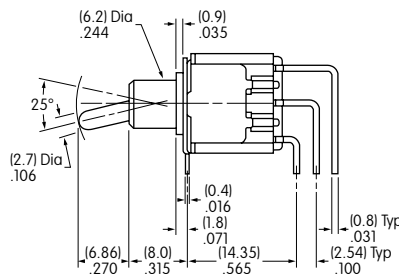
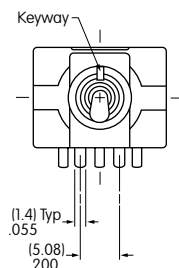
Double Pole



M2022S2A2G45

.100" (2.54mm) Vertical PC

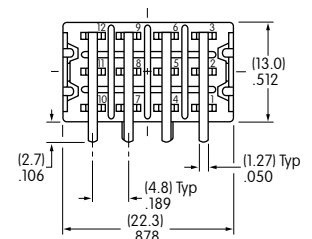
Three Pole



M2032S2A2G45

.100" (2.54mm) Vertical PC

Four Pole



M2042S2A2G45

Mouser Electronics

Authorized Distributor

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

NKK Switches:

[M2013S2A2G30-RO](#) [M2019S2A2G40-RO](#) [M2018S2A2G30-RO](#) [M2012S2A2G40-RO](#) [M2029ES1G30-RO](#)
[M2012E2A2W40-RO](#) [M2012ES1W30-RO](#) [M2012S2A2A30/UC-RO](#) [M2012S3S2G30-RO](#) [M2012S3S2W30-RO](#)
[M2012SS1W30-RO](#) [M2012SS1W40-RO](#) [M2012SS2G30-RO](#) [M2012SS2G30/U-RO](#) [M2013EA2W45-RO](#)
[M2013LL2G30/U-RO](#) [M2013SS2G30-RO](#) [M2015S2A2W30-RO](#) [M2018ES1G30-RO](#) [M2018S2A2G40-RO](#)
[M2018SS2G30-RO](#) [M2022ES1W30-RO](#) [M2022ES2W40-RO](#) [M2022S2A2W30/UC-RO](#) [M2022SS1G45-RO](#)
[M2023S2A2G40-RO](#) [M2023SS1G30-RO](#) [M2023SS2G30-RO](#) [M2029ES2G30-RO](#) [M2029SS2G30-RO](#)
[M2032SS2W30-RO](#) [M2012E4S1G40-RO](#) [M2019E3A2W45-RO](#) [M2021S2A2G40-RO](#) [M2022E4S1G40-RO](#)
[M2023SS1W30-RO](#) [M2013SA2G30-RO](#) [M2043S2A2G40-RO](#) [M2022LL1G30-RO](#) [M2028SS1W30-RO](#)
[M2012S3S2W40-RO](#) [M2012S2A2A30-RO](#) [M2012SA2W40-RO](#) [M2013SS1W40-RO](#) [M2032S2A2G40-RO](#)
[M2019S2A2G30-RO](#) [M2023S2A2G30-RO](#) [M2018SS1G40-RO](#) [M2022SA1W40-RO](#) [M2022LL1G45-RO](#)
[M2018ES1G40-RO](#) [M2024S2A2G30-RO](#) [M2024E2S2W40-RO](#) [M2022E2S2W40-RO](#) [M2012BB1W40-RO](#)
[M2012E2S1G45-RO](#) [M2012ES2W40-RO](#) [M2012S2A1G40/UC-RO](#) [M2012S2A2W30/UC-RO](#) [M2013LL2G30-RO](#)
[M2022SS1G40-RO](#) [M2022SS1W40-RO](#) [M2022SS2W30-RO](#) [M2022SS2W45-RO](#) [M2023SS1W40-RO](#)
[M2024SS1W40-RO](#) [M2026SS1W30-RO](#) [M2032S2A2G30-RO](#) [M2032SS1G30-RO](#) [M2042S2A2G40-RO](#)
[M2024S3A2G45-RO](#) [M2012SS1A45-RO](#) [M2013S2A2G32-RO](#) [M2012E2A2G30-RO](#) [M2012LL1G40-RO](#)
[M2012LL2W30-RO](#) [M2012S2A1G30-RO](#) [M2012S2A2A30/U-RO](#) [M2012S2A2W45-RO](#) [M2012SA1G40-RO](#)
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[M2023S2A1G30-RO](#) [M2023S3A2G45-RO](#) [M2023SS1W30-BA-RO](#) [M2024SA2G40-RO](#) [M2025ES1W30-RO](#)
[M2026SA2W30-RO](#) [M2028EA2W45-RO](#) [M2028S2A2G30-RO](#) [M2032S2A1G30-RO](#) [M2022SS1G30-RO](#)