



The Primary Source Worldwide<sup>®</sup>

Miniature and Subminiature  
Toggle, Rocker, Lever Handle,  
Pushbutton, Slide, Rotary,  
Thumbwheel, DIP, Membrane  
and Solid State Switches.

Catalog No. 8709

# C&K



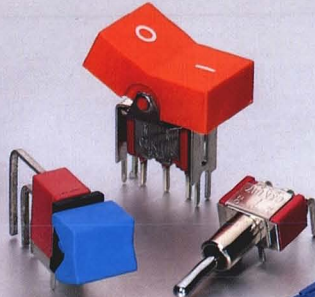


## SEE WHAT'S NEW INSIDE . . .

Look what's new at C&K! See the catalog sections noted below for complete information on these and other NEW MODELS AND OPTIONS.



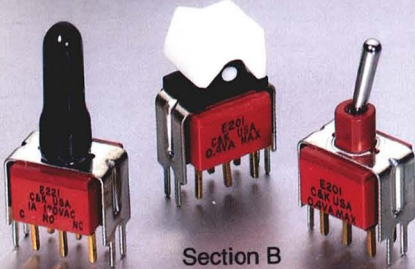
Section R



**TIN-LEAD TERMINALS**  
Sections A, B, E, F & G



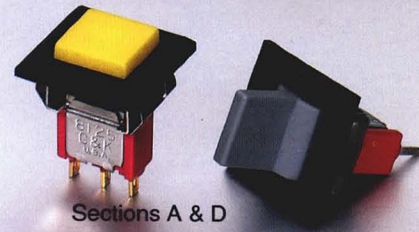
Section Q



Section B

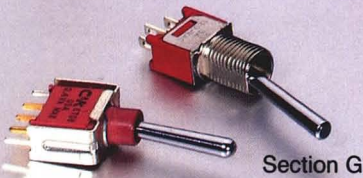


Section G

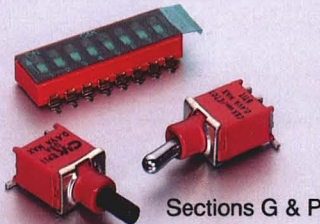


Sections A & D

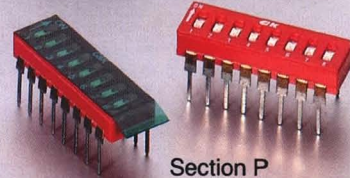
### SURFACE MOUNTED SWITCHES



Section G

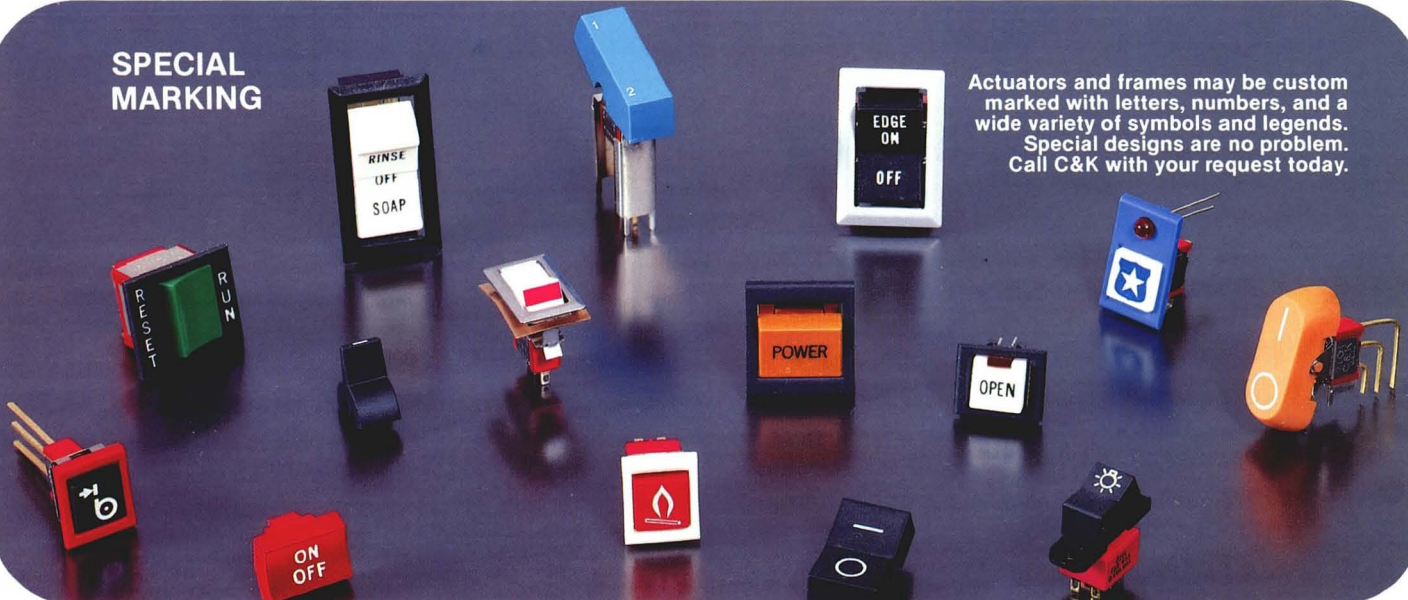


Sections G & P



Section P

### SPECIAL MARKING



Actuators and frames may be custom marked with letters, numbers, and a wide variety of symbols and legends. Special designs are no problem. Call C&K with your request today.





## INTRODUCTION

Welcome to C&K's NEWLY REVISED SWITCH CATALOG, containing a full line of miniature and subminiature toggle, rocker, lever handle, pushbutton, illuminated, slide, rotary, thumbwheel, DIP, membrane and solid state switches. C&K is THE PRIMARY SOURCE WORLDWIDE for switches of all types, and is unmatched in the industry for consistent high quality, performance, low-cost and delivery.

## HOW TO USE THIS CATALOG

First-time-user or familiar face, a few words to help with orientation: *Three* INDEXES are provided to help you locate your exact needs quickly. They begin on the next page.

- 1) MAIN INDEX, arranged by catalog section (Pages IV and V).
- 2) INDEX BY SWITCH SERIES, alphabetical, by switch series, A Series, BD Series, 7000 Series, etc. (Page VI).
- 3) INDEX BY SWITCH TYPE, groups all similar types of switches alphabetically, toggles, rockers, pushbuttons, etc. (Page VII).

Hundreds of thousands of switch models and types are represented in this catalog through our Build-A-Switch approach. No complete switch model numbers are provided. Instead, you are given many available options from which to choose: models, actuators, bushings, mounting styles, terminations, contact materials, etc. Simply create the switch model desired by selecting options from the choices provided.

Ordering formats and complete information for building order numbers are provided in each section. Complete HOW TO ORDER information is also provided in each section.

Each catalog section is numbered independently, and begins with a full page photograph of representative switches. All available options are shown in each switch section, with available hardware at the end of each section.

## OTHER SWITCH CATALOGS AVAILABLE

C&K Components, Inc., Clayton Division, manufactures a complete line of low-cost switchlocks, rotary, slide, rocker and pushbutton switches. See inside back cover of this catalog for more information and a free reply card to get a CLAYTON DIVISION SWITCH PRODUCTS CATALOG, or call (919) 553-3131.

C&K/Unimax, Inc. manufactures a full line of snap-acting, metal cased and illuminated switches. See inside back cover of this catalog for more information and a free reply card to get C&K/UNIMAX SWITCH PRODUCT information, or call (203) 269-8701.

Specifications and materials subject to change without notice.

## AGENCY LISTINGS

Most C&K switches are available with UL and CSA listing, when ordered with G or L (gold over silver) or Q or M (silver) contact materials. Note that B and K (gold) contact materials are not listed because UL and other agencies consider listing only those components suitable for power applications. B and K contact materials are used in low power and 'dry circuit' applications only i.e., where no arcing occurs during switching (0.4 VA max. @ 20 V AC or DC max.).

Some switches are UL listed automatically when ordered with the appropriate contact material (examples: E-Series, 8500-Series). Other switches are UL listed only when the UL Model Number is specified, otherwise no listings appear on the switches (examples: 5000-Series: L11 Model is UL listed, 5101 Model carries no listing). Most UL listed models are also available with CSA listing. See appropriate switch sections for specific contact material and rating information and ordering instructions.

9000-Series Power Switches: all models UL, CSA, VDE, SEV and SEMKO listed. See pages H-2 thru H-12.

At C&K, we are continuously upgrading our agency certifications, and new models and options are being added. If the listing you require does not appear, consult factory with your needs. Some of the applicable agency file nos. are listed below. Consult factory for further information.

UL FILE NO.:	E42363	SEV FILE NO.:	81.1162.01
CSA FILE NOS.:	LR29210 Newton, MA. LR49546 Clayton, N.C. LR47724 England LR47725 Hong Kong	JETL FILE NO.:	41-13749
		SEMKO FILE NO.:	43-63118/1-6
		Aust. Elec. Board Reg. No.:	CS81215V
VDE FILE NO.:	8869-4401		



# INDEX

NEW PRODUCTS & CUSTOM MARKING .....II  
 INTRODUCTION, HOW TO USE THIS CATALOG & AGENCY LISTINGS .....III  
 INDEX BY SWITCH SERIES .....VI  
 INDEX BY SWITCH TYPE .....VII  
 SWITCH SOLDERING AND CLEANING INFORMATION & WIRING FOR 3-WAY SWITCHES .....VIII

**7000 SERIES**  
 (also U SERIES) **SECTION A**  
 TOGGLE, ROCKER & LEVER HANDLE SWITCHES



Toggle Switches .....A-2 thru A-13



Rocker & Lever Handle Switches.....A-14 thru A-32

**E/E010/E020 SERIES** **SECTION B**  
 SEALED TOGGLE, ANTI-STATIC ROCKER, LEVER HANDLE & PUSHBUTTON SWITCHES



E Series Sealed Toggle Switches ..... B-2 thru B-6



E Series Sealed Anti-Static Rocker & Lever Handle Switches ..... B-7 thru B-12



E010 Series Sealed Momentary Pushbutton Switches ..... B-13 thru B-17



E020 Series Sealed Snap-Acting Momentary Pushbutton Switches ..... B-18 thru B-22



**W SERIES** **SECTION C**  
 .025 WIRE-WRAP TOGGLE SWITCHES



**8020 SERIES**  
 (also U SERIES) **SECTION D**  
 SNAP-ACTING MOMENTARY PUSHBUTTON SWITCHES



**8060 SERIES** **SECTION E**  
 ALTERNATE ACTION & MOMENTARY PUSHBUTTON SWITCHES



**1000 SERIES** **SECTION F**  
 MINIATURE SLIDE SWITCHES



**ET/EP/TP/T SERIES** **SECTION G**  
 TINY SWITCHES

ET Series Sealed Tiny Toggle Switches .....G-2 thru G-4



ET Series Sealed Tiny Rocker Switches.....G-5 thru G-8



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T Series Tiny Toggle Switches ..... G-13 thru G-17



T Series Tiny Rocker Switches .....G-18 thru G-21



TP Series Tiny Pushbutton Switches.....G-22 thru G-28



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# INDEX

## SURFACE MOUNT SWITCHES



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**ET SERIES** G-3

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**9000 SERIES** SECTION H  
POWER TOGGLE, ROCKER & LEVER  
HANDLE SWITCHES

Power Toggle  
Switches . . . . . H-2 thru H-7



Power Rocker & Lever Handle  
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**5000 SERIES** SECTION J  
(also **L SERIES**)  
ILLUMINATED ROCKER  
SWITCHES



**8500 SERIES** SECTION K  
SUBMINIATURE PUSHBUTTON  
SWITCHES



**8600 SERIES** SECTION L  
MICROMINIATURE PUSHBUTTON  
SWITCHES



**M SERIES** SECTION M  
HALF-INCH ROTARY SWITCHES



**SS SERIES** SECTION N  
SOLID STATE PUSHBUTTON  
SWITCHES



**KS SERIES** SECTION O  
PUSHBUTTON KEY SWITCHES

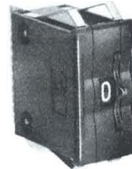


**BD/LD SERIES** SECTION P  
DIP SWITCHES



**4000 SERIES** SECTION Q  
MEMBRANE KEYPADS

**3/3M/SF/SR/S2D SERIES** SECTION R  
THUMBWHEEL SWITCHES



Thumbwheel Switches . . R-2 thru R-11



Minithumbwheel  
Switches. . . . . R-12 thru R-13



Thumbwheel Switches . . R-14 thru R-16



Miniature  
Thumbwheel Switches . . R-14 thru R-16

SALES AND DISTRIBUTOR  
INFORMATION. . . . . IX thru X

OTHER C&K SWITCH  
PRODUCTS  
AND CATALOGS. . . . . SEE REPLY CARD  
INSERT—INSIDE  
BACK COVER

Note: Available hardware is shown at end of each switch section.

A  
B  
C  
D  
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H  
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L  
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P  
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## INDEX BY SWITCH SERIES

SERIES	SWITCH TYPE	SECTION PAGES	SERIES	SWITCH TYPE	SECTION PAGES
<b>BD</b>	DIP Switches . . . . .	P-2 thru P-3	<b>T</b>	Tiny Toggle Switches . . . .	G-13 thru G-17
<b>E</b>	Sealed Toggle Switches . . . .	B-2 thru B-6		Tiny Rocker Switches . . . .	G-18 thru G-21
	Sealed Anti-Static Rocker & Lever Handle Switches . . . . .	B-7 thru B-12	<b>TP</b>	Tiny Pushbutton Switches . . . . .	G-22 thru G-28
<b>E010</b>	Sealed Momentary Pushbutton Switches . . . . .	B-13 thru B-17	<b>TS</b>	Tiny Slide Switches . . . . .	G-29 thru G-30
<b>E020</b>	Sealed Snap-Acting Momentary Pushbutton Switches . . . .	B-18 thru B-22	<b>U</b>	Toggle Switches . . . . .	A-2 thru A-13
<b>EP</b>	Sealed Tiny Pushbutton Switches . . . . .	G-9 thru G-12		Rocker & Lever Handle Switches . . . . .	A-14 thru A-32
<b>ET</b>	Sealed Tiny Toggle Switches . . . . .	G-2 thru G-4		Snap-Acting Momentary Pushbutton Switches . . . . .	D-2 thru D-14
	Sealed Tiny Rocker Switches . . . . .	G-5 thru G-8	<b>W</b>	.025 Wire-Wrap Toggle Switches . . . . .	C-2 thru C-4
<b>KS</b>	Pushbutton Key Switches . . . . .	O-2 thru O-4	<b>1000</b>	Miniature Slide Switches . . . .	F-2 thru F-8
<b>L</b>	Illuminated Rocker Switches . . . . .	J-2 thru J-4	<b>3</b>	Thumbwheel Switches . . . .	R-2 thru R-11
<b>LD</b>	DIP Switches . . . . .	P-4	<b>3M</b>	Minithumbwheel Switches . . . . .	R-12 thru R-13
<b>M</b>	Half-Inch Rotary Switches . . . . .	M-2 thru M-6	<b>4000</b>	Membrane Keypads . . . . .	Q-2 thru Q-6
<b>SF</b>	Thumbwheel Switches . . . . .	R-14 thru R-16	<b>5000</b>	Illuminated Rocker Switches . . . . .	J-2 thru J-4
<b>SR</b>	Thumbwheel Switches . . . . .	R-14 thru R-16	<b>7000</b>	Toggle Switches . . . . .	A-2 thru A-13
<b>S2D</b>	Miniature Thumbwheel Switches . . . . .	R-14 thru R-16		Rocker & Lever Handle Switches . . . . .	A-14 thru A-32
<b>SS</b>	Solid State Pushbutton Switches . . . . .	N-2 thru N-4	<b>8020</b>	Snap-Acting Momentary Pushbutton Switches . . . . .	D-2 thru D-14
			<b>8060</b>	Alternate Action & Momentary Pushbutton Switches . . . . .	E-2 thru E-10
			<b>8500</b>	Subminiature Pushbutton Switches . . . . .	K-2 thru K-4
			<b>8600</b>	Microminiature Pushbutton Switches . . . . .	L-2 thru L-4
			<b>9000</b>	Power Toggle Switches . . . .	H-2 thru H-7
				Power Rocker & Lever Handle Switches . . . . .	H-8 thru H-12


### **NEW** SURFACE MOUNT SWITCHES



SERIES	PAGE
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ET	G-3
LD	P-4



## INDEX BY SWITCH TYPE

SWITCH TYPE	SERIES	SECTION PAGES	SWITCH TYPE	SERIES	SECTION PAGES
<b>Anti-Static Switches</b>	E	B-7 thru B-12	<b>Rotary Switches</b>	M	M-2 thru M-6
<b>DIP Switches</b>	BD LD	P-2 thru P-3 P-4	<b>Sealed Switches</b>	E E010 E020 ET EP	B-2 thru B-12 B-13 thru B-17 B-18 thru B-22 G-2 thru G-8 G-9 thru G-12
<b>Illuminated Switches</b>	5000 and L	J-2 thru J-4	<b>Slide Switches</b>	1000 TS	F-2 thru F-8 G-29 thru G-30
<b>Lever Handle Switches</b>	7000 and U E 9000	A-14 thru A-32 B-7 thru B-12 H-8 thru H-12	<b>Solid State Switches</b>	SS	N-2 thru N-4
<b>Membrane Keypads</b>	4000	Q-2 thru Q-6	<b>NEW SURFACE MOUNT SWITCHES</b>		
<b>Power Switches</b>	9000	H-2 thru H-12		EP ET LD	G-10 G-3 P-4
<b>Pushbutton Switches</b>	E010 E020 8020 and U 8060 EP TP 8500 8600 SS KS	B-13 thru B-17 B-18 thru B-22 D-2 thru D-14 E-2 thru E-10 G-9 thru G-12 G-22 thru G-28 K-2 thru K-4 L-2 thru L-4 N-2 thru N-4 O-2 thru O-4	<b>Thumbwheel Switches</b>	3 3M SF, SR, S2D	R-2 thru R-11 R-12 thru R-13 R-14 thru R-16
<b>Rocker Switches</b>	7000 and U E ET T 9000 5000 and L	A-14 thru A-32 B-7 thru B-12 G-5 thru G-8 G-18 thru G-21 H-8 thru H-12 J-2 thru J-4	<b>Tiny Switches</b>	ET EP T TP TS	G-2 thru G-8 G-9 thru G-12 G-13 thru G-21 G-22 thru G-28 G-29 thru G-30
			<b>Toggle Switches</b>	7000 and U E W ET T 9000	A-2 thru A-13 B-2 thru B-6 C-2 thru C-4 G-2 thru G-4 G-13 thru G-17 H-2 thru H-7



## SWITCH SOLDERING AND CLEANING INFORMATION

Most manufacturing and field problems experienced by users of miniature switches are caused by contamination of switches during assembly, i.e., *during soldering and cleaning processes*. Occasionally, this contamination is not recognized as a process problem, but is assumed to be a product deficiency. Some percentage of switches may become intermittent after assembly into the equipment, particularly in low power applications. These intermittencies may become apparent during final factory tests of the equipment, or they may develop later during field use. In almost all cases, process contamination can be prevented when care is exercised during soldering and cleaning operations.

Most manually actuated switches are *not* totally sealed components. The equipment manufacturer must exercise care to prevent switch contamination during manual or wave soldering assembly processes, unless the switches are specifically designed to withstand such processes (e.g.: C&K's E SERIES Sealed Toggle, Anti-Static Rocker & Lever Handle Switches, ET SERIES Sealed Tiny Toggle & Rocker Switches, EP SERIES Sealed Tiny Pushbutton Switches, E010 and E020 SERIES Sealed Pushbutton Switches and BD SERIES DIP Switches).

Contamination of miniature switches can occur in both hand soldering and in wave soldering processes. In general, *hand soldering and cleaning processes* are perfectly acceptable if properly trained personnel use small diameter solder (.030"-.040"), use low wattage soldering irons (25 - 40 watts max.) and are careful not to immerse or spray the non-sealed areas of the switches with cleaning solvent during the flux removal process.

*Wave soldering* provides better control of pre-heat and maximum soldering temperatures when compared with manual operations. Unfortunately, oil is often added to the solder (oil is another source of contamination), and the final cleaning operations often require immersion or rigorous spraying with a solvent in automatic process equipment. This is not recommended unless the switches are designed to withstand such processes.

The usual causes of switch intermittencies are solder flux and/or wave solder oil. Sealed or molded-in terminals reduce, but do not eliminate the risk of process contamination. Since most miniature switches are not totally sealed components, even if the soldering is done carefully, flux or oil contaminants can be carried into the switch and not removed during the cleaning operation. When the solvent evaporates, non-conductive contaminants may be left on, or near, contact interfaces.

C&K has introduced a full line of switches that are designed to resist contamination due to wave soldering and cleaning methods and that require *no* special handling or processing:

The **BD Series DIP Switches** employ a flush-thru open-base design, proven effective in allowing high-agitation cleaning methods to thoroughly clean contact interfaces. See CATALOG SECTION P.

**E Series Sealed Toggle, Anti-Static Rocker and Lever Handle Switches** feature totally sealed splashproof construction, with toggle and terminal seals and welded-body construction. Rocker and Lever Handle models additionally have *anti-static* capabilities. See CATALOG SECTION B.

**E010 and E020 Series Sealed Pushbutton Switches** are sealed to withstand wave soldering and cleaning processes with either internal o-ring plunger seal (E010 Series) or disposable splashproof boot (E020 Series). See CATALOG SECTION B.

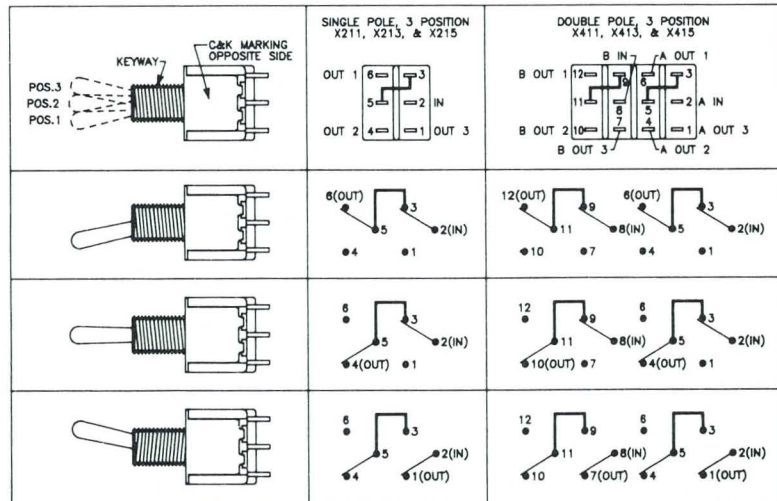
**ET Series Sealed Tiny Toggle & Rocker Switches** and **EP Series Sealed Tiny Pushbutton Switches** have the same sealed construction features as the larger E Series Sealed Switches, but in a DIP - pattern compatible miniature package. See CATALOG SECTION G.

## WIRING FOR 3-WAY SWITCHES

3-Position toggle and rocker switches with ON-ON-ON switching functions may be wired for '3-way' function. See wiring diagrams and schematics. Note that external jumpers are added by customer. The following switch models may be wired in this way to achieve SP3T or DP3T functions:

<b>7000 Series</b>	7211, 7213, 7215, 7411, 7413, 7415, U211, U213, U215, U411, U413, U415	} CATALOG SECTION A
<b>E Series</b>	E211, E215	
<b>Tiny Series</b>	T211	} CATALOG SECTION B
<b>5000 Series</b>	5211, 5213, 5215	} CATALOG SECTION J

## 3-WAY WIRING DIAGRAMS / SCHEMATICS

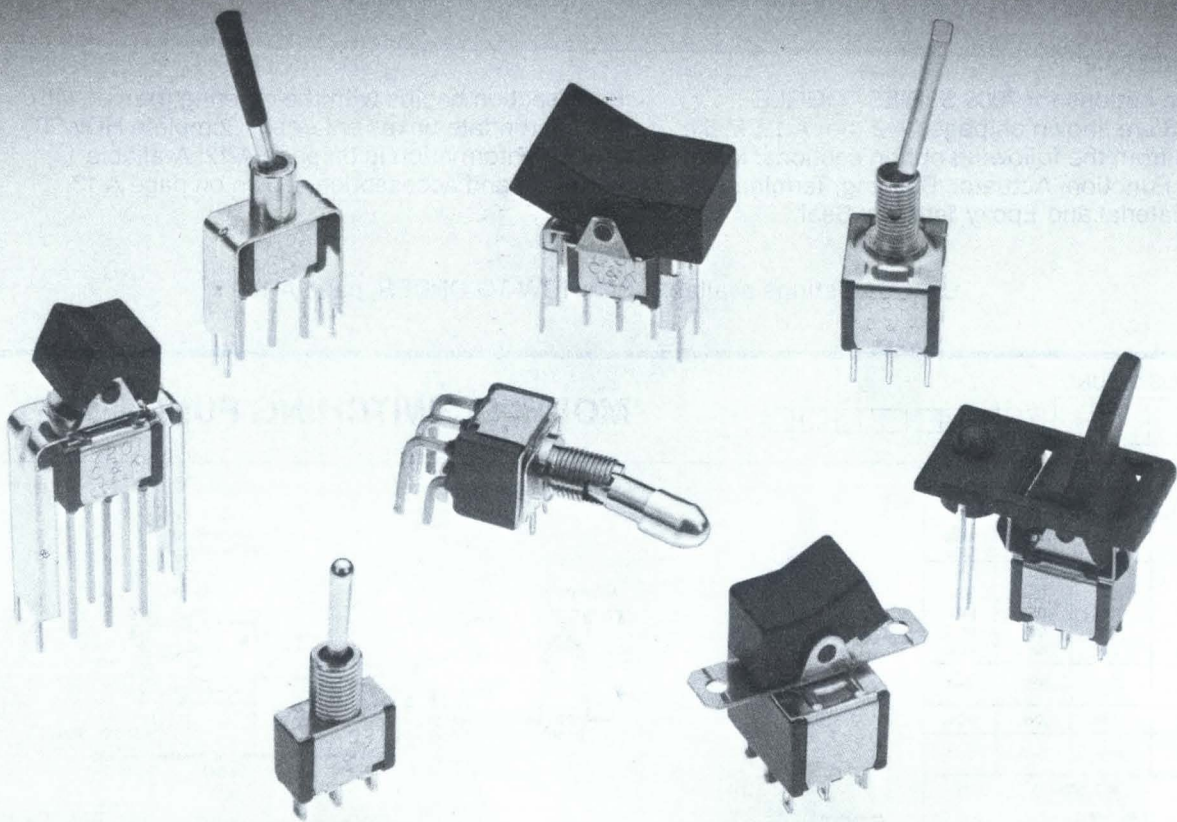


Note: External jumper added by customer.



# 7000 SERIES

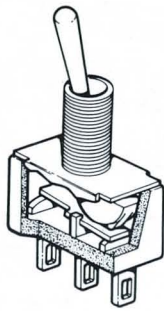
## TOGGLE, ROCKER & LEVER HANDLE SWITCHES



### SECTION A INDEX

Toggle Switches .....	A-2 thru A-13
Rocker & Lever Handle Switches .....	A-14 thru A-32





### SPECIFICATIONS

CONTACT RATING: 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC.  
 ELECTRICAL LIFE: 100,000 make-and-break cycles at full load on all models ending in -01 (ON-NONE-ON). All other models, 40,000 cycles.  
 CONTACT RESISTANCE: Below 10 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.  
 INSULATION RESISTANCE: 10<sup>9</sup> ohms min.  
 DIELECTRIC STRENGTH: 1,000 V RMS min. @ sea level.  
 OPERATING TEMPERATURE: -30°C to 85°C.

### MATERIALS

CASE: SP & DP- diallyl phthalate (DAP) or melamine phenolic. 3P & 4P- diallyl phthalate (DAP).  
 ACTUATOR: Brass, chrome plated.  
 BUSHING: Brass, nickel plated.  
 HOUSING: Stainless steel.  
 SWITCH SUPPORT: Brass or steel, electrotin plated.  
 END CONTACTS: Coin silver, silver plated (Q cont. mat'l.).  
 CENTER CONTACT & ALL TERMINALS: Brass, silver plated (Q cont. mat'l.).  
 TERMINAL SEAL: Epoxy.  
 HARDWARE: Nut — Brass, nickel plated.  
 Locking ring — Brass, bright nickel plated.  
 Lockwasher — Steel, bright nickel plated.

### NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

### INTRODUCTION

Available options for 7000 SERIES TOGGLE SWITCHES are shown on pages A-2 thru A-12. Make selections from the following option sections: Model/Switching Function, Actuator, Bushing, Terminations, Contact Material and Epoxy Terminal Seal.


Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page A-12. Available hardware and accessories shown on page A-13.

UL, CSA listings available. See HOW TO ORDER, page A-12.

MODEL/SW. FUNC.


## MODELS/SWITCHING FUNCTION

MODEL NO.	UL MODEL NO.	SWITCHING FUNCTION		
		POS 1	POS 2	POS 3
7101	U11	ON	NONE	ON
7103	U13	ON	OFF	ON
7105	U15	MOM.	OFF	MOM.
7107	U17	ON	OFF	MOM.
7108	U18	ON	NONE	MOM.
CONNECTED TERMINALS		2-3	OPEN	2-1
7109	U19	NONE	ON	MOM.
CONNECTED TERMINALS		N/A	2-3	2-1
SCHEMATIC				
MOM. = MOMENTARY POSITION				
7201	U21	ON	NONE	ON
7203	U23	ON	OFF	ON
7205	U25	MOM.	OFF	MOM.
7207	U27	ON	OFF	MOM.
7208	U28	ON	NONE	MOM.
CONNECTED TERMINALS		2-3,5-6	OPEN	2-1,5-4
7209	U29	NONE	ON	MOM.
CONNECTED TERMINALS		N/A	2-3,5-6	2-1,5-4
7211	U211	ON	ON	ON
7213	U213	ON	ON	MOM.
7215	U215	MOM.	ON	MOM.
CONNECTED TERMINALS		2-3,5-6	2-3,5-4	2-1,5-4
SCHEMATIC				
MOM. = MOMENTARY POSITION				



**SPDT**

MODEL SHOWN: 7101-S-Y-Z-Q-E



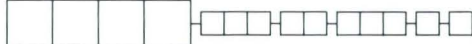
**DPDT**

MODEL SHOWN: 7201-S-Y-Z-Q-E

TERM. NOS. FOR REFERENCE ONLY



MODEL/SW. FUNC



## MODELS/SWITCHING FUNCTION (cont'd)

MODEL NO.	UL MODEL NO.	SWITCHING FUNCTION		
		POS 1 C&K MARKING	POS 2 MARKING	POS 3 THIS SIDE
7301	U31	ON	NONE	ON
7303	U33	ON	OFF	ON
7305	U35	MOM.	OFF	MOM.
7307	U37	ON	OFF	MOM.
7308	U38	ON	NONE	MOM.

CONNECTED TERMINALS	2-3,5-6,8-9	OPEN	2-1,5-4,8-7
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7309	U39	NONE	ON	MOM.
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CONNECTED TERMINALS	N/A	2-3,5-6,8-9	2-1,5-4,8-7
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MOM. = MOMENTARY POSITION

7401	U41	ON	NONE	ON
7403	U43	ON	OFF	ON
7405	U45	MOM.	OFF	MOM.
7407	U47	ON	OFF	MOM.
7408	U48	ON	NONE	MOM.

CONNECTED TERMINALS	2-3,5-6,8-9,11-12	OPEN	2-1,5-4,8-7,11-10
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7409	U49	NONE	ON	MOM.
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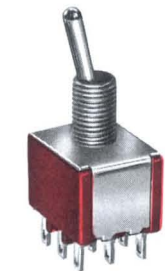
CONNECTED TERMINALS	N/A	2-3,5-6,8-9,11-12	2-1,5-4,8-7,11-10
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7411*	U411	ON	ON	ON
7413*	U413	ON	ON	MOM.
7415*	U415	MOM.	ON	MOM.

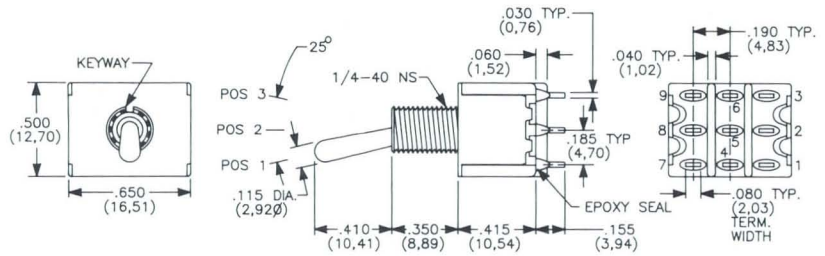
CONNECTED TERMINALS	2-3,5-6,8-9,11-12	2-3,5-4,8-9,11-10	2-1,5-4,8-7,11-10
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MOM. = MOMENTARY POSITION



3PDT

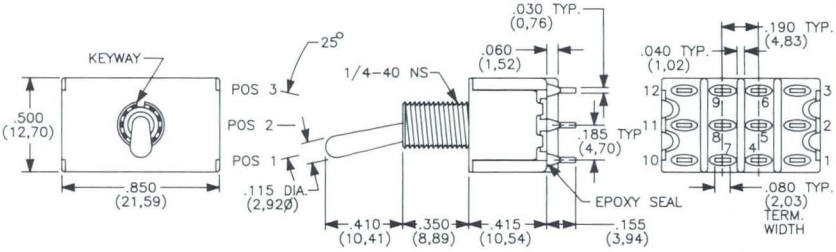


MODEL SHOWN: 7301-S-Y-Z-Q-E

TERM. NOS. FOR REFERENCE ONLY



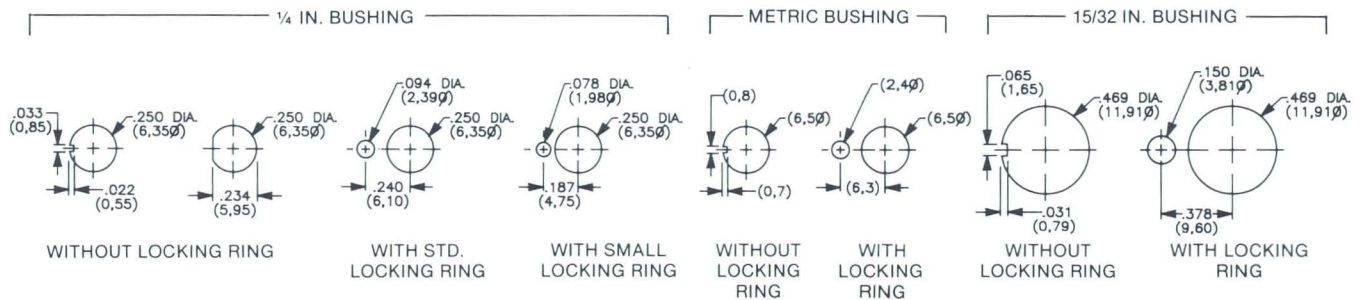
4PDT



MODEL SHOWN: 7401-S-Y-Z-Q-E

TERM. NOS. FOR REFERENCE ONLY

## PANEL MOUNTING



\* WIRING FOR 3-WAY SWITCH, SEE PAGE VIII.

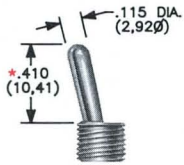


## ACTUATOR



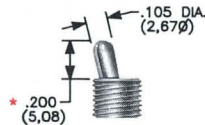
## ACTUATORS

### S SP WITH ANTIROTATION



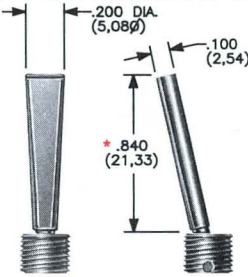
S actuator std. when ordered with Z, C, Z3 or W-W5 terminations.

### M MP WITH ANTIROTATION

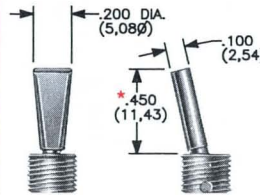


M actuator std. when ordered with A, A2, A4, AV2, R, R2 or V30-V90 terminations.

### P1 WITH ANTIROTATION



### P3 WITH ANTIROTATION

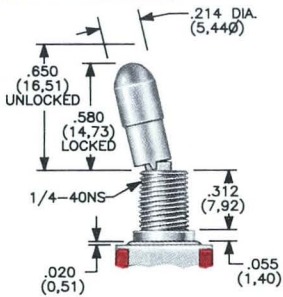


### P4 WITH ANTIROTATION



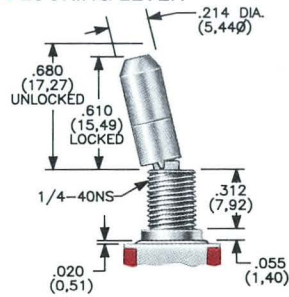
Antirotation feature standard on P1, P3, P4 actuators. Hardware: P/N 7099 dress nut supplied standard with threaded bushings.

### K LOCKING LEVER



Bushing option code not required.

### K1 LOCKING LEVER



### K & K1 options



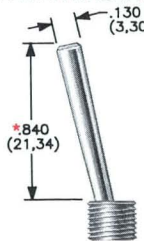
01 Models 2 Pos. Lock  
03, 11 Models 3 Pos. Lock  
05, 09, 15 Models 1 Pos. Lock  
07, 13 Models 2 Pos. Lock  
08 Models 1 Pos. Lock

To prevent accidental actuation, toggles must be lifted before being actuated. When released, toggles again lock in place. Add cap color in word form after order number. If no color is specified, natural aluminum will be supplied. Keyway on right side.

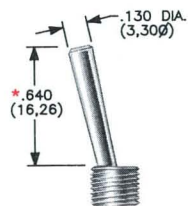
CAP COLORS	
Natural AL.	(Std.)
Black Anodized AL.	
Red Anodized AL.	
Blue Anodized AL.	

**Note:** Overtightening mounting nut may cause actuator to bind.

### L LP WITH ANTIROTATION



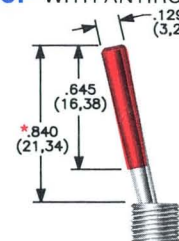
### L1 L1P WITH ANTIROTATION



### L2 L2P WITH ANTIROTATION



### L3 L3P WITH ANTIROTATION



Bushing option code not required with these actuators: K, K1, T, T1, T2P; CW bushing may be specified with T, T1 actuators.

**Antirotation:** provides anti-'push-in' feature on actuator, reducing risk of internal switch damage from impact forces on the actuator.

All actuators (except K, K1, L3, L40- L43) are available with satin chrome or black finish. Write 'SATIN CHROME ACTUATOR' or 'BLACK ACTUATOR' in word form after order number. If nothing is specified, chrome plated actuators will be supplied.

\*Add .070 (1,78) for D, D9 bushings, subtract .020 (0,51) for H3 bushing.

1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

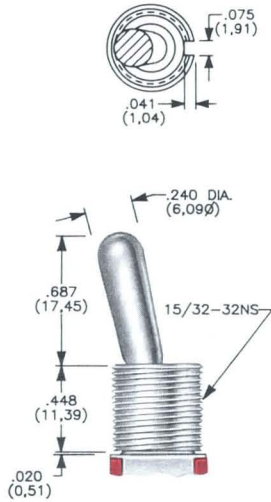
Add actuator color in word form after order number. If no color is specified, black will be supplied. Finish: gloss.



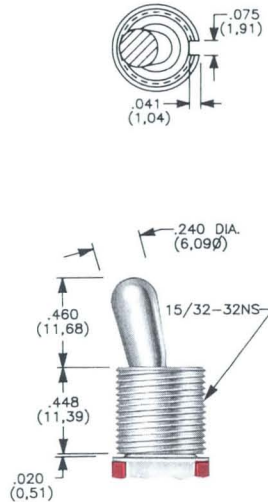


## ACTUATORS (cont'd.)

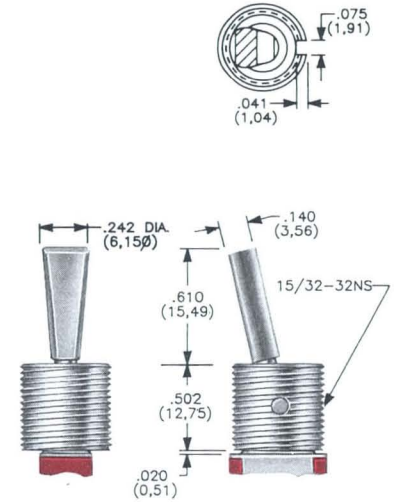
### T TP WITH ANTIROTATION



### T1 T1P WITH ANTIROTATION



### T2P WITH ANTIROTATION



Bushing option code not required unless CW splashproof bushing option desired.

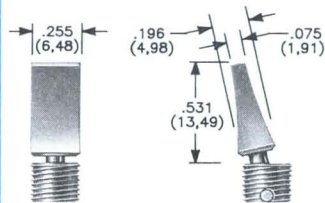
Bushing option code not required.

CW splashproof bushing not available with TP, T1P, T2P actuators.

### L40

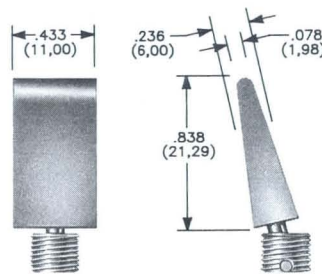


### L41 LEVER HANDLE



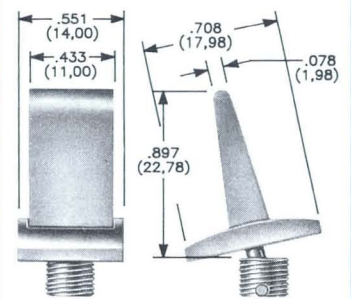
LEVER HANDLE P/N: 4810

### L42 LEVER HANDLE



LEVER HANDLE P/N: 4811

### L43 LEVER HANDLE



LEVER HANDLE P/N: 4812

Y bushing std. Also avail. with Y9, D, D9, H, H3 and CW bushings.

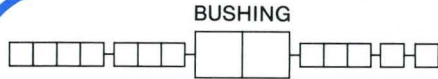
Add lever handle color in word form after order number. See color chart. If no color is specified, black will be supplied. Lever handles can be ordered separately, specify part no. and color. For interchangeability, order L40 actuator option and order lever handles separately. Finish: matte.

Antirotation feature standard on L40-L43 actuators.

1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

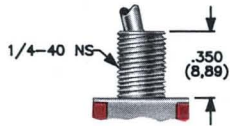
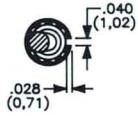


A



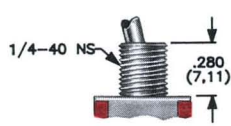
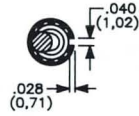
## BUSHINGS

### Y Y9 UNTHREADED



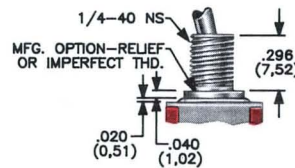
Y bushing std. with Z, C, Z3 or W-W5 terminations.

### D D9 UNTHREADED



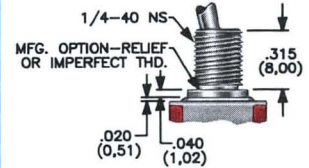
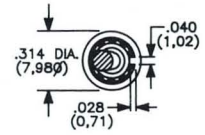
Add .070 (1,78) to all actuator lengths for D, D9 bushings.  
D9 bushing std. with A, A2, A4, R, R2, AV2 or V30-V90 terminations.

### H HIGH TORQUE



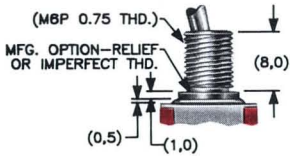
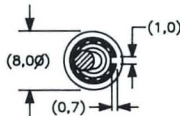
Will withstand 12 in.-lbs. of torque with no distortion.

### H3 HIGH TORQUE



Subtract .020 (0,51) from all actuator lengths for H3 bushing.  
Will withstand 12 in.-lbs. of torque with no distortion.

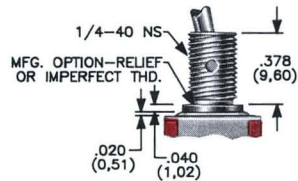
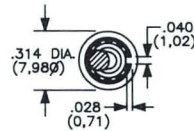
### H4 METRIC HIGH TORQUE\*



Not avail. with antirotation actuators.

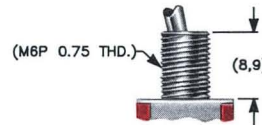
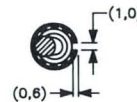
Will withstand 12 in.-lbs. of torque with no distortion.

### Y1 HIGH TORQUE

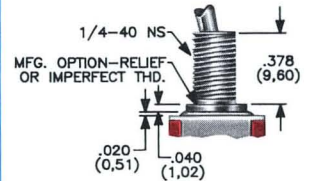
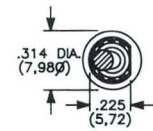


Available with antirotation actuator options only.  
Will withstand 12 in.-lbs. of torque with no distortion.

### Y3 METRIC

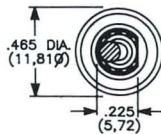


### Y4 HIGH TORQUE\*

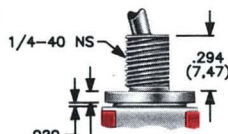
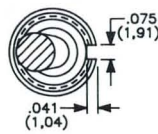


Will withstand 12 in.-lbs. of torque with no distortion.

### CW SPLASHPROOF

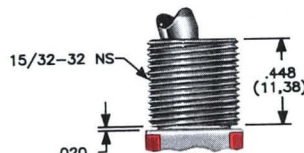


Actuator and bushing seals give splashproof models



CW bushing for all actuators except T, T1.

Bushing sealing washer supplied std.

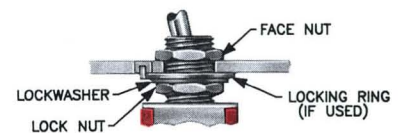


CW bushing for T, T1 actuators.

Bushing sealing washer available from: Multi-Flex Seals, Inc., Hackensack, New Jersey

Part No. MFS-60064

### PANEL MOUNTING



### TYPICAL ASSEMBLY WITH LOCKING RING.

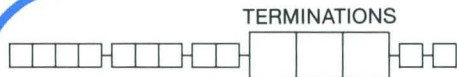
To avoid damaging front of panel, always tighten assembly with back-of-panel lock nut. Note: it is recommended that lock nut always be used with non-flanged bushings.

K - K1 ACTUATORS: Overtightening mounting nut may cause actuator to bind.

All bushings are available with black oxide finish. Write 'BLACK BUSHING' in word form after order number. If nothing is specified, nickel plated bushings will be supplied.

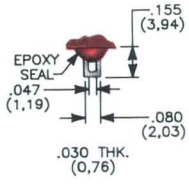
\* H4, Y4 bushings not available with A, A2, A4, AV2, R, R2 or V30-V90 terminations.





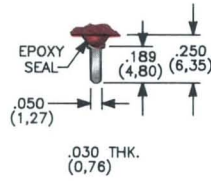
## TERMINATIONS

### Z (Std.)



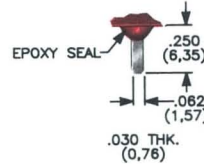
'Q' Contact Material Std.  
Not avail. with 'K', 'L' or 'M' Contact Material.

### C



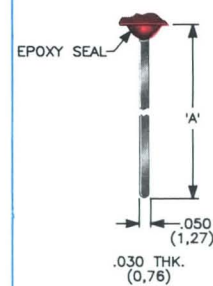
'Q' Contact Material Std.

### Z3 QUICK CONNECT



Mating quick connector available; order part no. 5301.  
'Q' Contact Material Std.  
Not avail. with 'K', 'L' or 'M' Contact Material.

### W-W5 WIRE-WRAP

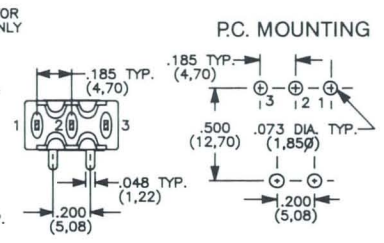
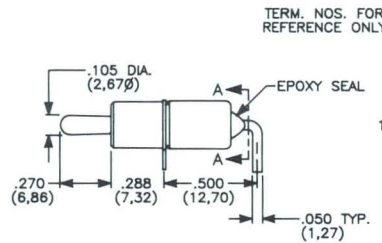
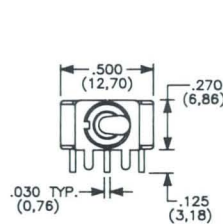


OPTION CODE	DIM. 'A'
W	.750 (19,05)
W1	.964 (24,48)
W3	.425 (10,80)
W4	1.062 (26,97)
W5	1.305 (33,15)

Wire-Wrap is a registered trademark of the Gardner-Denver Company.

'B' Contact Material Std.

## A



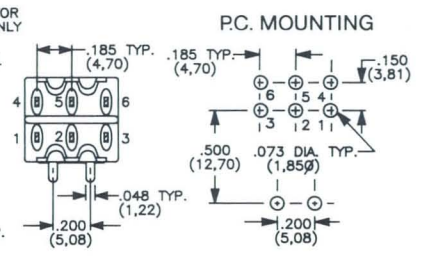
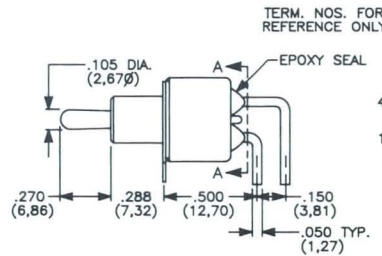
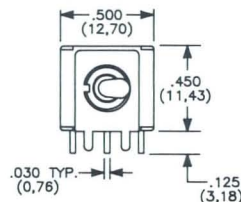
### SPDT

Actuator shown in POS.1.

'B' Contact Material Std.

Term. bend radii mfg. option.

## A



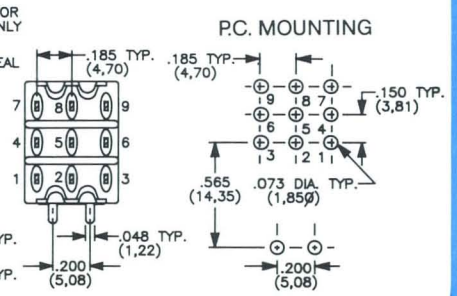
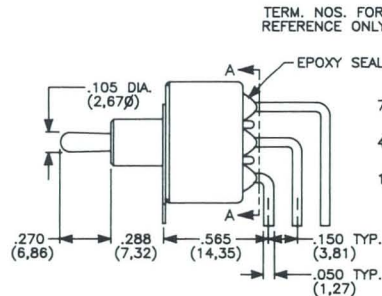
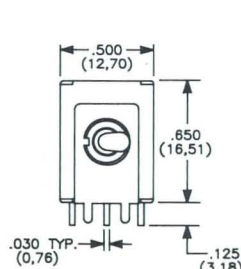
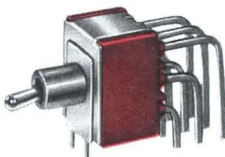
### DPDT

Actuator shown in POS.1.

'B' Contact Material Std.

Term. bend radii mfg. option.

## A



### 3PDT

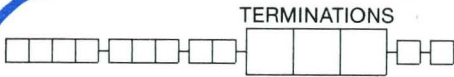
Actuator shown in POS.1.

'B' Contact Material Std.

Term. bend radii mfg. option.

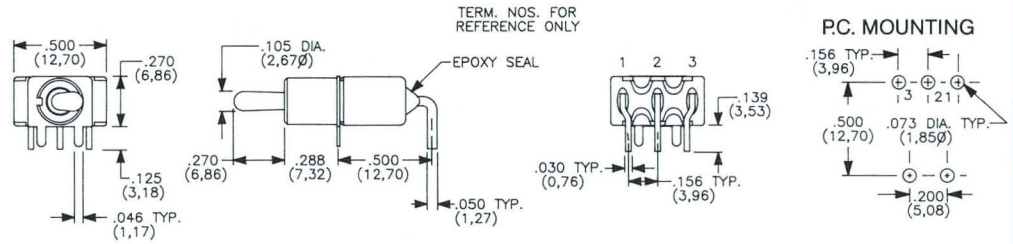


**A**



**TERMINATIONS (cont'd.)**

**A2**



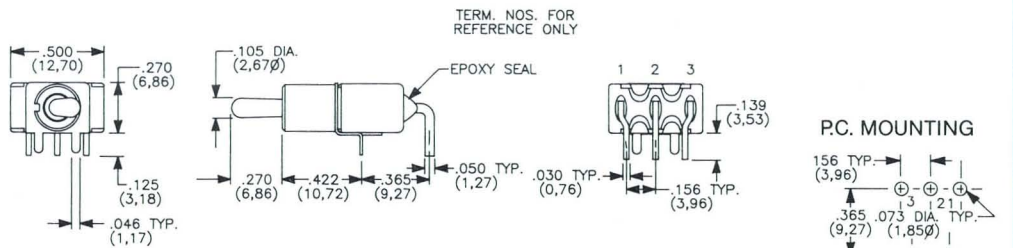
**SPDT**

Actuator shown in POS.1.

'B' Contact Material Std.

Term. bend radii mfg. option.

**A4**



The A4 and R2 termination options are functionally identical and fit the same P.C. mounting pattern. The switches are shifted relative to the mounting holes, however. Unlike the R2, the A4 option is available with G or Q contact material and can be UL and CSA listed. Note that the P.C. pattern must clear switch support legs.

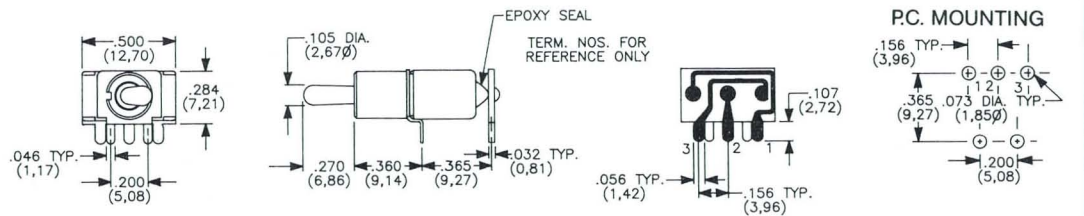
**SPDT**

Actuator shown in POS.1.

'B' Contact Material Std.

Term. bend radii mfg. option.

**R**



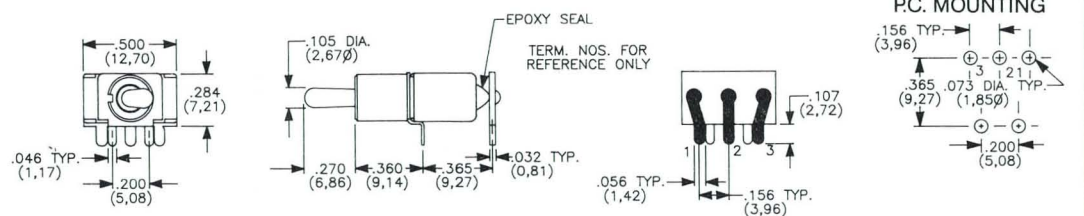
**SPDT**

Actuator shown in POS.1.

'B' Contact Material Only Available.

Contacts make on same side actuator thrown.

**R2**



**SPDT**

Actuator shown in POS.1.

'B' Contact Material Only Available.

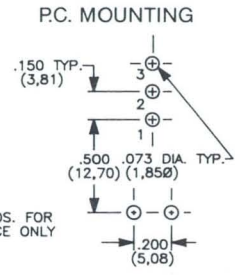
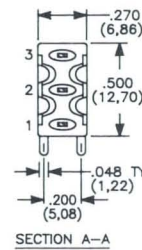
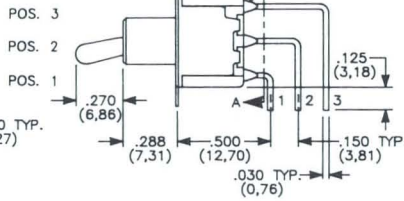
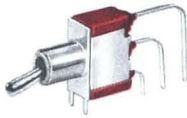
Contacts make on opposite side actuator thrown.





**TERMINATIONS (cont'd.)**

**AV2**

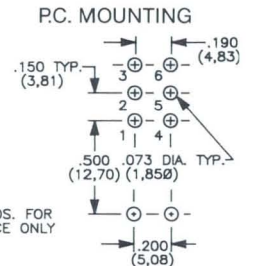
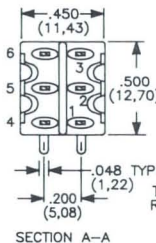
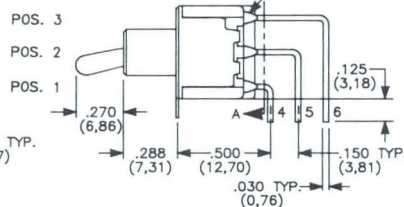
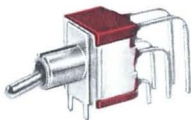


**SPDT**

'B' Contact Material Std.

Term. bend radii mfg. option.

**AV2**

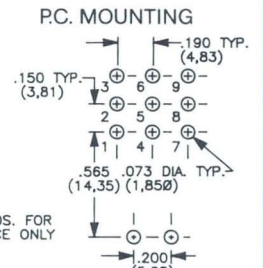
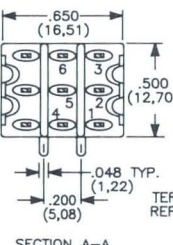
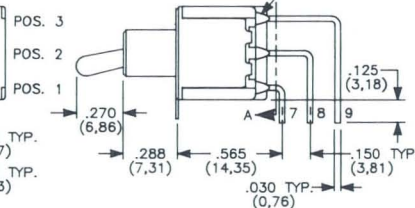
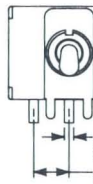
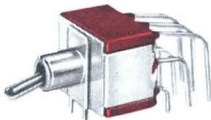


**DPDT**

'B' Contact Material Std.

Term. bend radii mfg. option.

**AV2**

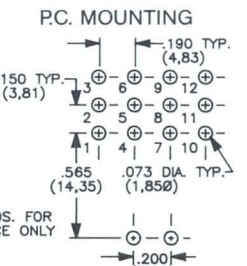
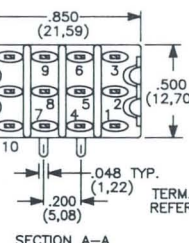
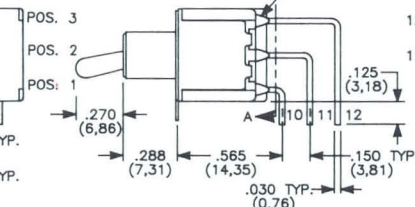
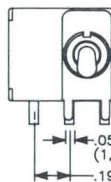
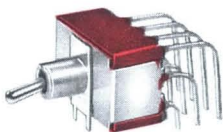


**3PDT**

'B' Contact Material Std.

Term. bend radii mfg. option.

**AV2**



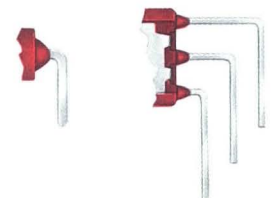
**4PDT**

'B' Contact Material Std.

Term. bend radii mfg. option.

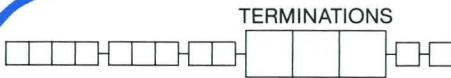
**EXTENDED TERMINAL OPTION**

Switches with A or AV2 terminations may be ordered with extended terminals, as shown. This provides easier installation into P.C. boards. To order, specify 'Extended Terminals' in word form after order number.



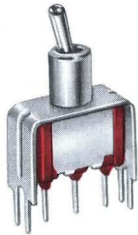


A

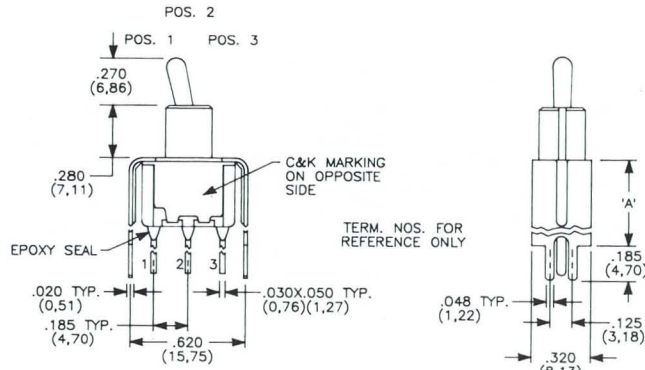


## TERMINATIONS (cont'd.)

### V30-V40-V90

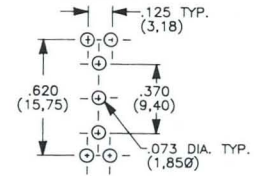


SPDT



'B' Contact Material Std.

### P.C. MOUNTING

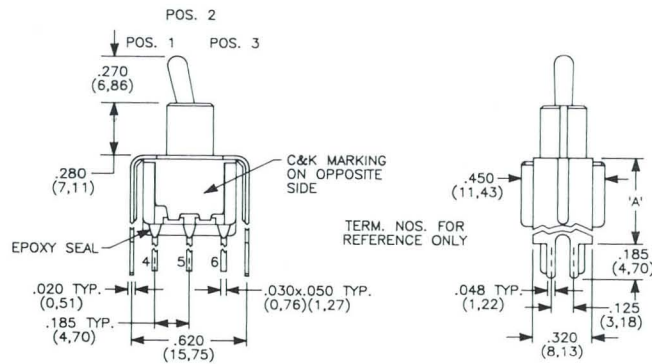


OPTION CODE	DIM. 'A'
V30	.460 (11,68)
V40	.630 (16,00)
V90	1.150 (29,21)

### V30-V40-V90

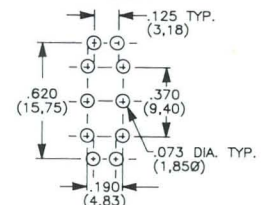


DPDT



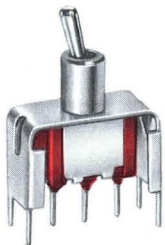
'B' Contact Material Std.

### P.C. MOUNTING

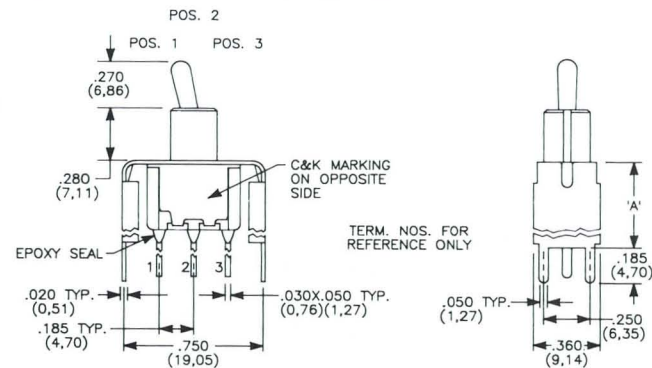


OPTION CODE	DIM. 'A'
V30	.460 (11,68)
V40	.630 (16,00)
V90	1.150 (29,21)

### V60-V70-V80

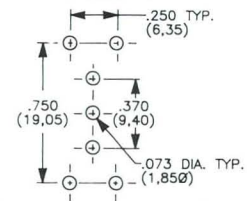


SPDT



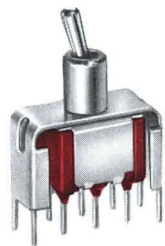
'B' Contact Material Std.

### P.C. MOUNTING

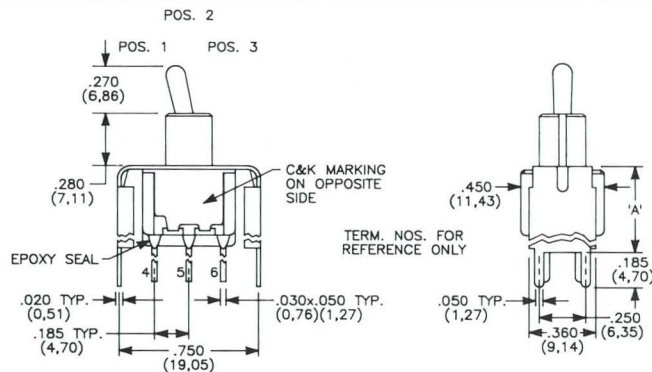


OPTION CODE	DIM. 'A'
V60	.460 (11,68)
V70	.630 (16,00)
V80	.953 (24,21)

### V60-V70-V80

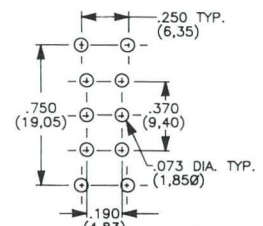


DPDT



'B' Contact Material Std.

### P.C. MOUNTING



OPTION CODE	DIM. 'A'
V60	.460 (11,68)
V70	.630 (16,00)
V80	.953 (24,21)





**CONTACT MATERIALS**

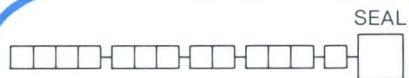
- B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Std. with all termination options exc. Z, C, Z3)
- Q** END CONTACTS: Coin silver, silver plated.  
CENTER CONTACT & ALL TERMINALS: Brass, silver plated.  
RATING: 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC. (Std. with termination options Z, C, Z3)
- G** END CONTACTS: Coin silver, with gold plate over nickel plate.  
CENTER CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC.

**NEW TIN-LEAD PLATED TERMINATIONS**

- K** CONTACTS: Brass, with gold plate over nickel plate (same as B contact material).  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Available with C, W-W5, A, A2, A4, AV2, V30-V90 termination options only)
- M** END CONTACTS: Coin silver, silver plated. ] (same as Q contact material)  
CENTER CONTACT: Brass, silver plated. ]  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC. (Available with C, W-W5, A, A2, A4, AV2, V30-V90 termination options only)
- L** END CONTACTS: Coin silver, with gold plate over nickel plate. ] (same as G contact material)  
CENTER CONTACT: Brass, with gold plate over nickel plate. ]  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC. (Available with C, W-W5, A, A2, A4, AV2, V30-V90 termination options only)

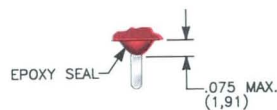
**Note:** G and L contact materials are electrically equivalent to B, Q, K and M contact materials and can be used where either dry circuit\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. These options should be specified where UL or CSA listing is required on a switch used in a dry circuit application.

\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.

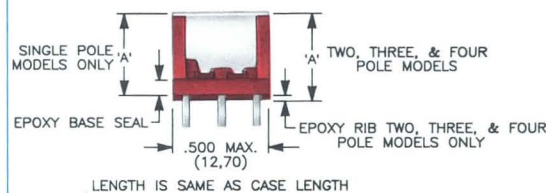


**SEALING**

**E (std.)**



**I**



POLES	DIM. 'A'
SP	.410 (10,41)
DP	.440 (11,18)
3P	.505 (12,83)
4P	.505 (12,83)

Available only with Z, C, Z3 or W-W5 terminations.

**A**

**HOW TO ORDER**

Complete the order number below by selecting the desired model no., actuator, bushing (where required), termination, contact material and terminal sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Where applicable, write actuator color in word form after order number.

(Example: 7208-L42-Y-Z  -Q-E with white actuator).  
If no color is specified, black will be supplied.

**S** actuator, **Y** bushing, **Z** terminations, **Q** contact material and **E** epoxy terminal seal are supplied if no options are specified.

UL listed with all options when ordered with model nos. **U11** thru **U415** and **G**, **Q**, **L** or **M** contact material. CSA listing available on all UL listed switches, specify 'with CSA listing' in word form after order number. **Z** termination option CSA listed only when ordered with **I** epoxy base seal.

**ADDITIONAL ORDERING INFORMATION:**

**ACTUATORS:** Satin chrome or black finish available on all actuators except **K-K1**, **L3**, **L40-L43**. Write 'SATIN CHROME ACTUATOR' or 'BLACK ACTUATOR' in word form after order number. If nothing is specified, chrome plated actuators will be supplied.

**K-K1 ACTUATORS:** Write actuator cap color in word form after order number. If nothing is specified, natural aluminum caps will be supplied. Bushing option code not required.

**T, T1 ACTUATORS:** Bushing option code not required unless **CW** splashproof bushing option is desired.

**TP, T1P, T2P ACTUATORS:** Bushing option code not required.

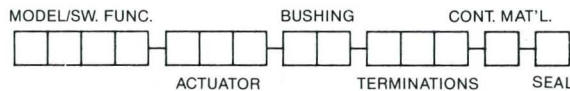
**BUSHINGS:** Black oxide finish available. Write 'BLACK BUSHING' in word form after order number. If nothing is specified, nickel plated bushings will be supplied.

**HARDWARE:** Two mounting nuts, locking ring and lockwasher are supplied standard, where applicable (except **P1**, **P3**, **P4** actuators: one P/N 7099 dress nut, one hex nut, locking ring and lockwasher supplied standard). Optional mounting nut styles and locking rings available. Write part descriptions and part nos. in word form after order number. If nothing is specified, standard hardware will be supplied. Hardware is also available separately, see **HARDWARE** section, page A-13.

**UNAVAILABLE OPTION COMBINATIONS**

<u>Model or Option</u>	<u>Options Not Available</u>
U11 thru U415	B, K*
S, M, L, L1, L2, L3	Y1
L40, L41, L42, L43	H4, Y1, Y4
A, A2, A4, AV2, R, R2, V30-V90	H4, Y4, I
SP, MP, P1, P3, P4, LP, L1P, L2P, L3P	H4
Z, Z3	K, L, M
R, R2	Q, G, K, L, M
TP, T1P, T2P	CW

\*UL listed switches must be ordered with G, Q, L or M contact material because UL considers for listing only those components suitable for power applications.

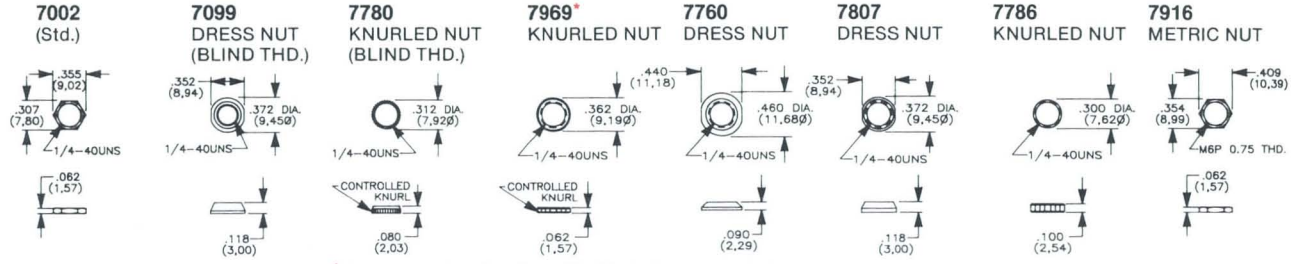




### AVAILABLE HARDWARE

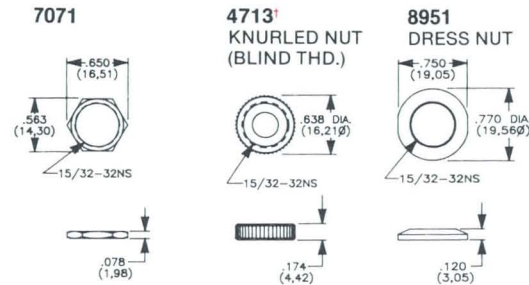
The following hardware is available separately. To order, write part nos., descriptions and colors where applicable.

#### NUTS

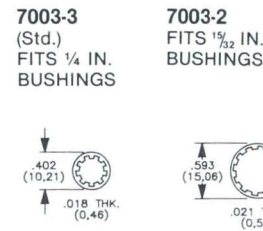


\* Controlled knurl pattern fits 'Gulmite' #12 socket.

#### NUTS



#### LOCKWASHERS



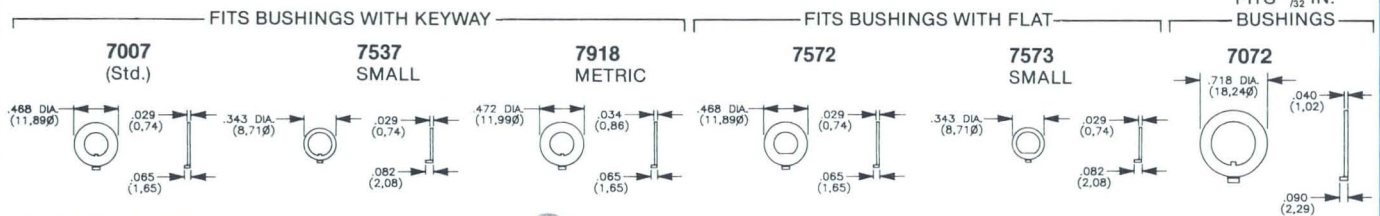
#### MATERIALS

NUTS, LOCKING RINGS - Brass, nickel plated.  
LOCKWASHERS - Steel, bright nickel plated.

Black finish hardware is available, and is supplied when black bushings are specified. To order, write 'BLACK HARDWARE' in word form with descriptions and part nos.

† Fits T2P actuator only.

#### LOCKING RINGS



#### WRENCHES

Switches are normally mounted to panel using two mounting nuts: one front of panel, one back of panel. To avoid damaging front of panel, always tighten back of panel nut. When ordering, specify 4 digit part no.



WRENCH P/N	FITS NUTS P/N
7785	7002, 7099, 7807, 7916
8942	7969
4815	7780

#### TOGGLE CAPS



Plastic caps, available in 9 colors, fit either S or L actuator options. When ordering, specify cap part no. and color in word form.

CAP COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		

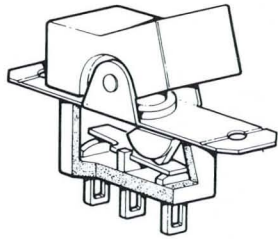
#### LEVER HANDLES FOR L40 ACTUATOR OPTION

Lever handles available in 3 styles and 9 colors, fit L40 actuator option. For illustrations and dimensions, see page A-5. Lever handles snap-fit and may be installed or replaced by user. When ordering, specify part no. and color in word form. Finish: matte.

LEVER HANDLE P/N	MAKES ACTUATOR OPTION
4810	L41
4811	L42
4812	L43

LEVER HANDLE COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		

A



### SPECIFICATIONS

**CONTACT RATING:** 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC.  
**ELECTRICAL LIFE:** 100,000 make-and-break cycles at full load on all models ending in -01 (ON-NONE-ON). All other models, 40,000 cycles.  
**CONTACT RESISTANCE:** Below 10 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.  
**INSULATION RESISTANCE:**  $10^9$  ohms min.  
**DIELECTRIC STRENGTH:** 1,000 V RMS min. @ sea level.  
**OPERATING TEMPERATURE:** -30°C to 85°C.

### MATERIALS

**CASE:** SP & DP- diallyl phthalate (DAP) or melamine phenolic.  
 3P & 4P- diallyl phthalate (DAP).  
**ACTUATOR:** Nylon, black, std.  
**BUSHING:** Brass, nickel plated or zinc, nickel plated.  
**HOUSING:** Stainless steel.  
**SWITCH SUPPORT:** Brass or steel, electrotin plated.  
**MOUNTING BRACKET:** Stainless steel.  
**END CONTACTS:** Coin silver, silver plated (Q cont. mat'l.).  
**CENTER CONTACT & ALL TERMINALS:** Brass, silver plated (Q cont. mat'l.).  
**TERMINAL SEAL:** Epoxy.  
**HARDWARE:** Nut- Stainless steel.  
 Screw- Stainless steel.  
 Lockwasher- Stainless steel.  
 Standoff- Aluminum or nylon.

### NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

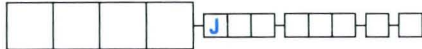
### INTRODUCTION

Available options for 7000 SERIES ROCKER AND LEVER HANDLE SWITCHES are shown on pages A-14 thru A-30. Make selections from the following option sections: Model/Switching Function, Actuator/Mounting Style, Terminations, Contact

Material and Epoxy Terminal Seal. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page A-30. Available hardware and accessories shown on pages A-31 and A-32.

UL, CSA listings available. See HOW TO ORDER, page A-30.

MODEL/SW. FUNC.

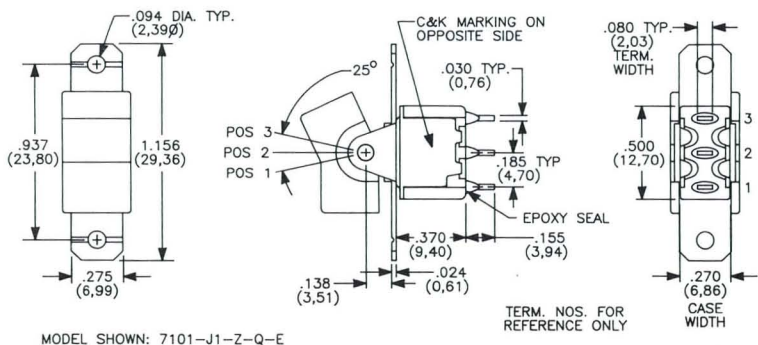
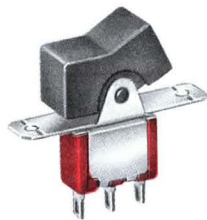


### MODELS/SWITCHING FUNCTION

MODEL NO.	UL MODEL NO.	SWITCHING FUNCTION		
		POS 1	POS 2	POS 3
7101	U11	ON	NONE	ON
7103	U13	ON	OFF	ON
7105	U15	MOM.	OFF	MOM.
7107	U17	ON	OFF	MOM.
7108	U18	ON	NONE	MOM.
CONNECTED TERMINALS		2-3	OPEN	2-1
109	U19	NONE	ON	MOM.
CONNECTED TERMINALS		N/A	2-3	2-1



SPDT

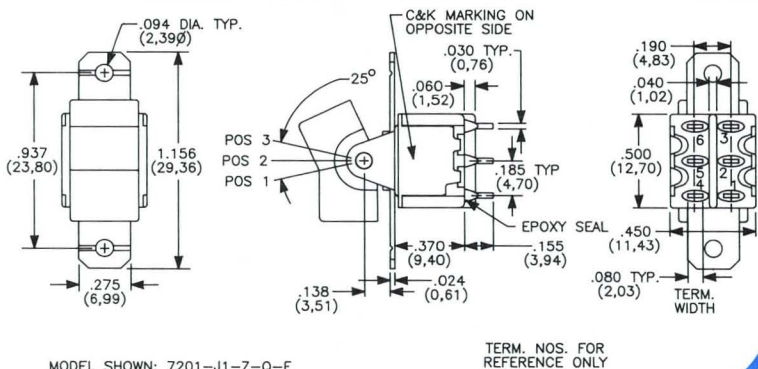
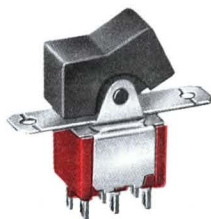


MODEL SHOWN: 7101-J1-Z-Q-E

MOM. = MOMENTARY POSITION				
MODEL NO.	UL MODEL NO.	POS 1	POS 2	POS 3
7201	U21	ON	NONE	ON
7203	U23	ON	OFF	ON
7205	U25	MOM.	OFF	MOM.
7207	U27	ON	OFF	MOM.
7208	U28	ON	NONE	MOM.
CONNECTED TERMINALS		2-3,5-6	OPEN	2-1,5-4
7209	U29	NONE	ON	MOM.
CONNECTED TERMINALS		N/A	2-3,5-6	2-1,5-4



DPDT



MODEL SHOWN: 7201-J1-Z-Q-E

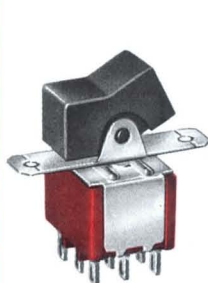


MODEL/SW. FUNC.

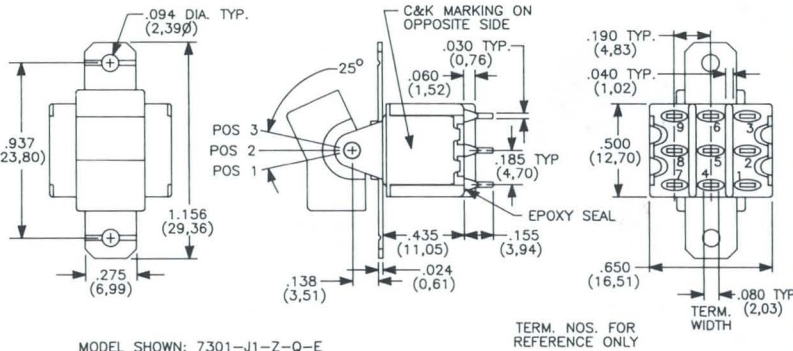
\_\_\_\_\_ J \_\_\_\_\_

## MODELS/SWITCHING FUNCTION (cont'd.)

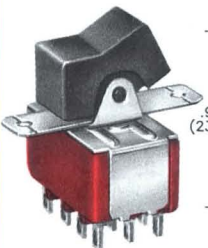
MODEL NO.	UL MODEL NO.	SWITCHING FUNCTION		
		POS 1	POS 2	POS 3
7301	U31	ON	NONE	ON
7303	U33	ON	OFF	ON
7305	U35	MOM.	OFF	MOM.
7307	U37	ON	OFF	MOM.
7308	U38	ON	NONE	MOM.
CONNECTED TERMINALS		2-3,5-6, 8-9	OPEN	2-1,5-4, 8-7
7309	U39	NONE	ON	MOM.
CONNECTED TERMINALS		N/A	2-3,5-6, 8-9	2-1,5-4, 8-7
SCHEMATIC				



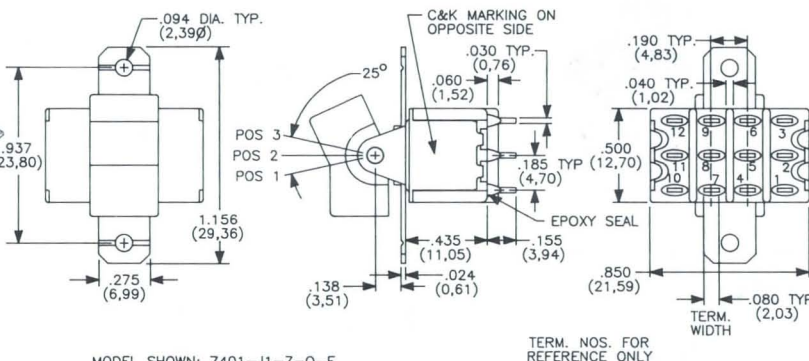
3PDT



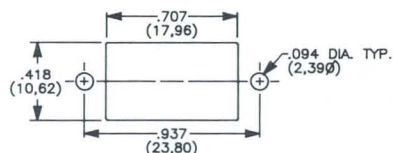
MOM. = MOMENTARY POSITION				
7401	U41	ON	NONE	ON
7403	U43	ON	OFF	ON
7405	U45	MOM.	OFF	MOM.
7407	U47	ON	OFF	MOM.
7408	U48	ON	NONE	MOM.
CONNECTED TERMINALS		2-3,5-6, 8-9,11-12	OPEN	2-1,5-4, 8-7,11-10
7409	U49	NONE	ON	MOM.
CONNECTED TERMINALS		N/A	2-3,5-6, 8-9,11-12	2-1,5-4, 8-7,11-10
7411	U411	ON	ON	ON
7413	U413	ON	ON	MOM.
7415	U415	MOM.	ON	MOM.
CONNECTED TERMINALS		2-3,5-6, 8-9,11-12	2-3,5-4, 8-9,11-10	2-1,5-4, 8-7,11-10
SCHEMATIC				
MOM. = MOMENTARY POSITION				



4PDT



### PANEL MOUNTING



• WIRING FOR 3-WAY SWITCH, SEE PAGE VIII

## INTRODUCTION TO ACTUATOR / MOUNTING STYLE OPTIONS

7000 Series ACTUATOR / MOUNTING STYLE OPTIONS are shown on pages A-16 thru A-24, grouped by mounting style:

Panel Mounted Actuator Options: . . . . . Pages A-16, A-17.  
(avail. with Z, C, Z3 or W-W5 terminations)

Snap-In Front Mounted Actuator Options: . . . . . Pages A-18 thru A-21.  
(avail. with Z, C, Z3, or W-W5 terminations, SPDT and DPDT models only)

Rear mounted Actuator Options: . . . . . Pages A-22, A-23.  
(avail. with Z, C, Z3, or W-W5 terminations)

P.C. Mounted Actuator Options: . . . . . Pages A-23, A-24.  
(avail. with A, AV2, V3-V9 terminations)

Note terminations available with each mounting style. Select actuator color from chart at right. Also select frame color from chart, unless option desired has separate frame color chart. Add actuator and, where applicable, frame color in word form after order number. If no color is specified, black will be supplied. See HOW TO ORDER, page A-30. Actuator and frame finish: matte.

L.E.D.s not included on J52, J62, J92 actuators. For L.E.D. information, see page A-25.

ACTUATOR AND FRAME COLORS	
1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

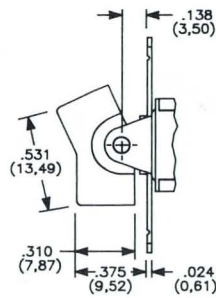
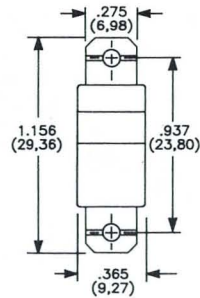
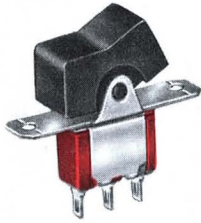
ACT./MTG. STYLE



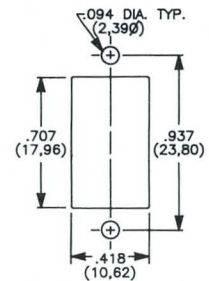
**ACTUATOR OPTIONS FOR PANEL MOUNTING**

Available with Z, C, Z3 or W-W5 terminations.  
Available actuator colors, see page A-15.

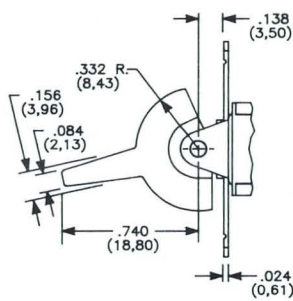
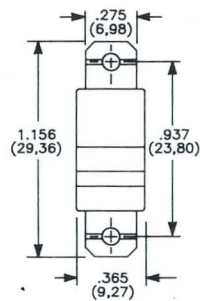
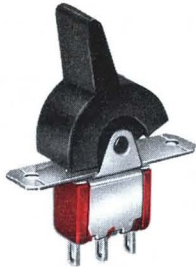
**J1**



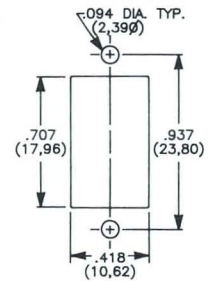
PANEL MOUNTING



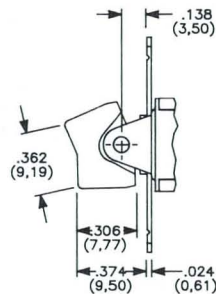
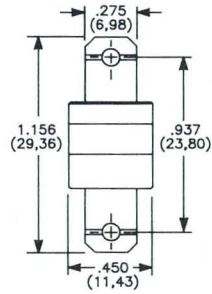
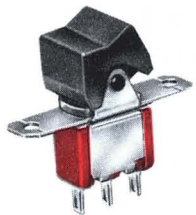
**J2**



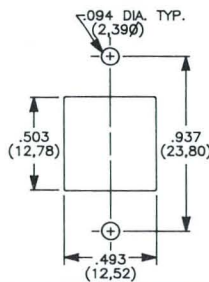
PANEL MOUNTING



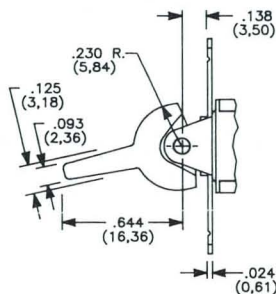
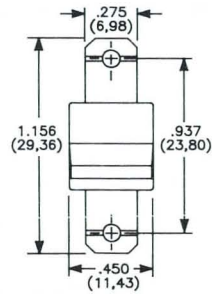
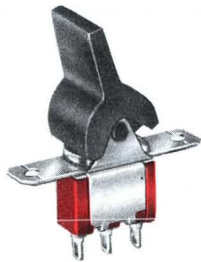
**J54**



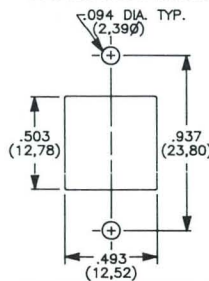
PANEL MOUNTING



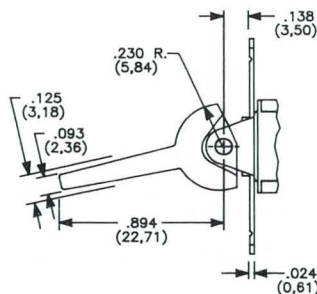
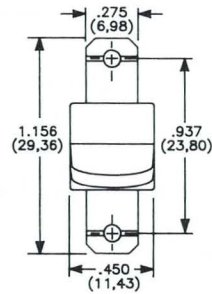
**J64**



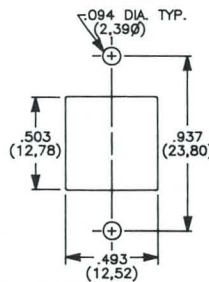
PANEL MOUNTING



**J94**



PANEL MOUNTING





ACT./MTG. STYLE

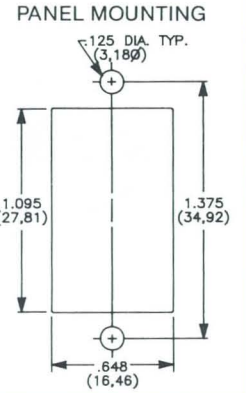
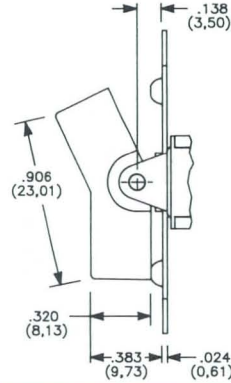
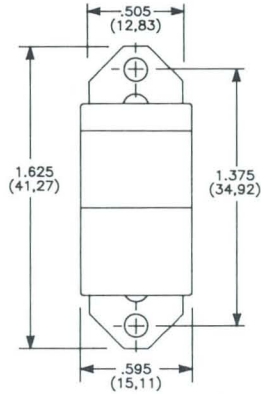
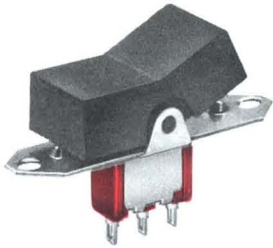


**ACTUATOR OPTIONS FOR PANEL MOUNTING (cont'd.)**

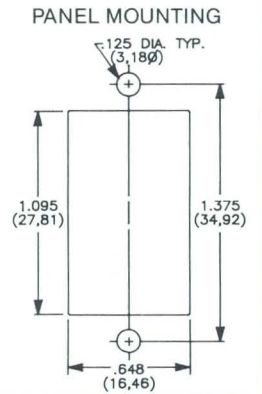
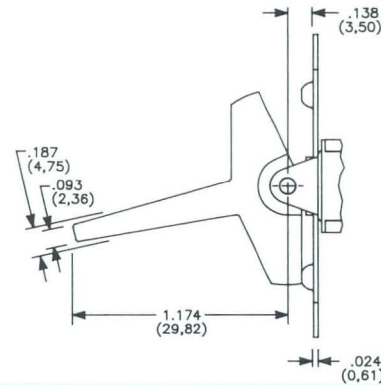
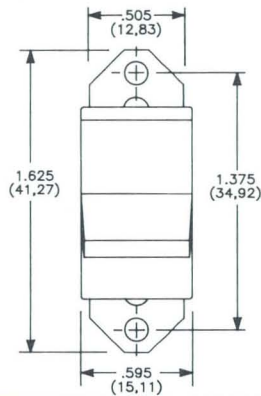
Available with Z, C, Z3 or W-W5 terminations.  
Available actuator colors, see page A-15.

**A**

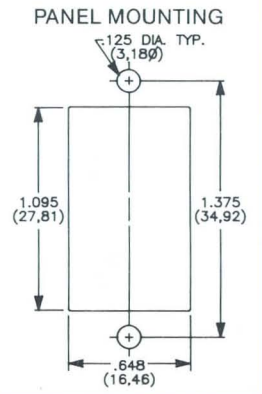
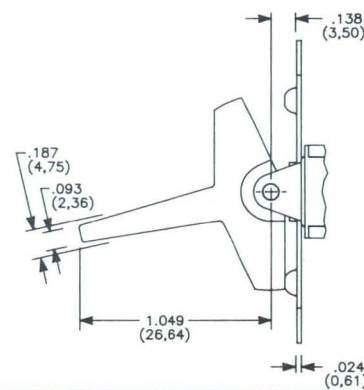
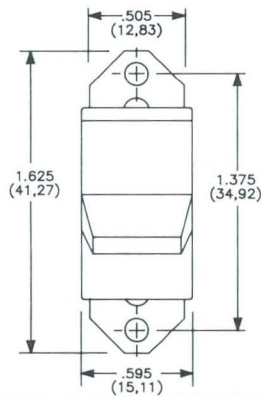
**J3**



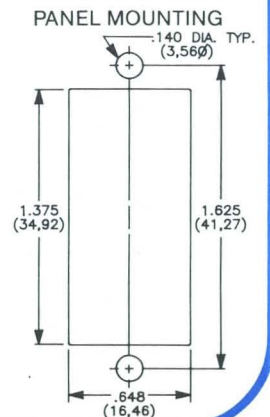
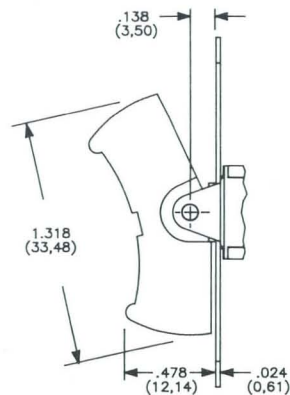
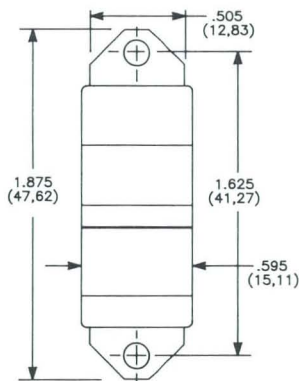
**J4**



**J5**



**J10**



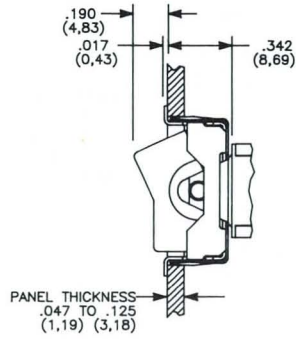
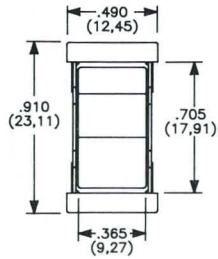
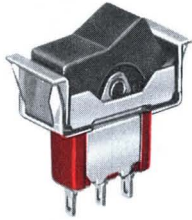
ACT./MTG. STYLE



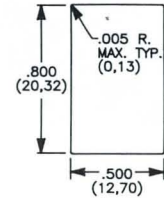
**ACTUATOR OPTIONS FOR SNAP-IN FRONT MOUNTING**

Available with Z, C, Z3 or W-W5 terminations. SPDT and DPDT models only.  
Available actuator and frame colors, see page A-15.

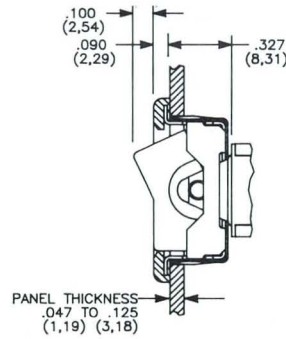
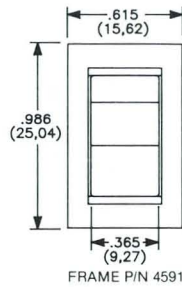
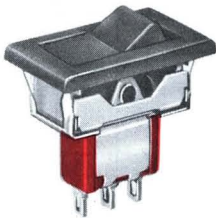
**J15**



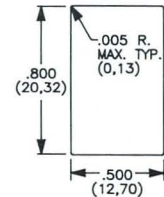
PANEL MOUNTING



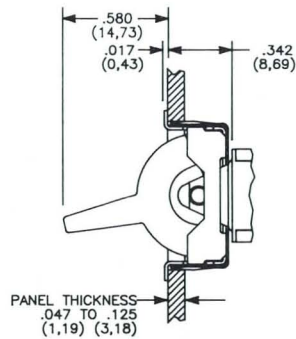
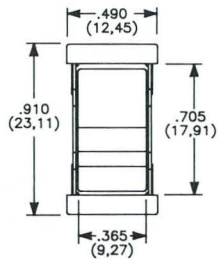
**J16**



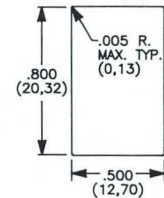
PANEL MOUNTING



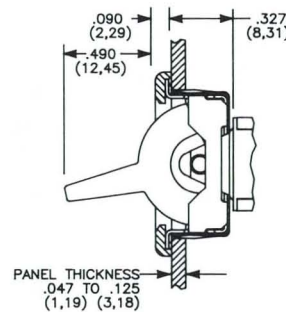
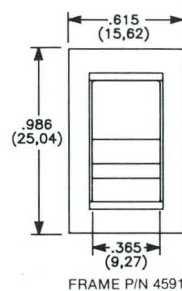
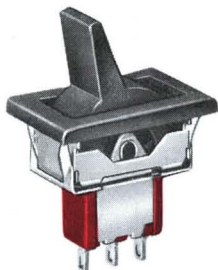
**J25**



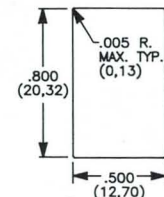
PANEL MOUNTING



**J26**



PANEL MOUNTING





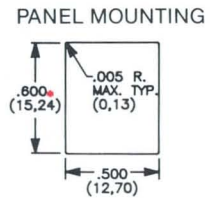
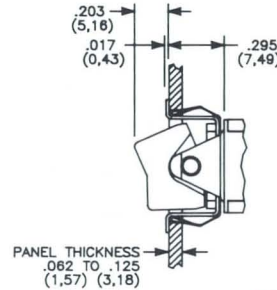
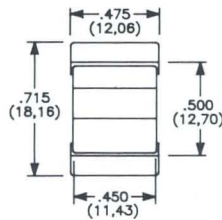
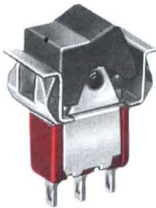
ACT./MTG. STYLE



**ACTUATOR OPTIONS FOR SNAP-IN FRONT MOUNTING (cont'd.)**

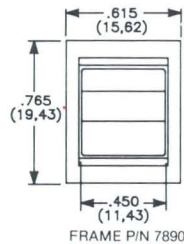
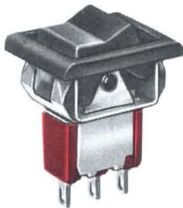
Available with Z, C, Z3 or W-W5 terminations. SPDT and DPDT models only.  
Available actuator and frame colors, see page A-15.

**J50**

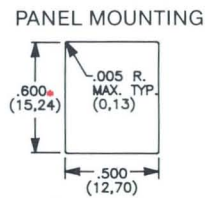
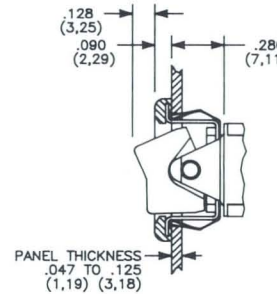


\* For .091/.125 (2,31/3,18) THK. panel, increase this DIM. to .620/.625 (15,75/15,88).

**J51**

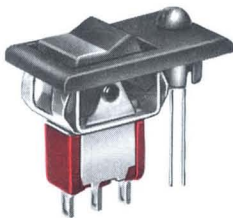


FRAME P/N 7890

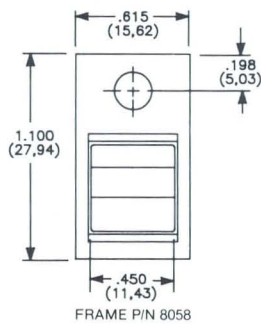


\* For .091/.125 (2,31/3,18) THK. panel, increase this DIM. to .620/.625 (15,75/15,88).

**J52**

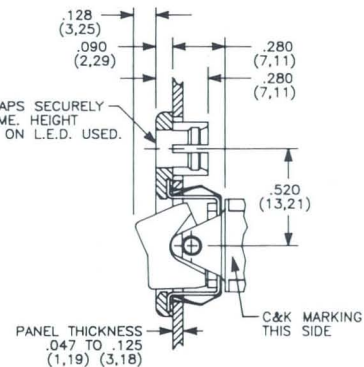


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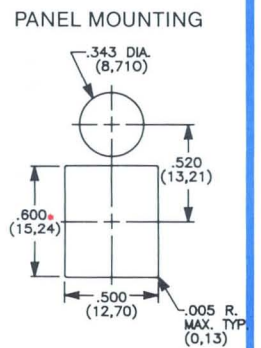


FRAME P/N 8058

L.E.D. SNAPS SECURELY INTO FRAME. HEIGHT DEPENDS ON L.E.D. USED.



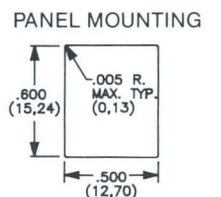
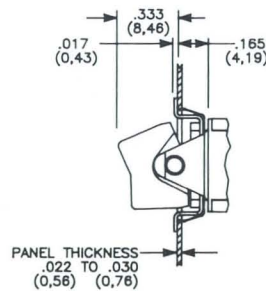
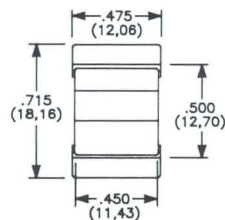
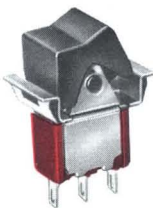
C&K MARKING THIS SIDE



L.E.D. NOT INCLUDED. FOR L.E.D. INFORMATION, SEE PAGE A-25.

\* For .091/.125 (2,31/3,18) THK. panel, increase this DIM. to .620/.625 (15,75/15,88).

**J53**



ACT./MTG. STYLE

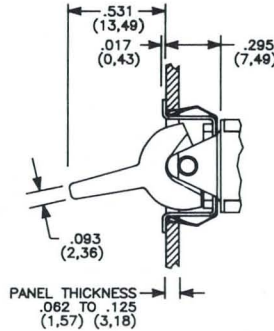
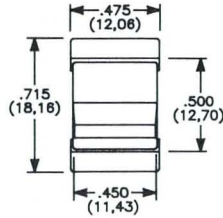
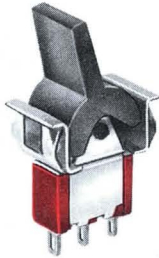
**ACTUATOR OPTIONS FOR SNAP-IN FRONT MOUNTING (cont'd.)**

Available with Z, C, Z3 or W-5 terminations. SPDT and DPDT models only.  
Available actuator and frame colors, see page A-15.

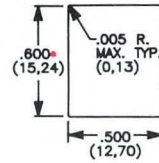
**A**



**J60**

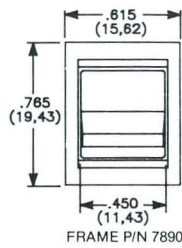


PANEL MOUNTING

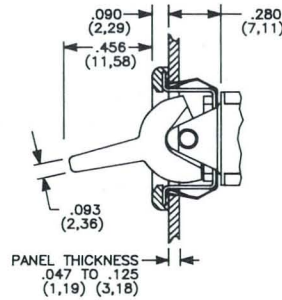


\* For .091/.125 (2,31/3,18) THK. panel, increase this DIM. to .620/.625 (15,75/15,88).

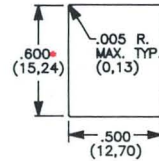
**J61**



FRAME P/N 7890

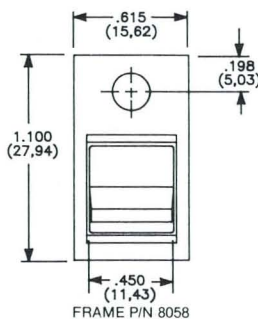
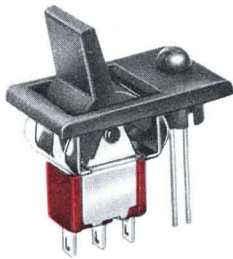


PANEL MOUNTING



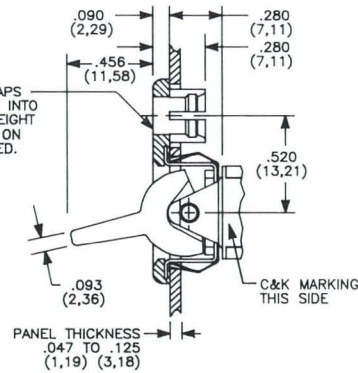
\* For .091/.125 (2,31/3,18) THK. panel, increase this DIM. to .620/.625 (15,75/15,88).

**J62**

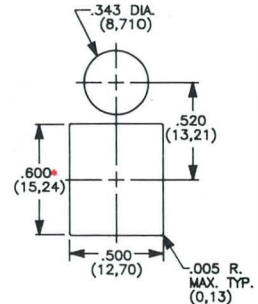


FRAME P/N 8058

L.E.D. SNAPS SECURELY INTO FRAME. HEIGHT DEPENDS ON L.E.D. USED.



PANEL MOUNTING

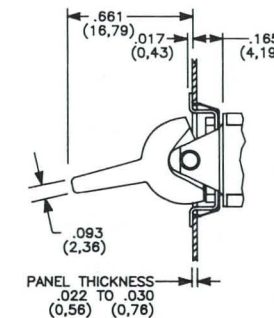
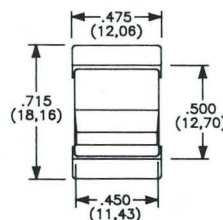
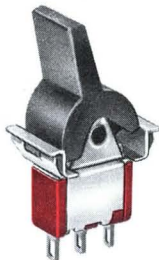


\* For .091/.125 (2,31/3,18) THK. panel, increase this DIM. to .620/.625 (15,75/15,88).

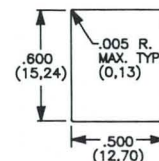
U.S. PAT. NO. 4,004,120

L.E.D. NOT INCLUDED. FOR L.E.D. INFORMATION, SEE PAGE A-25.

**J63**



PANEL MOUNTING





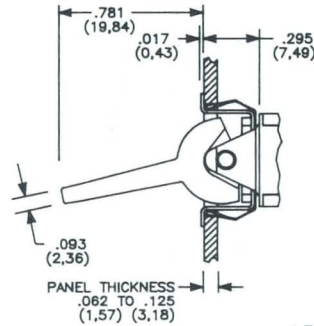
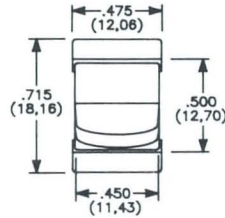
ACT./MTG. STYLE



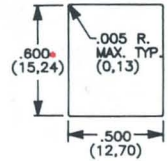
**ACTUATOR OPTIONS FOR SNAP-IN FRONT MOUNTING (cont'd.)**

Available with Z, C, Z3 or W-W5 terminations. SPDT and DPDT models only.  
Available actuator and frame colors, see page A-15.

**J90**

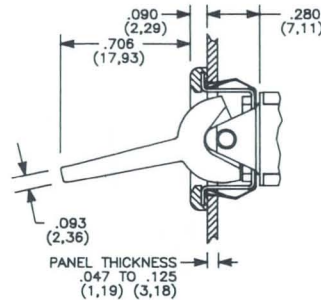
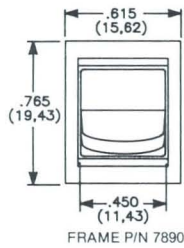


PANEL MOUNTING

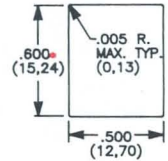


\* For .091/.125 (2.31/3.18) THK. panel, increase this DIM. to .620/.625 (15.75/15.88).

**J91**

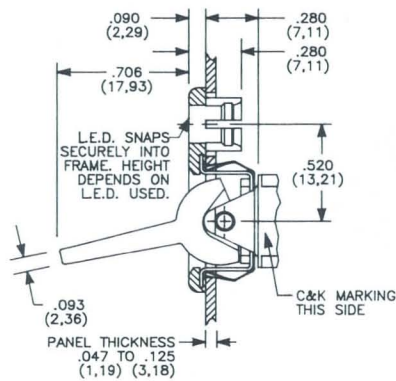
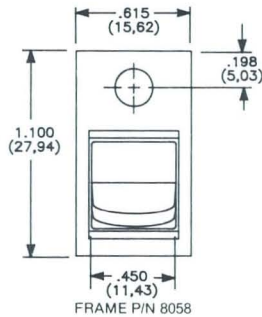


PANEL MOUNTING

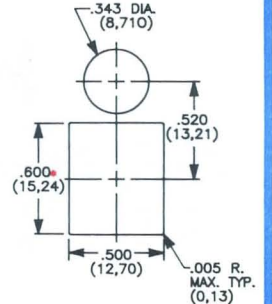


\* For .091/.125 (2.31/3.18) THK. panel, increase this DIM. to .620/.625 (15.75/15.88).

**J92**



PANEL MOUNTING

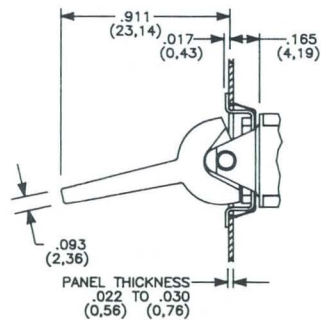
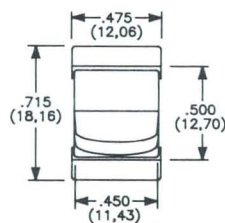
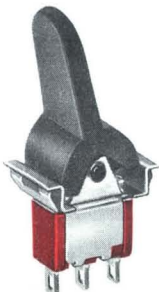


U.S. PAT. NO. 4,004,120

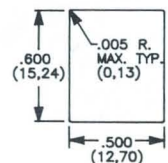
L.E.D. NOT INCLUDED. FOR L.E.D. INFORMATION, SEE PAGE A-25.

\* For .091/.125 (2.31/3.18) THK. panel, increase this DIM. to .620/.625 (15.75/15.88).

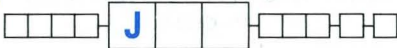
**J93**



PANEL MOUNTING



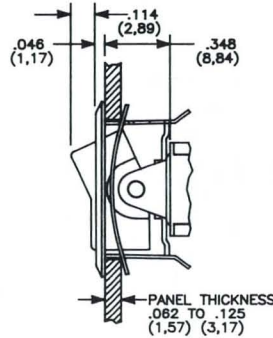
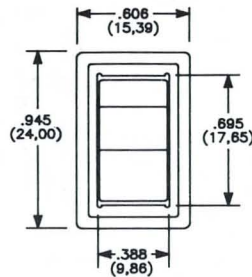
ACT./MTG. STYLE



**ACTUATOR OPTIONS FOR REAR MOUNTING**

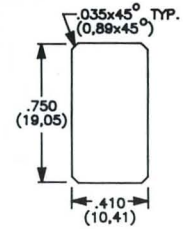
Available with Z, C, Z3 or W-W5 terminations.  
Available actuator colors, see page A-15. Select frame colors below.

**J11**

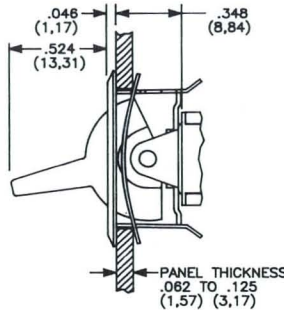
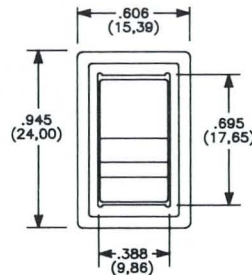
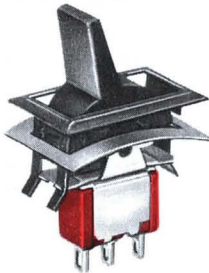


FRAME COLORS	
P/N	FINISH
7645-1	BRIGHT CHROME
7645-2	BLACK (Std.)
7645-3	SATIN CHROME
7645-4	WHITE ENAMEL

PANEL MOUNTING

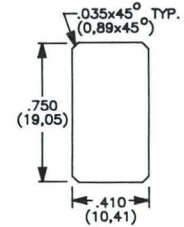


**J21**

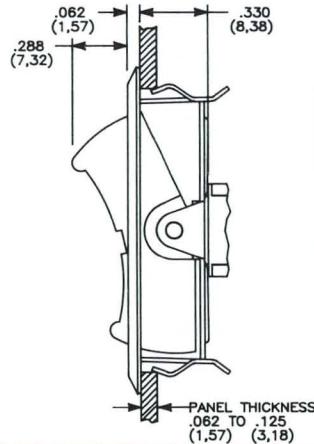
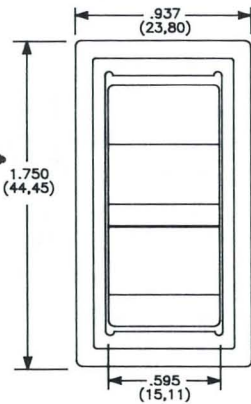
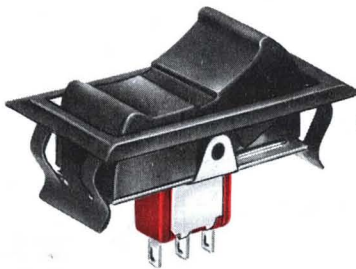


FRAME COLORS	
P/N	FINISH
7645-1	BRIGHT CHROME
7645-2	BLACK (Std.)
7645-3	SATIN CHROME
7645-4	WHITE ENAMEL

PANEL MOUNTING

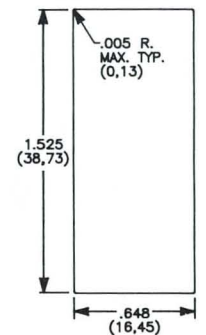


**J19**

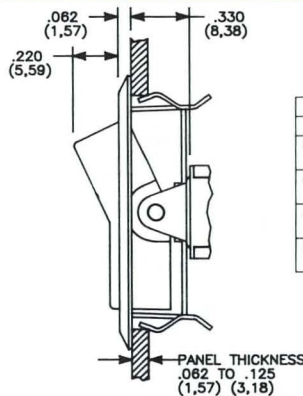
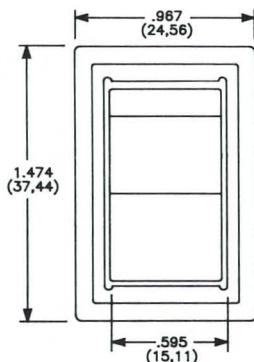
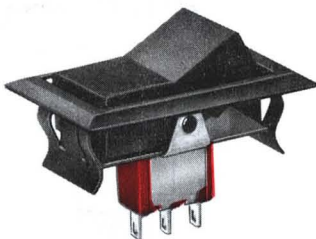


FRAME COLORS	
P/N	FINISH
7810-1	BRIGHT CHROME
7810-2	BLACK (Std.)
7810-3	SATIN CHROME
7810-4	WHITE ENAMEL

PANEL MOUNTING

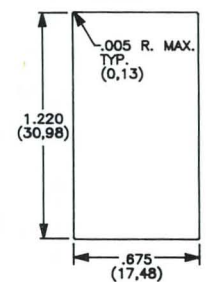


**J37**



FRAME COLORS	
P/N	FINISH
4454-1	BRIGHT CHROME
4454-2	BLACK (Std.)
4454-3	SATIN CHROME
4454-4	WHITE ENAMEL

PANEL MOUNTING





ACT./MTG. STYLE

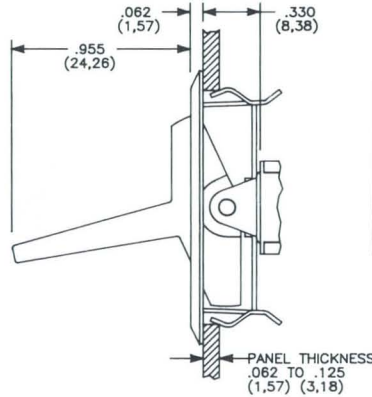
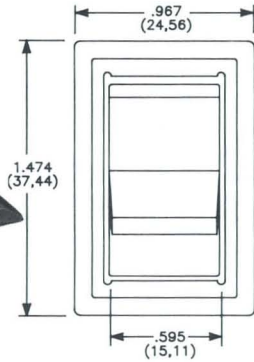


**ACTUATOR OPTIONS FOR REAR MOUNTING (cont'd.)**

Available with Z, C, Z3 or W-W5 terminations.

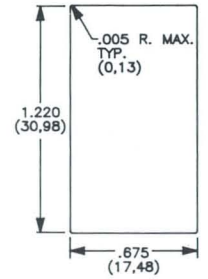
Available actuator colors, see page A-15. Select frame colors below.

**J47**

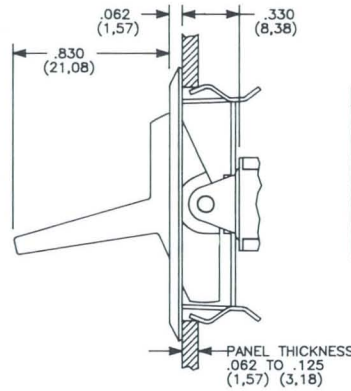
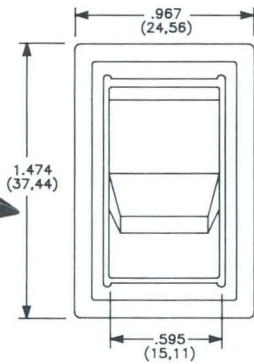
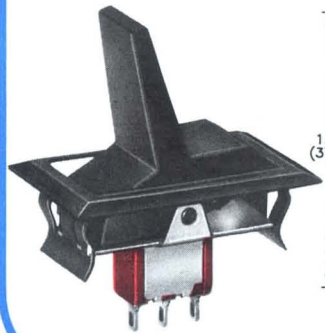


FRAME COLORS	
P/N	FINISH
4454-1	BRIGHT CHROME
4454-2	BLACK (Std.)
4454-3	SATIN CHROME
4454-4	WHITE ENAMEL

PANEL MOUNTING

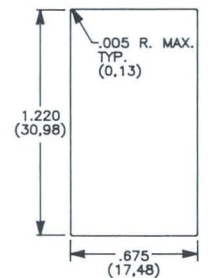


**J57**

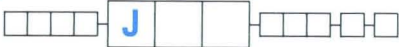


FRAME COLORS	
P/N	FINISH
4454-1	BRIGHT CHROME
4454-2	BLACK (Std.)
4454-3	SATIN CHROME
4454-4	WHITE ENAMEL

PANEL MOUNTING



ACT./MTG. STYLE



**ACTUATOR OPTIONS FOR P.C. MOUNTING**

(shown on next page)

Available actuator options for P.C. mounted switches are shown on next page. Select actuator color from chart on page A-15. Chart below shows available actuator / termination combinations. Note that some permissible combinations may lack clearance between actuator and P.C. board, and care must be exercised to accommodate this condition.

AVAILABLE ACTUATOR / TERMINATION COMBINATIONS	
ACTUATOR OPTIONS	P.C. TERMINATIONS AVAILABLE
J1, J2	A, AV2, V3, V4, V5*, V6-V9
J3, J4, J5	AV2*, V3, V4, V5*, V6-V9
J50, J60, J90	A*, AV2, V3-V9

\* Actuator may lack clearance with P.C. board.

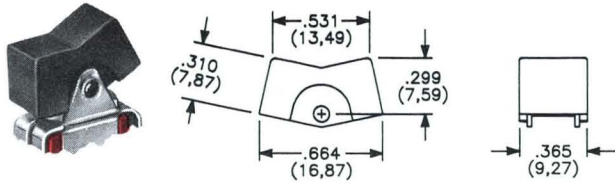
ACT./MTG. STYLE



**ACTUATOR OPTIONS FOR P.C. MOUNTING**

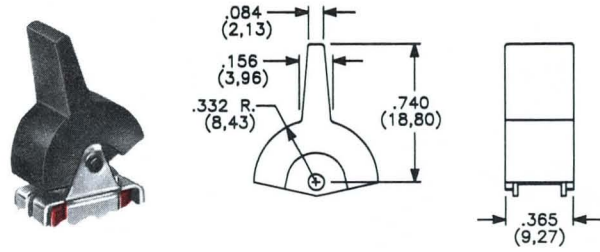
See page A-23 for available actuator/termination combinations.  
Available actuator colors, see page A-15.

**J1**



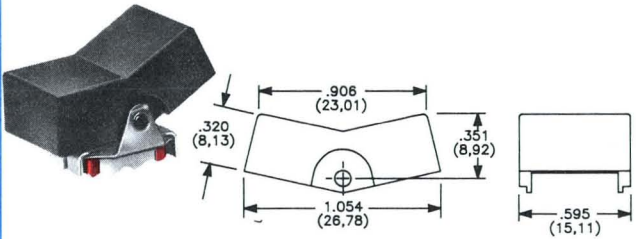
ACTUATOR P/N 7602

**J2**



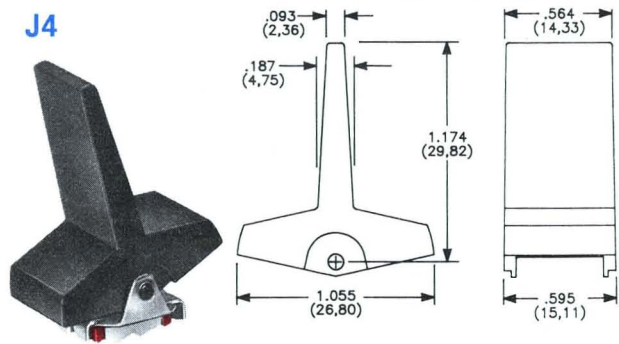
ACTUATOR P/N 7605

**J3**



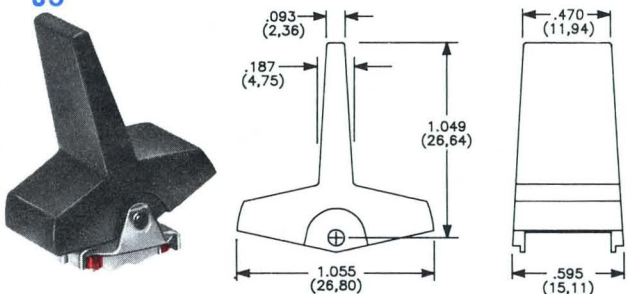
ACTUATOR P/N 7666

**J4**



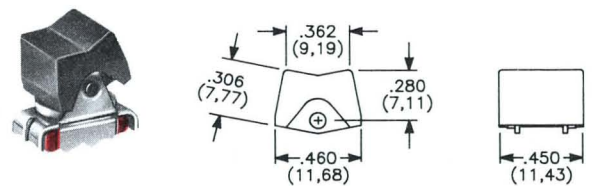
ACTUATOR P/N 7733

**J5**



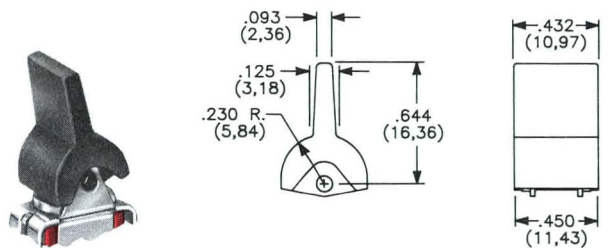
ACTUATOR P/N 7912

**J50**



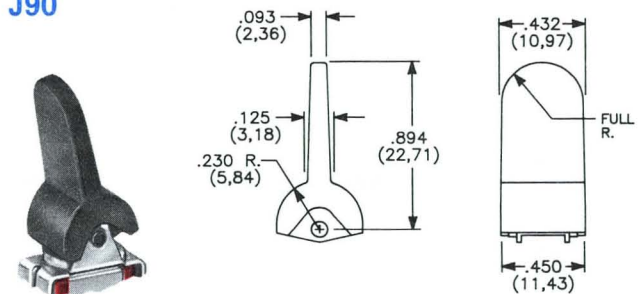
ACTUATOR P/N 7870

**J60**



ACTUATOR P/N 7868

**J90**



ACTUATOR P/N 7904



**L.E.D. INFORMATION FOR J52- J62- J92 ACTUATOR OPTIONS**

(See pages A-19 thru A-21 for option illustrations)

L.E.D.'s are not supplied with J52, J62, J92 actuator options. Below are recommended dimensions, sources and typical ratings:

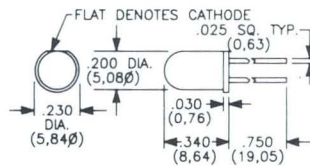
**SUGGESTED L.E.D. LAMP MODELS AND SUPPLIERS**

GEN. INSTRUMENT	XCITON	SIEMENS CORP.
MV5054-Red	XC556-Red	LD41-Red
MV5253-Green	XC556G-Green	LD57-Green
MV5353-Yellow	XC556Y-Yellow	LD55-Yellow

**TYPICAL L.E.D. RATINGS**

Forward Voltage	Current	Power	Max. Reverse Voltage
2.3V	50mA	100mW	5V

**RECOMMENDED L.E.D. DIMENSIONS**



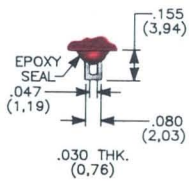
**TERMINATIONS**



**TERMINATIONS**

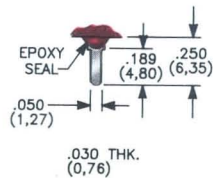
Note: Switches with Z, C, Z3 or W-W5 terminations have panel mounting bracket, shown pages A-14 & A-15.

**Z (Std.)**



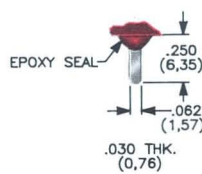
'Q' Contact Material Std.  
Not avail. with 'K', 'L' or 'M' Contact Material.

**C**



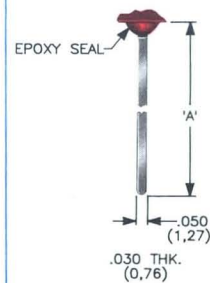
'Q' Contact Material Std.

**Z3 QUICK CONNECT**



Mating quick connector available; order part no. 5301.  
'Q' Contact Material Std.  
Not avail. with 'K', 'L' or 'M' Contact Material.

**W-W5 WIRE-WRAP**



OPTION CODE	DIM. 'A'
W	.750 (19.05)
W1	.964 (24.48)
W3	.425 (10.80)
W4	1.062 (26.97)
W5	1.305 (33.15)

Wire-Wrap is a registered trademark of the Gardner-Denver Company.

'B' Contact Material Std.

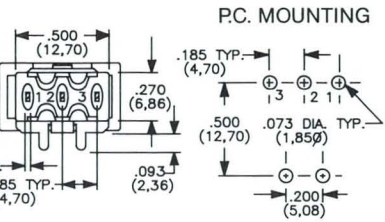
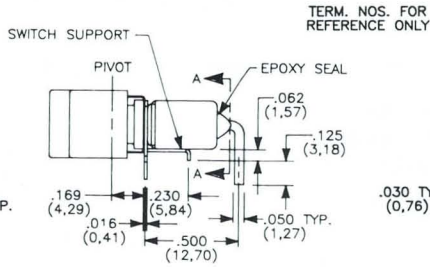
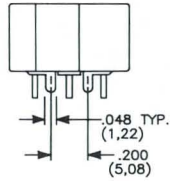
**A**

TERMINATIONS



**TERMINATIONS (cont'd.)**

**A**



**SPDT**

Note: P.C. pattern must clear switch support legs. For available actuator options, see chart, page A-23.

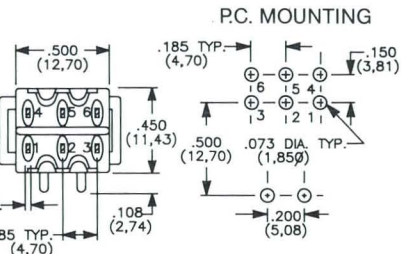
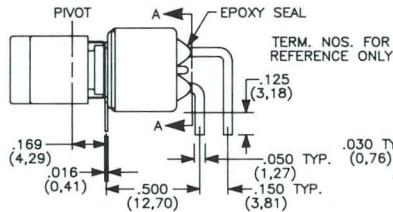
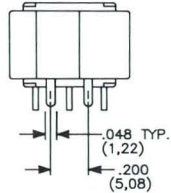
Actuator shown in POS.1.

'B' Contact Material Std.

Term. bend radii mfg. option.

SECTION A-A

**A**



**DPDT**

For available actuator options, see chart, page A-23

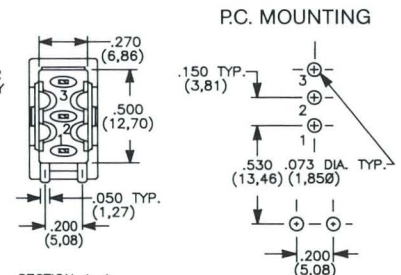
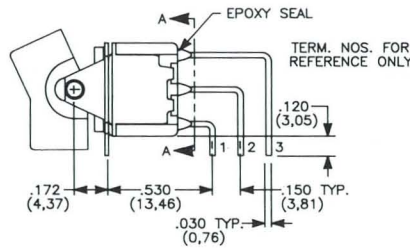
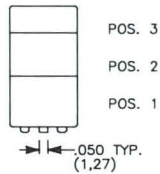
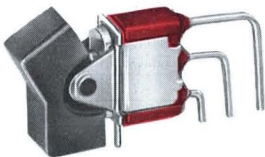
Actuator shown in POS.1.

'B' Contact Material Std.

Term. bend radii mfg. option.

SECTION A-A

**V5**



**SPDT**

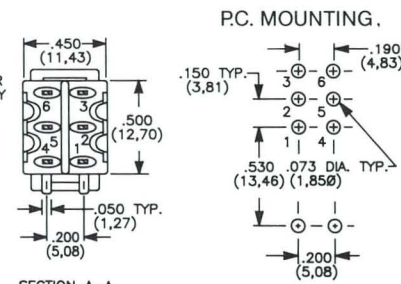
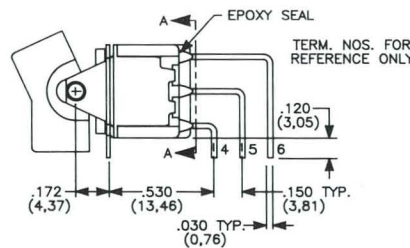
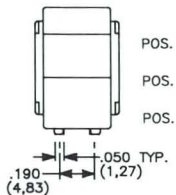
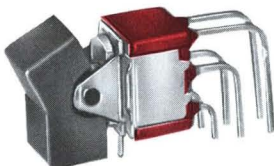
For available actuator options, see chart, page A-23

'B' Contact Material Std.

Term. bend radii mfg. option.

SECTION A-A

**V5**



**DPDT**

For available actuator options, see chart, page A-23

'B' Contact Material Std.

Term. bend radii mfg. option.

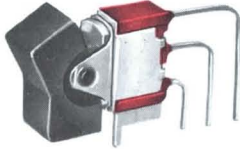
SECTION A-A



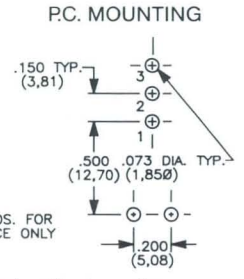
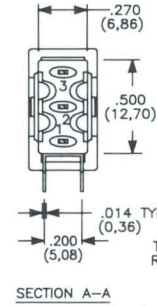
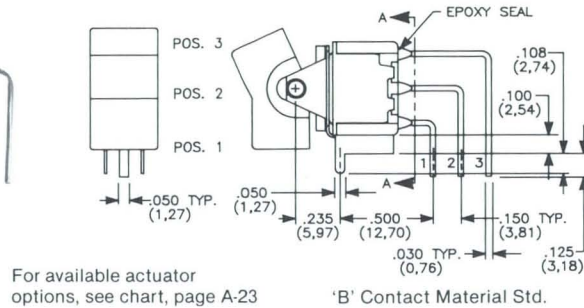


**TERMINATIONS (cont'd.)**

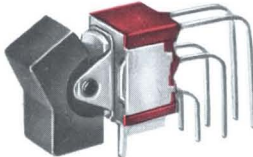
**AV2**



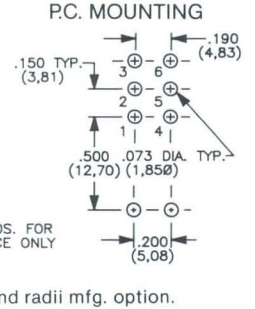
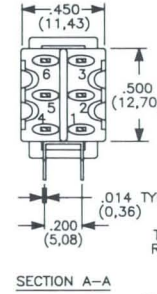
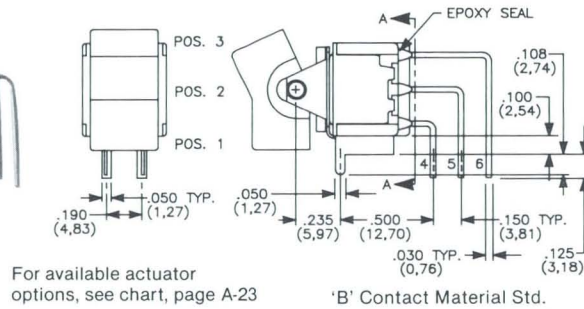
**SPDT**



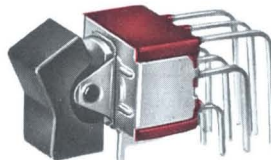
**AV2**



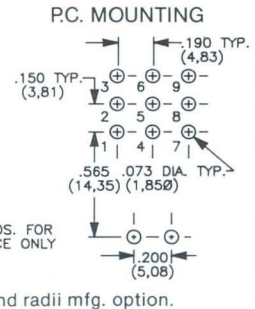
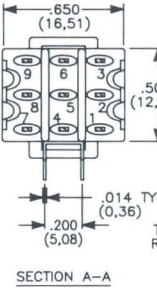
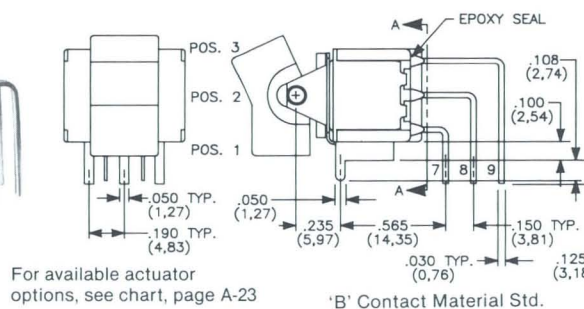
**DPDT**



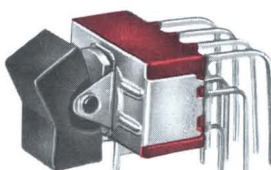
**AV2**



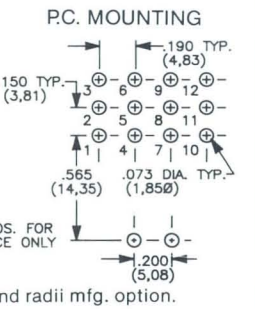
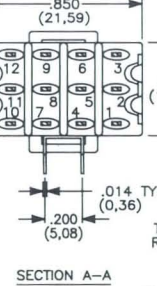
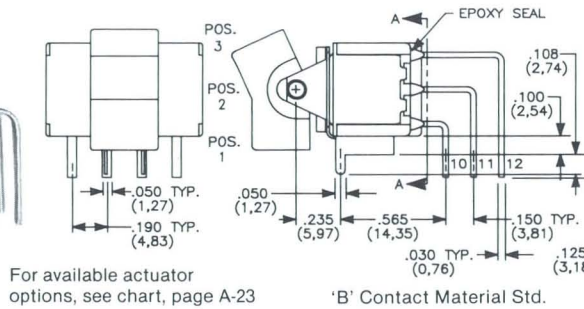
**3PDT**



**AV2**

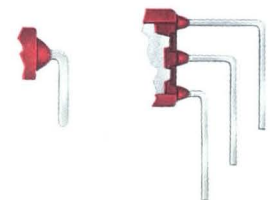


**4PDT**

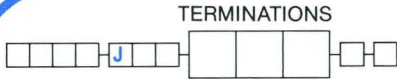


**EXTENDED TERMINAL OPTION**

Switches with A or AV2 terminations may be ordered with extended terminals, as shown. This provides easier installation into P.C. boards. To order, specify 'Extended Terminals' in word form after order number.

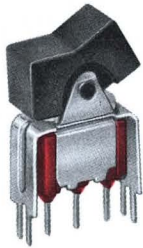


A

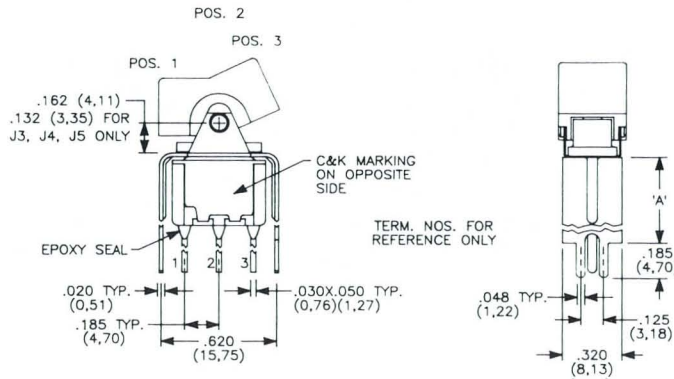


## TERMINATIONS (cont'd.)

### V3-V4-V9

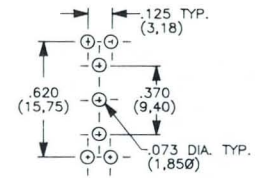


SPDT



'B' Contact Material Std.

### PC MOUNTING

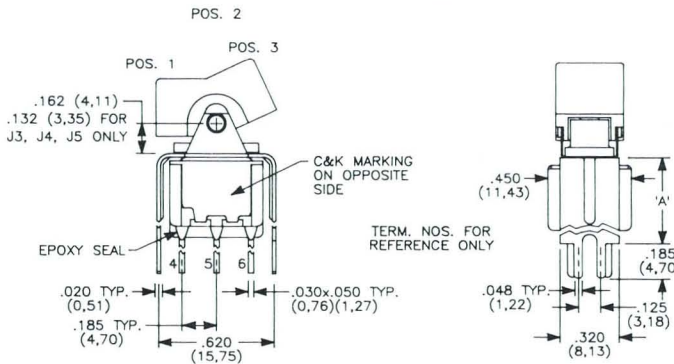


OPTION CODE	DIM. 'A'
V3	.460 (11,68)
V4	.630 (16,00)
V9	1.150 (29,21)

### V3-V4-V9

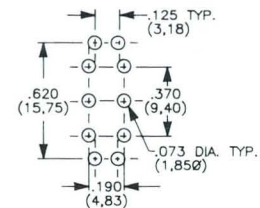


DPDT



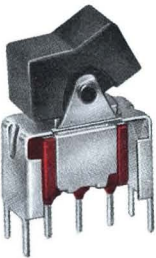
'B' Contact Material Std.

### PC MOUNTING

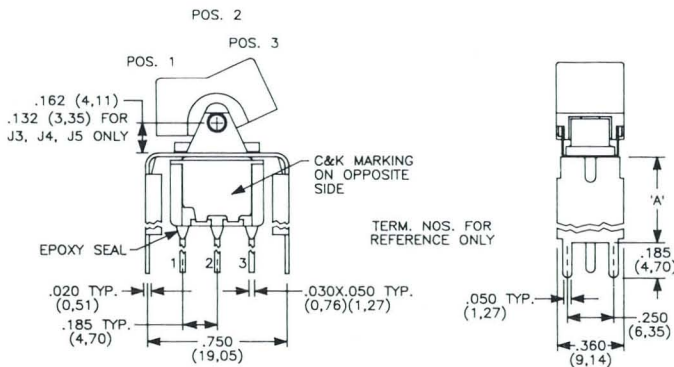


OPTION CODE	DIM. 'A'
V3	.460 (11,68)
V4	.630 (16,00)
V9	1.150 (29,21)

### V6-V7-V8

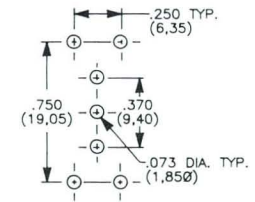


SPDT



'B' Contact Material Std.

### PC MOUNTING

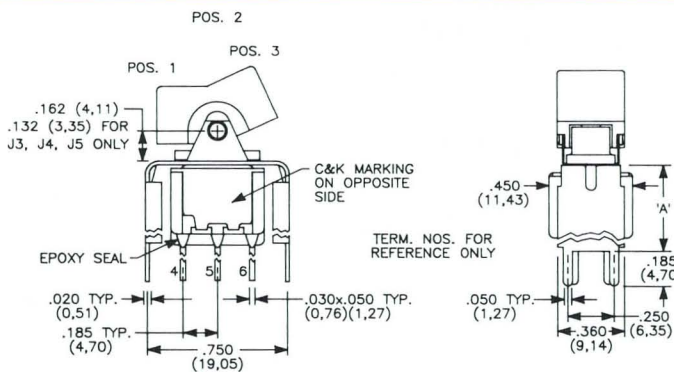


OPTION CODE	DIM. 'A'
V6	.460 (11,68)
V7	.630 (16,00)
V8	.953 (24,21)

### V6-V7-V8

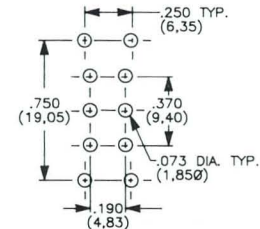


DPDT



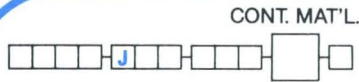
'B' Contact Material Std.

### PC MOUNTING



OPTION CODE	DIM. 'A'
V6	.460 (11,68)
V7	.630 (16,00)
V8	.953 (24,21)





**NEW TIN-LEAD TERMINATIONS**

**CONTACT MATERIALS**

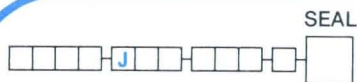
- B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Std. with all termination options exc. Z, C, Z3)
- Q** END CONTACTS: Coin silver, silver plated.  
CENTER CONTACT & ALL TERMINALS: Brass, silver plated.  
RATING: 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC. (Std. with termination options Z, C, Z3)
- G** END CONTACTS: Coin silver, with gold plate over nickel plate.  
CENTER CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC.

**NEW TIN-LEAD PLATED TERMINATIONS**

- K** CONTACTS: Brass, with gold plate over nickel plate (same as B contact material).  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Available with C, W-W5, A, AV2, V3-V9 termination options only)
- M** END CONTACTS: Coin silver, silver plated. ] (same as Q contact material).  
CENTER CONTACT: Brass, silver plated. ]  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC. (Available with C, W-W5, A, AV2, V3-V9 termination options only)
- L** END CONTACTS: Coin silver, with gold plate over nickel plate. ] (same as G contact material).  
CENTER CONTACT: Brass, with gold plate over nickel plate. ]  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC. (Available with C, W-W5, A, AV2, V3-V9 termination options only)

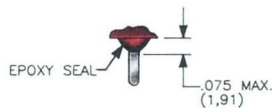
**Note:** G and L contact materials are electrically equivalent to B, Q, K and M contact materials and can be used where either dry circuit \* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. These options should be specified where UL or CSA listing is required on a switch used in a dry circuit application.

\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.

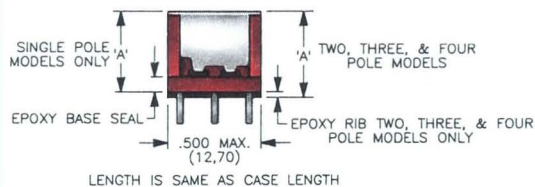


**SEALING**

**E (Std.)**



**I**



POLES	DIM. 'A'
SP	.410 (10,41)
DP	.440 (11,18)
3P	.505 (12,83)
4P	.505 (12,83)

Available only with Z, C, Z3 or W-W5 terminations.

**A**

**HOW TO ORDER**

Complete the order number below by selecting the desired model no., actuator/mounting style, termination, contact material and terminal sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Write actuator color and, where applicable, frame color in word form after order number.

(Example: 7211-J26-Z  -B-E) with white actuator and blue frame.  
If no color is specified, black will be supplied.

Note: all terminations are not available with all mounting styles, see ACTUATOR/MOUNTING STYLE option section.

L.E.D.'s not furnished with J52, J62 or J92 actuator options.

Z terminations, Q contact material and E epoxy terminal seal are supplied if no options are specified.

UL listed with all options when ordered with model nos. U11 thru U415 and G, Q, L or M contact material. CSA listing available on all UL listed switches, specify 'with CSA listing' in word form after order number. Z termination option CSA listed only when ordered with I epoxy base seal.

Note: Custom actuator markings and legends available, see inside front cover and consult factory.

**HARDWARE:** Two mounting screws, two nuts, two standoffs for 1/8 in. thk. panel and two lockwashers are supplied standard on panel mounted switches. Hardware for optional panel thicknesses available. See chart on page A-31 to determine correct standoff length and part no. Write part description and part no. in word form after order number. If nothing is specified, standard hardware will be supplied. Hardware is also available separately, see HARDWARE section, pages A-31 and A-32.

**UNAVAILABLE OPTION COMBINATIONS**

<u>Model or Option</u>	<u>Options Not Available</u>
U11 thru U415	B, K*
A, V5	J3, J4, J5, J10
A, AV2, V3-V9	I
Z, Z3	K, L, M

\*UL listed switches must be ordered with G, Q, L or M contact material because UL considers for listing only those components suitable for power applications.

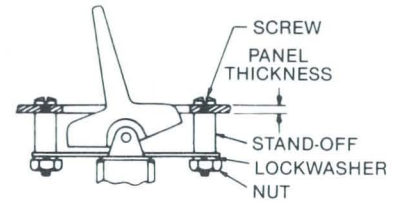




**AVAILABLE HARDWARE**

Hardware shown below and on next page is available separately. To order, write part nos., descriptions and colors in word form. Mounting hardware for panel mounted switches consists of two screws, two nuts, two standoffs and two lockwashers per switch. See chart.

MOUNTING HARDWARE			
HARDWARE P/N	PANEL THK.	STANDOFF LENGTH	ACTUATOR OPTION
7611-01	1/16 in. (1,59)	.295 (7,49)	J1, J2, J54, J64, J94
7611-02	3/32 in. (2,38)	.264 (6,71)	
7611-03 (Std.)	1/8 in. (3,18)	.233 (5,92)	
7706-01	1/16 in. (1,59)	.295 (7,49)	J3
7706-02	3/32 in. (2,38)	.264 (6,71)	
7706-03 (Std.)	1/8 in. (3,18)	.233 (5,92)	
7750-01	1/16 in. (1,59)	.375 (9,53)	J4, J5
7750-02	3/32 in. (2,38)	.344 (8,74)	
7750-03 (Std.)	1/8 in. (3,18)	.312 (7,92)	
7707-01	1/16 in. (1,59)	.295 (7,49)	J10
7707-02	3/32 in. (2,38)	.264 (6,71)	
7707-03 (Std.)	1/8 in. (3,18)	.233 (5,92)	



MATERIALS: SCREWS, NUTS, LOCKWASHERS- Stainless Steel.  
STANDOFFS- Aluminum or nylon.

**FRAMES**

Frames for the following actuator options are available separately. Chart shows available colors for nylon frames. For illustrations and dimensions of parts not shown, see pages noted. Nylon frame finish: matte.

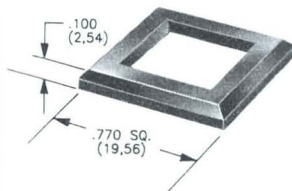
FRAME P/N	FITS ACTUATOR OPTION	SEE PAGE NO.	MATERIAL
4591	J16, J26	A-18	Nylon
7890	J51, J61, J91	A-19, A-20, A-21	Nylon
8058	J52, J62, J92	A-19, A-20, A-21	Nylon
7645-*	J11, J21	A-22	Spring Steel
7810-*	J19	A-22	Spring Steel
4454-*	J37, J47, J57	A-22, A-23	Spring Steel

\*For complete part nos. and available colors, see FRAME COLOR CHARTS pages A-22, A-23.

FRAME COLORS (NYLON FRAMES)	
1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

**SQUARE FRAME**

**NEW**

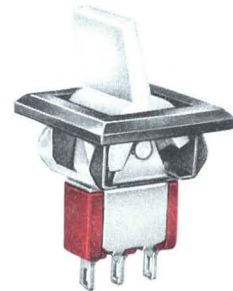


Matte finish P/N 4867  
Gloss finish P/N 4868

Square frames available separately or installed on switch.

To order separately: specify 4 digit part number for frame (matte finish—P/N 4867, gloss finish—P/N 4868) and desired color in word form (Example: P/N 4867 RED). If no color is specified, black will be supplied.

To order switches with frames installed: specify switch order number, followed by 4 digit part number for frame. Write desired frame color and actuator color in word form (Example: 7201-J61-Z-Q-E with WHITE ACTUATOR and BLUE FRAME P/N 4867). If no colors are specified, black will be supplied standard.



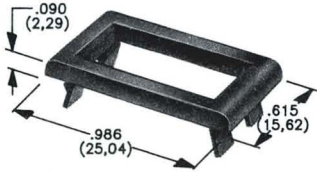
SWITCH SERIES	ACTUATOR OPTIONS AVAIL. WITH SQ. FRAME
7000	J50, J51, J60, J61, J90, J91

(cont'd. on next page)

**A**

**SNAP-IN FRAMES**

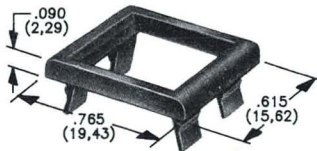
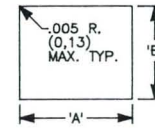
Frames below snap into panel opening and are independent from switch mounting. They are recommended for P.C. mounted switches with A, AV2 or V3 - V9 terminations. Accurate positioning of the P.C. mounted switch relative to the panel opening is necessary to provide proper clearance between the actuator and the frame. See charts for correct part no., panel thickness and available colors. Frame finish: matte; material, nylon.



FOR J1, J2 ACTUATORS

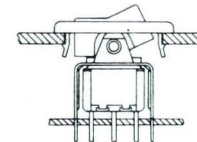
FRAME PART NO.	PANEL THICKNESS	DIM. 'A'	DIM. 'B'
4529	.047 (1,19)	.797-.803 (20,24-20,40)	.495-.505 (12,57-12,83)
4527	.062 (1,57)		
4528	.090 (2,29)		
4526	.125 (3,18)		

**MOUNTING INFORMATION**



FOR J50, J60, J90 ACTUATORS

FRAME PART NO.	PANEL THICKNESS	DIM. 'A'	DIM. 'B'
4325	.047 (1,19)	.595-.605 (15,11-15,37)	.495-.500 (12,57-12,70)
4326	.062 (1,57)		
4327	.090 (2,29)	.620-.625 (15,75-15,88)	.495-.500 (12,57-12,70)
4328	.125 (3,18)		

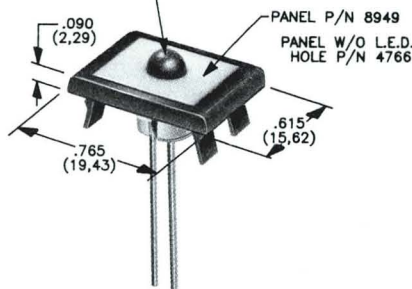


FRAME COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		

**INSERTS FOR SNAP-IN FRAMES**

Above frames (P/N 4325 thru 4328) are also available with insert which accepts L.E.D.'s for indicator light assembly. Order insert separately from frame, specify P/N 8949 and desired color in word form. Blank panel, without hole for L.E.D. also available, P/N 4766. For L.E.D. specifications and recommended dimensions, see page A-25.

L.E.D. (.200 DIA. (5,08)) SNAPS SECURELY INTO INSERT (P/N 8949). HEIGHT DEPENDS ON L.E.D. USED.

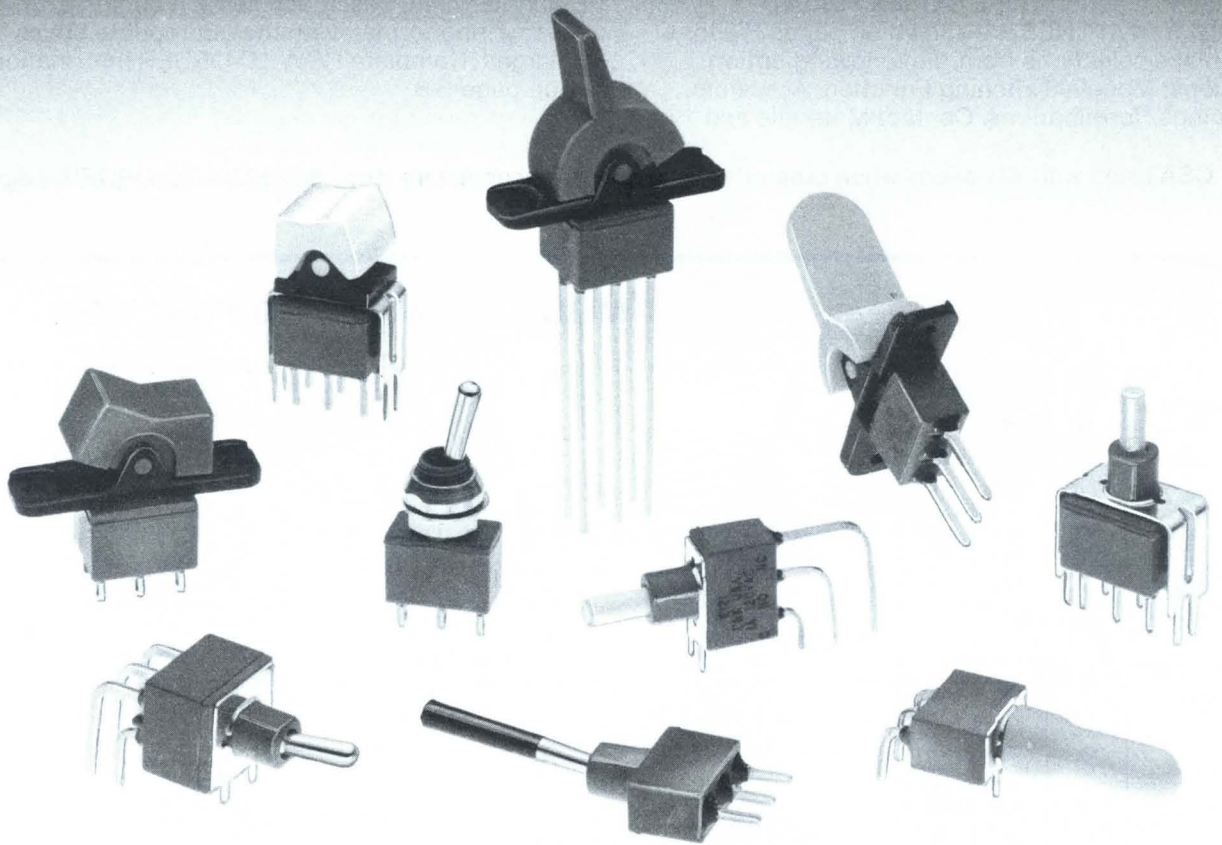


INSERT COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		



# E/E010/E020 SERIES SEALED SWITCHES

B



## SECTION B INDEX

E Series Sealed Toggle Switches .....	B-2 thru B-6
E Series Sealed Anti-Static Rocker & Lever Handle Switches .....	B-7 thru B-12
E010 Series Sealed Momentary Pushbutton Switches .....	B-13 thru B-17
E020 Series Sealed Snap-Acting Momentary Pushbutton Switches .....	B-18 thru B-22





## ACTUATORS

\*\* Subtract .100 (2,54) from all actuator lengths for Y bushing.

### S

Std. with Z, C, Z3 or W- W5 terminations.

### M

Std. with A, AV2, R, R2 or V30-V90 terminations.

### L3 PLASTIC

Add actuator color in word form after order number. If no color is specified, black will be supplied. Finish: gloss.

1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

## BUSHINGS

### D1 (Std.)

Internal o-ring actuator seal std.

### Y

SPDT model shown. Also available on DPDT models. Not available with A, AV2, R, R2 or V30-V90 terminations. Internal o-ring actuator seal std. Hardware: One dress nut (P/N 7807), one hex nut and lockwasher supplied standard.

## TERMINATIONS

### Z

'B' Contact Material Std. Not avail. with 'K', 'L' or 'M' Contact Material.

### C

'B' Contact Material Std.

### Z3 QUICK CONNECT

Mating quick connector available; order part no. 5301. 'B' Contact Material Std. Not avail. with 'K', 'L' or 'M' Contact Material.

### W-W5 WIRE WRAP

Wire-Wrap is a registered trademark of the Gardner-Denver Company. 'B' Contact Material Std.

OPTION CODE	DIM. 'A'
W	.750 (19,05)
W1	.964 (24,48)
W3	.425 (10,80)
W4	1.062 (26,97)
W5	1.305 (33,15)

## P.C. MOUNTING

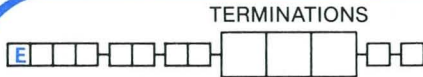
### R

SPDT Actuator shown in POS.1.

'B' Contact Material Only Available.

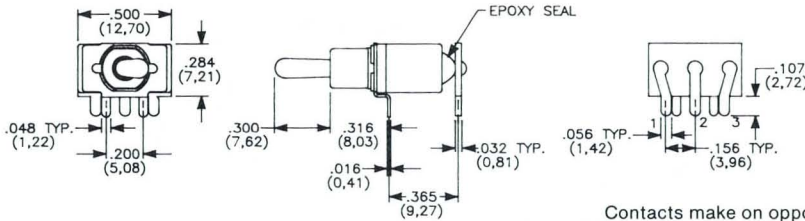
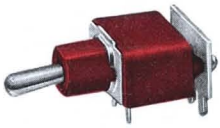
Contacts make on same side actuator thrown.

TERM. NOS. FOR REFERENCE ONLY

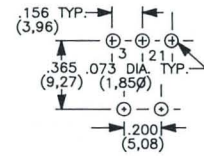


**TERMINATIONS (cont'd.)**

**R2**



**P.C. MOUNTING**

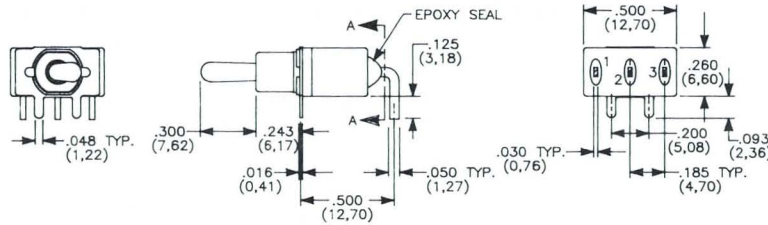


TERM. NOS. FOR REFERENCE ONLY

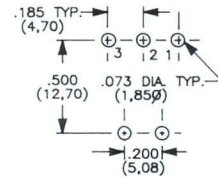
**SPDT**

Actuator shown in POS.1. 'B' Contact Material Only Available. Contacts make on opposite side actuator thrown.

**A**



**P.C. MOUNTING**

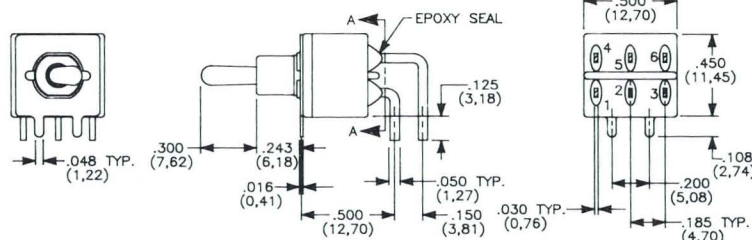
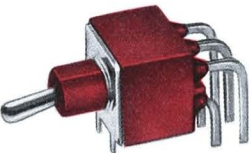


TERM. NOS. FOR REFERENCE ONLY

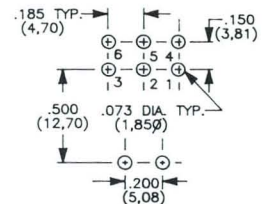
**SPDT**

Actuator shown in POS.1. 'B' Contact Material Std. Term. bend radii mfg. option.

**A**



**P.C. MOUNTING**

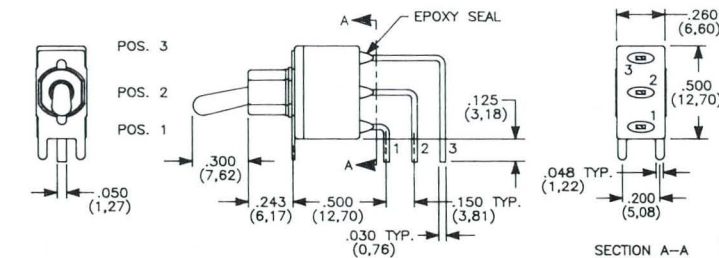
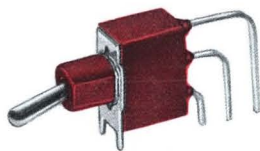


TERM. NOS. FOR REFERENCE ONLY

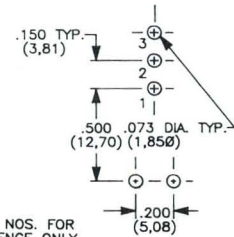
**DPDT**

Actuator shown in POS.1. 'B' Contact Material Std. Term. bend radii mfg. option.

**AV2**



**P.C. MOUNTING**

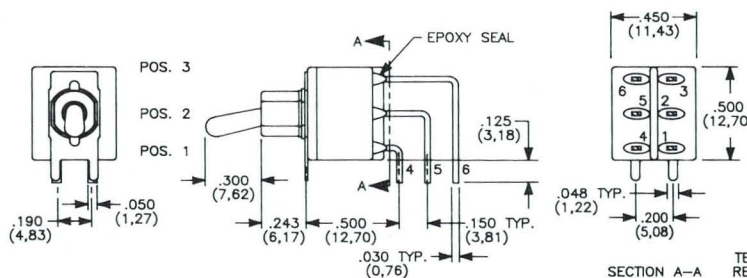
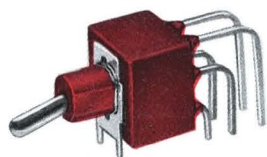


TERM. NOS. FOR REFERENCE ONLY

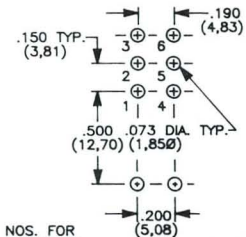
**SPDT**

Term. bend radii mfg. option.

**AV2**



**P.C. MOUNTING**



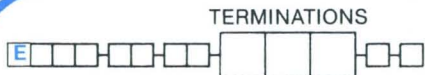
TERM. NOS. FOR REFERENCE ONLY

**DPDT**

Term. bend radii mfg. option.

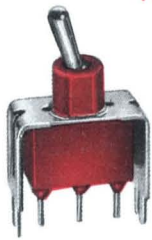
'B' Contact Material Std.



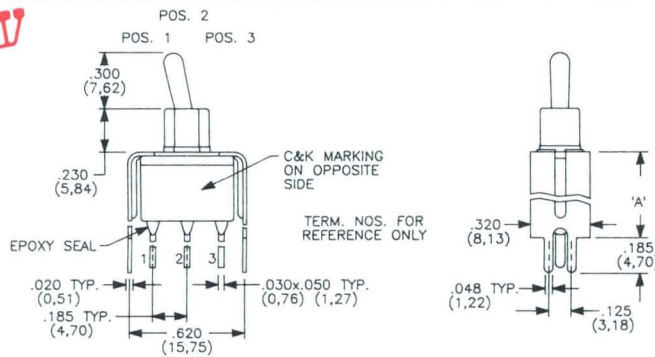


## TERMINATIONS (cont'd.)

V30-V40-V90 **NEW**

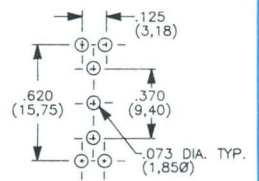


SPDT



'B' Contact Material Std.

P.C. MOUNTING

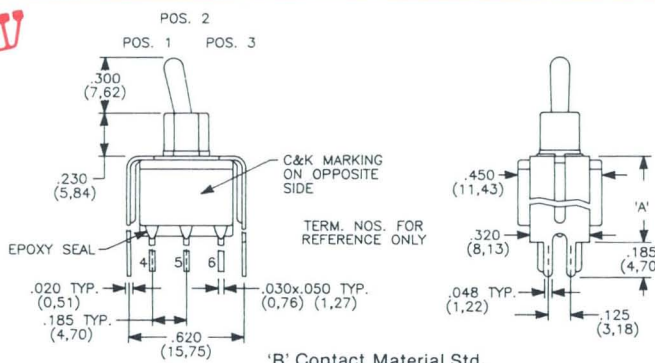


OPTION CODE	DIM. 'A'
V30	.460 (11,68)
V40	.630 (16,00)
V90	1.150 (29,21)

V30-V40-V90 **NEW**

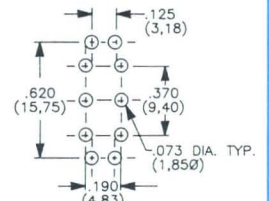


DPDT



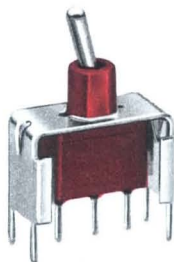
'B' Contact Material Std.

P.C. MOUNTING

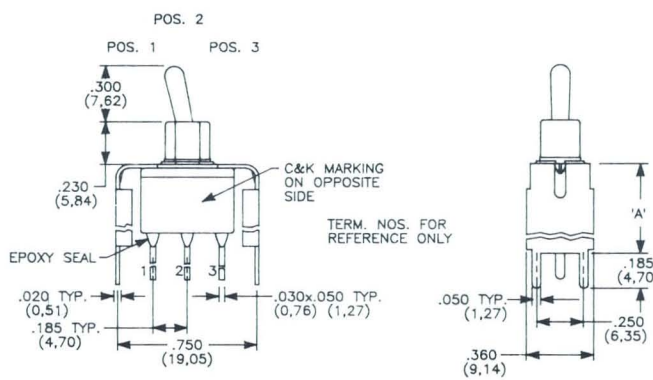


OPTION CODE	DIM. 'A'
V30	.460 (11,68)
V40	.630 (16,00)
V90	1.150 (29,21)

V60-V70-V80

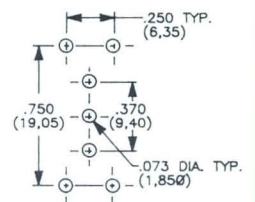


SPDT



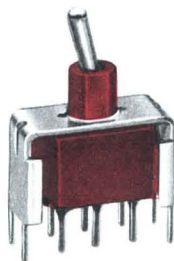
'B' Contact Material Std.

P.C. MOUNTING

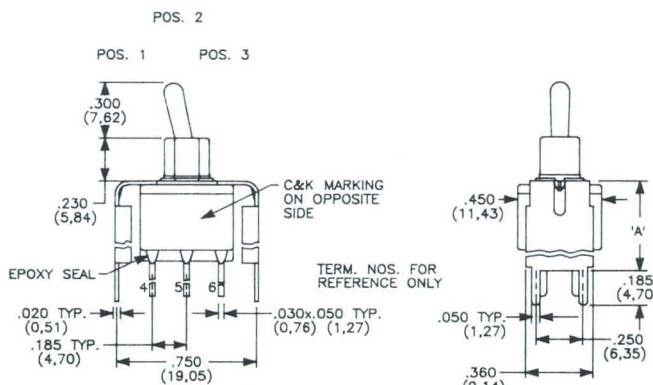


OPTION CODE	DIM. 'A'
V60	.460 (11,68)
V70	.630 (16,00)
V80	.953 (24,21)

V60-V70-V80

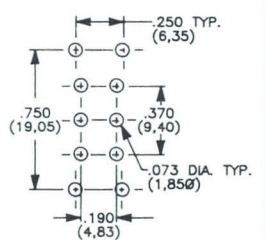


DPDT



'B' Contact Material Std.

P.C. MOUNTING



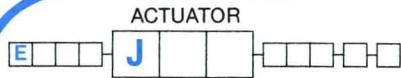
OPTION CODE	DIM. 'A'
V60	.460 (11,68)
V70	.630 (16,00)
V80	.953 (24,21)





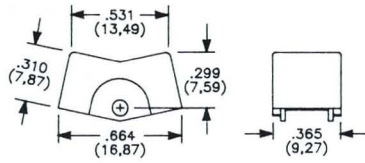


\*Sealed to withstand wave soldering and cleaning processes.



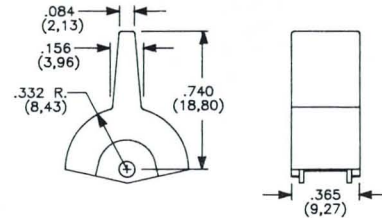
**ACTUATORS**

**J1 (Std.)**



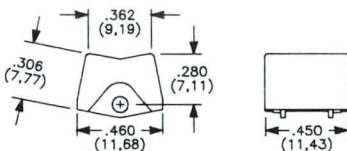
ACTUATOR P/N 7602

**J2**



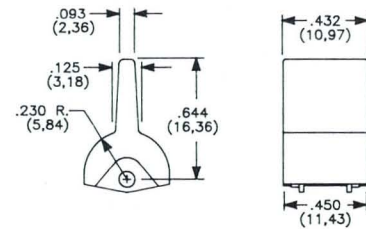
ACTUATOR P/N 7605

**J50**



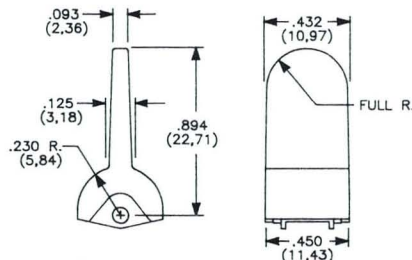
ACTUATOR P/N 7870

**J60**



ACTUATOR P/N 7868

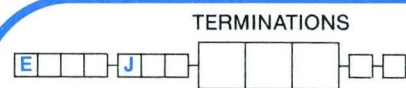
**J90**



ACTUATOR P/N 7904

1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

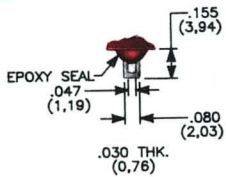
Write actuator color in word form after order number.  
Ex.: E101-J90-AV2-B-E with blue actuator. If no color is specified, black will be supplied. Finish: matte.



**TERMINATIONS**

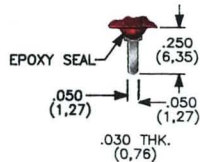
Note: Switches with Z, C, Z3 or W-W5 terminations have panel mounting bracket, shown page B-7.

**Z**



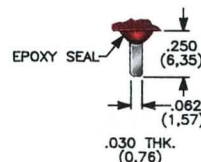
'B' Contact Material Std.  
Not avail. with 'K', 'L' or 'M' Contact Material.

**C**



'B' Contact Material Std.

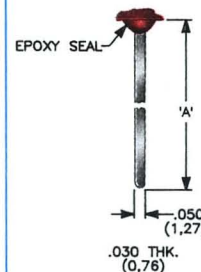
**Z3 QUICK CONNECT**



Mating quick connector available; order part no. 5301.

'B' Contact Material Std.  
Not avail. with 'K', 'L' or 'M' Contact Material.

**W-W5 WIRE-WRAP**



OPTION CODE	DIM. 'A'
W	.750 (19,05)
W1	.964 (24,48)
W3	.425 (10,80)
W4	1.062 (26,97)
W5	1.305 (33,15)

Wire-Wrap is a registered trademark of the Gardner-Denver Company.

'B' Contact Material Std.

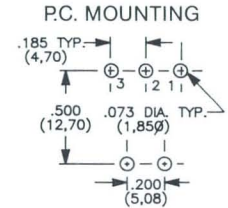
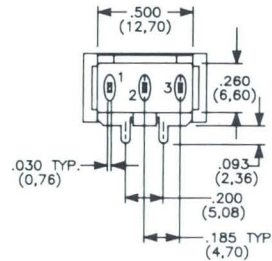
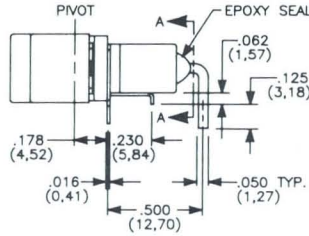
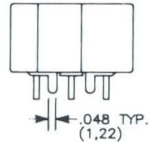


\*Sealed to withstand wave soldering and cleaning processes.



**TERMINATIONS (cont'd.)**

**A**



TERM. NOS. FOR REFERENCE ONLY

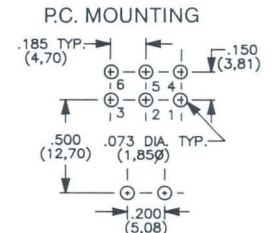
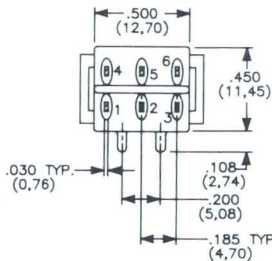
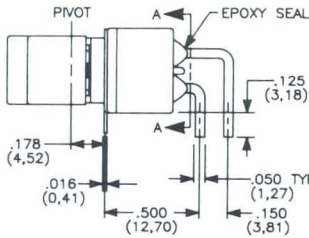
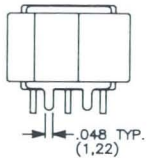
**SPDT**

Actuator shown in POS.1.

'B' Contact Material Std.

Term. bend radii mfg. option.

**A**



TERM. NOS. FOR REFERENCE ONLY

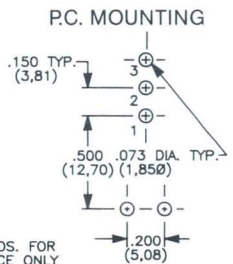
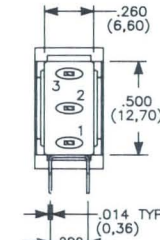
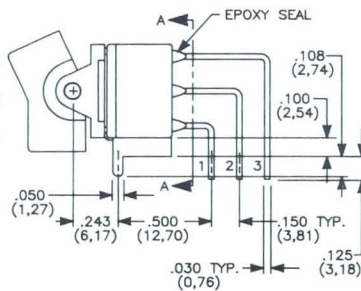
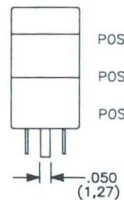
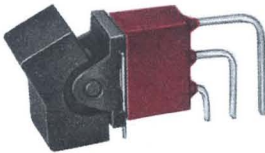
**DPDT**

Actuator shown in POS.1.

'B' Contact Material Std.

Term. bend radii mfg. option.

**AV2**



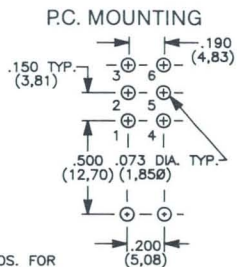
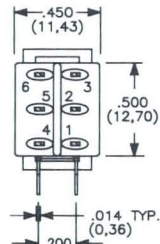
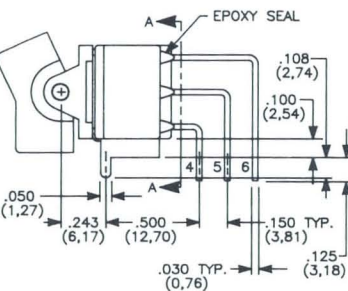
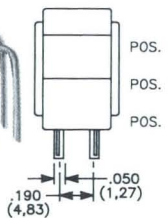
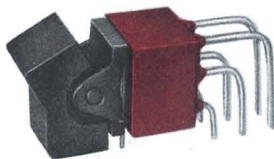
TERM. NOS. FOR REFERENCE ONLY

**SPDT**

'B' Contact Material Std.

Term. bend radii mfg. option.

**AV2**

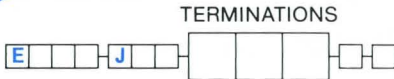


TERM. NOS. FOR REFERENCE ONLY

**DPDT**

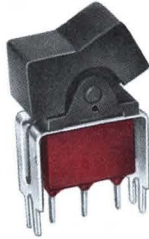
'B' Contact Material Std.

Term. bend radii mfg. option.

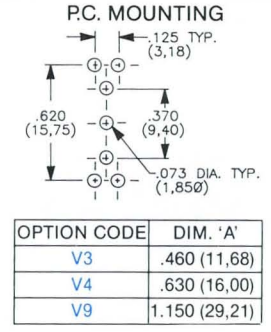
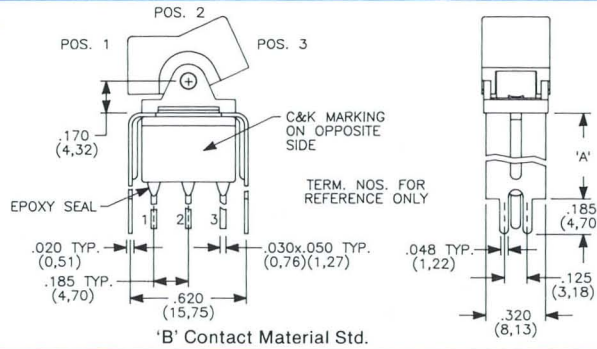


**TERMINATIONS (cont'd.)**

**V3-V4-V9 NEW**



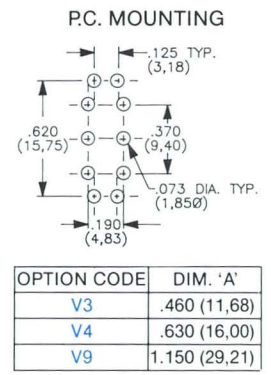
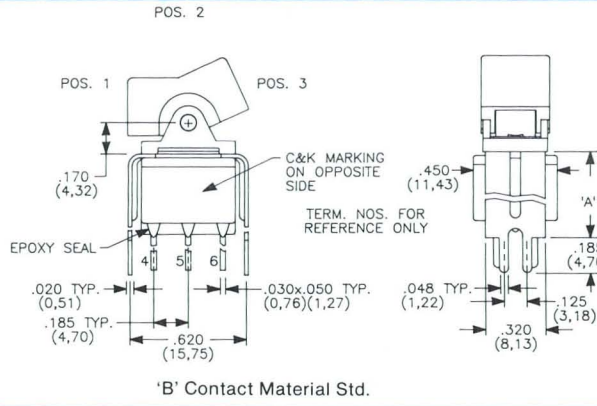
**SPDT**



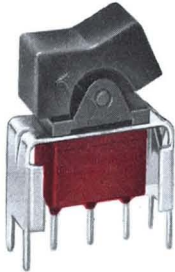
**V3-V4-V9 NEW**



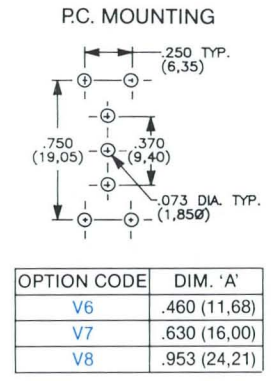
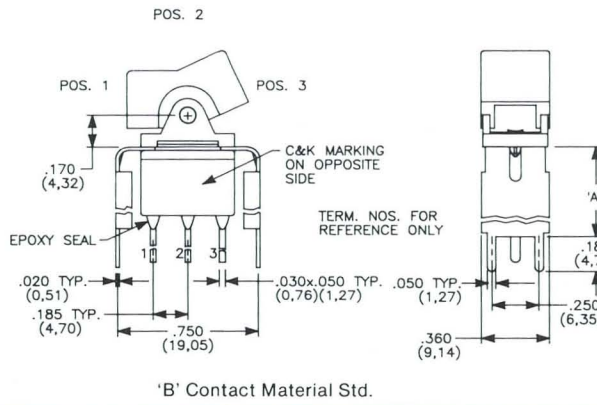
**DPDT**



**V6-V7-V8**



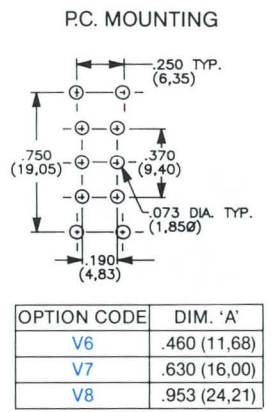
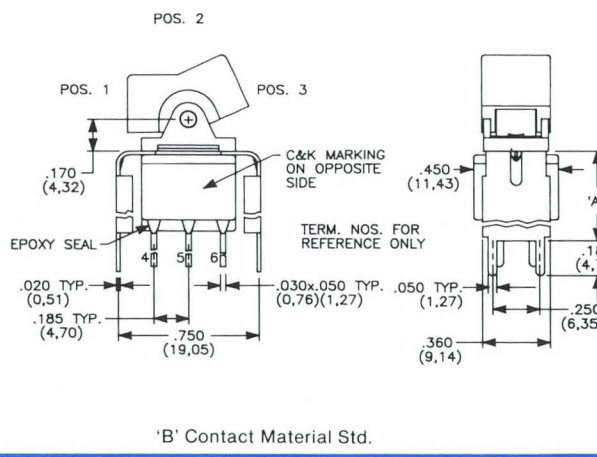
**SPDT**



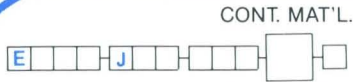
**V6-V7-V8**



**DPDT**







**NEW TIN-LEAD TERMINATIONS**

**CONTACT MATERIALS**

- B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Std. with all termination options)
- Q** END CONTACTS: Coin silver, silver plated.  
CENTER CONTACT & ALL TERMINALS: Brass, silver plated.  
RATING: 7.5 AMPS @ 125 V AC or 28 V DC; 3 AMPS @ 250 V AC (UL/CSA).
- G** END CONTACTS: Coin silver, with gold plate over nickel plate.  
CENTER CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 7.5 AMPS @ 125 V AC or 28 V DC; 3 AMPS @ 250 V AC (UL/CSA).

**NEW TIN-LEAD PLATED TERMINATIONS**

- K** CONTACTS: Brass, with gold plate over nickel plate (same as B contact material).  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Available with C, W-W5, A, AV2, V3-V9 termination options only)
- M** END CONTACTS: Coin silver, silver plated. ] (same as Q contact material)  
CENTER CONTACT: Brass, silver plated.  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 7.5 AMPS @ 125 V AC or 28 V DC; 3 AMPS @ 250 V AC (UL/CSA). (Available with C, W-W5, A, AV2, V3-V9 termination options only)
- L** END CONTACTS: Coin silver, with gold plate over nickel plate. ] (same as G contact material)  
CENTER CONTACT: Brass, with gold plate over nickel plate.  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 7.5 AMPS @ 125 V AC or 28 V DC; 3 AMPS @ 250 V AC (UL/CSA). (Available with C, W-W5, A, AV2, V3-V9 termination options only)

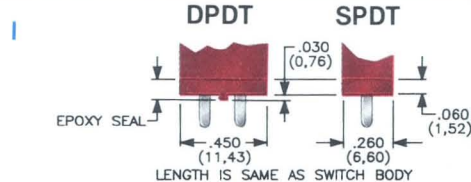
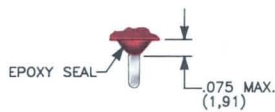
**Note:** G and L contact materials are electrically equivalent to B, Q, K and M contact materials and can be used where either dry circuit\*\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. These options should be specified where UL or CSA listing is required on a switch used in a dry circuit application.

\*\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.



**SEALING**

**E (Std.)**



Available only with Z, C, Z3 or W-W5 terminations.

**HOW TO ORDER**

Complete the order number below by selecting the desired model no., actuator, termination, contact material and terminal sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Write actuator color in word form after order number. (Example: E105-J2-W3-G-E with blue actuator). If no color is specified, black will be supplied.

J1 actuator (black), B contact material and E epoxy terminal seal are supplied if no options are specified. Internal actuator o-ring seal supplied standard.

UL/CSA listed with all options when ordered with G, Q, L or M contact material.

Note: Custom actuator markings and legends available, see inside front cover and consult factory.

**HARDWARE:** Two mounting screws, two nuts, two standoffs for 1/8 in. thk. panel and two lockwashers are supplied standard on panel mounted switches. Hardware for optional panel thicknesses available. See chart, page B-12 to determine correct standoff length and part no. Write part description and part no. in word form after order number. If nothing is specified, standard hardware will be supplied. Hardware is also available separately, see HARDWARE section, page B-12.

**UNAVAILABLE OPTION COMBINATIONS**

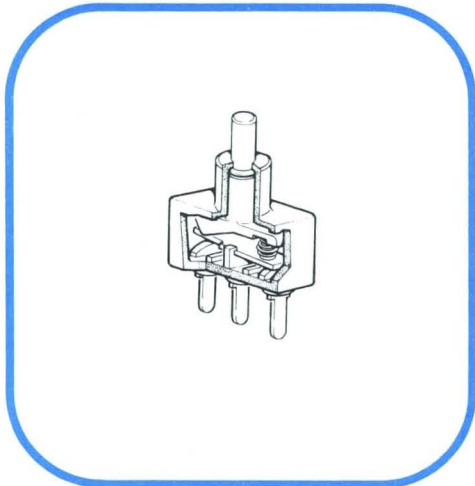
Model or Option	Options Not Available
A, AV2, V3-V9	I
Z, Z3	K, L, M







\* Sealed to withstand wave soldering and cleaning processes.



## SPECIFICATIONS

CONTACT RATING: 4 AMPS @ 125 V AC or 28 V DC.  
 ELECTRICAL LIFE: 40,000 actuations at full load.  
 CONTACT RESISTANCE: Below 20 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.  
 INSULATION RESISTANCE: 10<sup>9</sup> ohms min.  
 DIELECTRIC STRENGTH: 1,000 V RMS min. @ sea level.  
 OPERATING TEMPERATURE: -30°C to 75°C.  
 CAP INSTALLATION FORCE: 10 lbs. max. permissible.

## NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

## MATERIALS

CASE & BUSHING: Glass filled nylon (UL 94V-0).  
 PLUNGER: Glass filled nylon or glass filled polyester, with internal o-ring seal.  
 SWITCH SUPPORT: Brass or steel, electrotin plated.  
 END CONTACTS: Coin silver, silver plated (Q cont. mat'l.).  
 CENTER CONTACT & ALL TERMINALS: Brass, silver plated (Q cont. mat'l.).  
 TERMINAL SEAL: Epoxy.

**B**

## INTRODUCTION

Available options for E010 SERIES SEALED MOMENTARY PUSHBUTTON SWITCHES are shown on pages B-13 thru B-16. Make selections from the following option sections: Model/Switching Function, Plungers, Bushing, Terminations, Contact

Materials and Epoxy Terminal Seal. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page B-16. Available caps and accessories shown on page B-17.

UL/CSA listed with all options when ordered with G, Q, L or M contact material. See HOW TO ORDER, page B-16.

### MODEL/SW. FUNC.

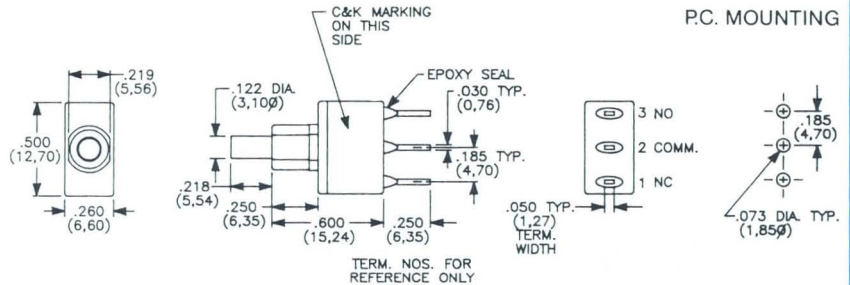


## MODEL / SWITCHING FUNCTION

MODEL NO.	SWITCHING FUNC.	
	POS 1	POS 2
E112	ON	MOM.
CONNECTED TERMINALS	2-1	2-3
SCHEMATIC		
COMM.: 2		
NC: 1		
NO: 3		



SPDT



MODEL SHOWN: E112-S-D1-C-B-E

MOM. = MOMENTARY POSITION

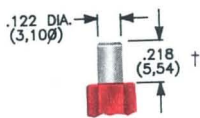
### PLUNGER



## PLUNGERS

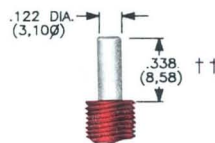
Available caps, see HARDWARE, page B-17.

### S



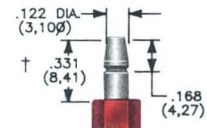
Std. with D1 bushing; shown with D1 bushing.  
 † Subtract .100 (2,54) from plunger length when ordered with Y bushing.

### L LONG



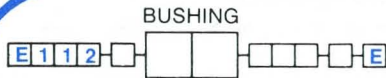
Std. with Y bushing; shown with Y bushing.  
 †† Add .100 (2,54) to plunger length when ordered with D1 bushing.

### M SNAP FITTING



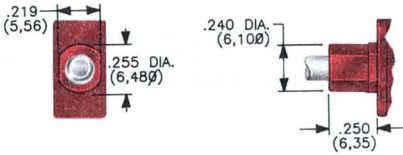
Shown with D1 bushing.  
 † Subtract .100 (2,54) from plunger length when ordered with Y bushing.

**B**



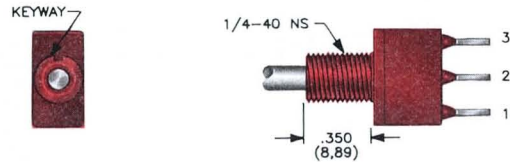
**BUSHINGS**

**D1 (Std.)**



S plunger std. with D1 bushing.  
Internal O-ring actuator seal std.

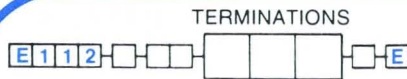
**Y**



L plunger std. with Y bushing.  
Not available with A, AV2, R, R2 or V30-V90 terminations.

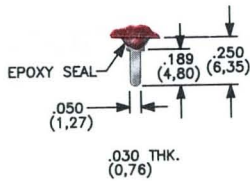
Internal o-ring actuator seal std.

Hardware: One dress nut (P/N 7807), one hex nut and lockwasher supplied standard.



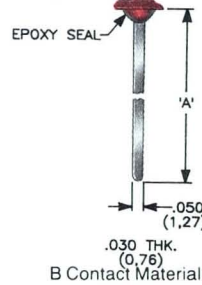
**TERMINATIONS**

**C**



Q Contact Material Std.

**W-W5 WIRE-WRAP**



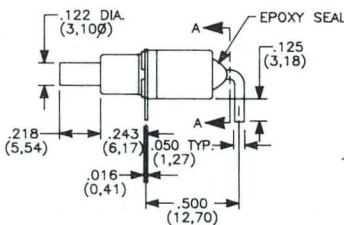
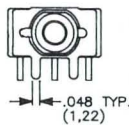
B Contact Material Std.

OPTION CODE	DIM 'A'
W	.750(19,05)
W1	.964(24,48)
W3	.425(10,80)
W4	1.062(26,97)
W5	1.305(33,15)

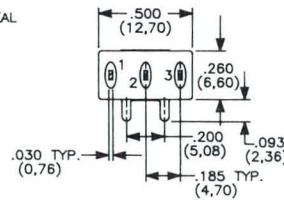
Wire-Wrap is a registered trademark of the Gardner-Denver Company.

**A**

**P.C. MOUNTING**

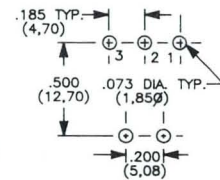


B Contact Material Std.



SECTION A-A

Term. bend radii mfg. option.

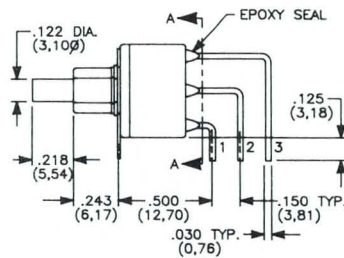
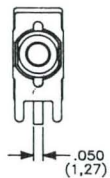
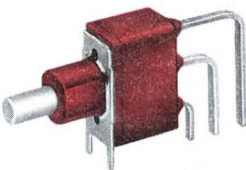


TERM. NOS. FOR REFERENCE ONLY

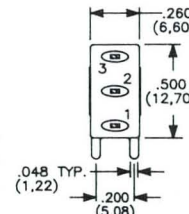
**SPDT**

**AV2**

**P.C. MOUNTING**

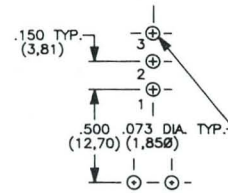


B Contact Material Std.



SECTION A-A

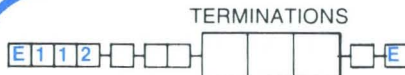
Term. bend radii mfg. option.



TERM. NOS. FOR REFERENCE ONLY

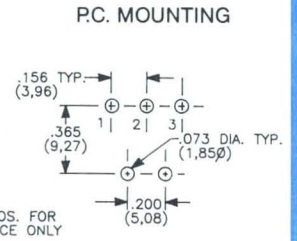
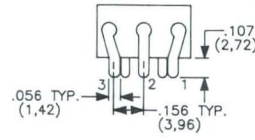
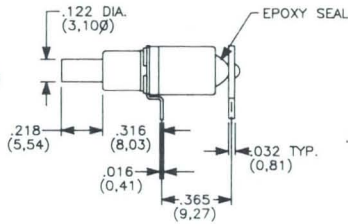
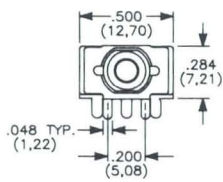
**SPDT**





**TERMINATIONS (cont'd.)**

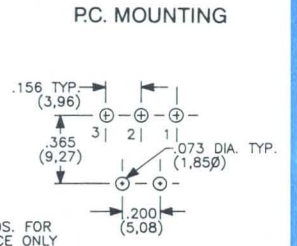
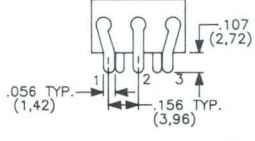
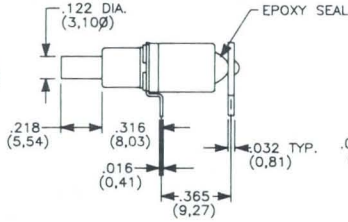
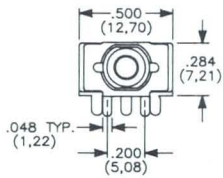
**R**



**SPDT**

B Contact Material Only Available.

**R2**

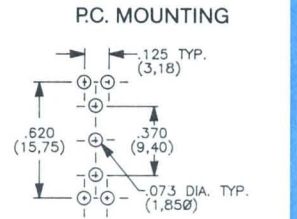
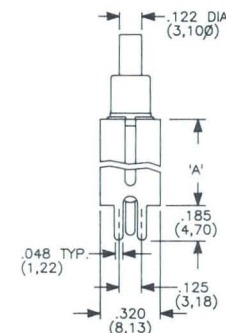
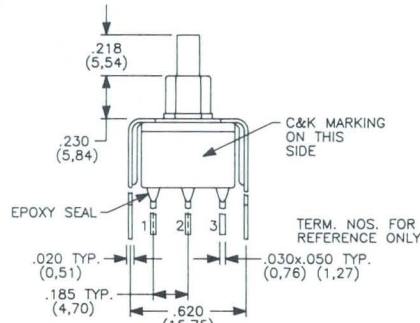


**SPDT**

B Contact Material Only Available.

**V30-V40-V90**

**NEW**

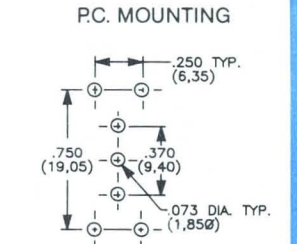
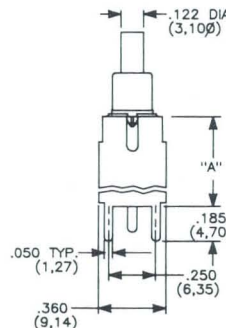
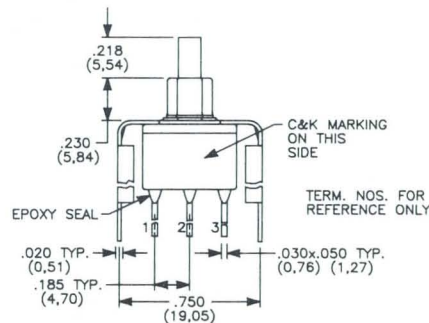


OPTION CODE	DIM. 'A'
V30	.460 (11,68)
V40	.630 (16,00)
V90	1.150 (29,21)

**SPDT**

B Contact Material Std.

**V60-V70-V80**

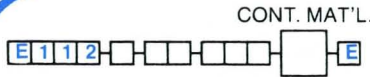


OPTION CODE	DIM. 'A'
V60	.460 (11,68)
V70	.630 (16,00)
V80	.953 (24,21)

**SPDT**

B Contact Material Std.

\*Sealed to withstand wave soldering and cleaning processes.



**NEW TIN-LEAD TERMINATIONS**

**CONTACT MATERIALS**

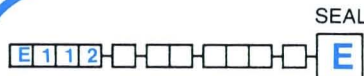
- B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Std. with all termination options except C)
- Q** END CONTACTS: Coin silver, silver plated.  
CENTER CONTACT & ALL TERMINALS: Brass, silver plated.  
RATING: 4 AMPS @ 125 V AC or 28 V DC. (Std. with C terminations)
- G** END CONTACTS: Coin silver, with gold plate over nickel plate.  
CENTER CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 4 AMPS @ 125 V AC or 28 V DC.

**NEW TIN-LEAD PLATED TERMINATIONS**

- K** CONTACTS: Brass, with gold plate over nickel plate (same as B contact material).  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Available with C, W-W5, A, AV2, V30-V90 termination options only)
- M** END CONTACTS: Coin silver, silver plated. ] (same as Q contact material).  
CENTER CONTACT: Brass, silver plated. ]  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 4 AMPS @ 125 V AC or 28 V DC. (Available with C, W-W5, A, AV2, V30-V90 termination options only)
- L** END CONTACTS: Coin silver, with gold plate over nickel plate. ] (same as G contact material).  
CENTER CONTACT: Brass, with gold plate over nickel plate. ]  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 4 AMPS @ 125 V AC or 28 V DC. (Available with C, W-W5, A, AV2, V30-V90 termination options only)

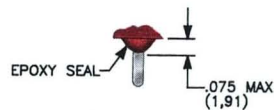
**Note:** G and L contact materials are electrically equivalent to B, Q, K and M contact materials and can be used where either dry circuit\*\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. These options should be specified where UL or CSA listing is required on a switch used in a dry circuit application.

\*\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.



**SEALING**

**E (Std.)**



**HOW TO ORDER**

Complete the order number below by selecting the desired model no., plunger, bushing, termination, contact material, and sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled.

(Example: **E 1 1 2** - **S** - **D 1** - **A** - **G** - **E**).

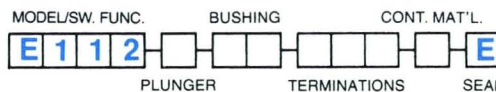
S plunger, D1 bushing, E epoxy terminal seal and plunger internal o-ring seal supplied standard.

UL/CSA listed with all options when ordered with G, Q, L or M contact material.

Available caps and accessories shown on page B-17.

**UNAVAILABLE OPTION COMBINATIONS**

Model or Option	Options Not Available
R, R2	Q, G, K, L, M



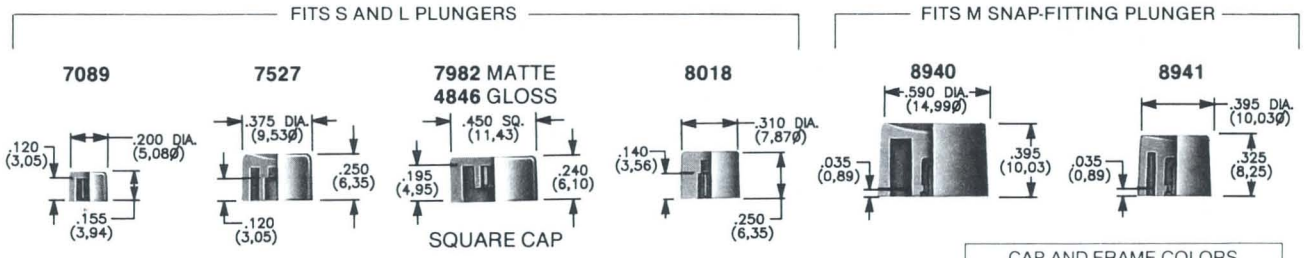


**AVAILABLE HARDWARE**

The following hardware is available separately. To order, write part nos., descriptions, and colors where applicable.

**CAPS**

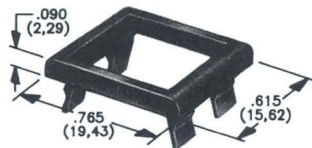
All caps: finish, gloss, except where noted; material, nylon. See color chart below.



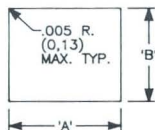
CAP AND FRAME COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		

**SNAP-IN FRAMES**

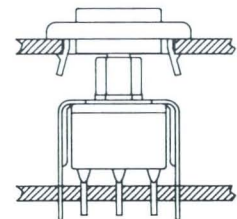
Frames snap into panel opening and are independent from switch mounting. They are recommended for all P.C. mounted switches with square caps. Accurate positioning of the P.C. mounted switch relative to the panel opening is necessary to provide proper clearance between cap and frame. See charts for correct part no., panel thickness, and available colors. Frame finish: matte; material, nylon.



**MOUNTING INFORMATION**

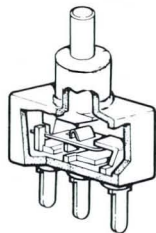


FRAME PART NO.	PANEL THICKNESS	DIM. 'A'	DIM. 'B'
4325	.047 (1,19)	.595-605	.495-500
4326	.062 (1,57)	(15,11-15,37)	(12,57-12,70)
4327	.090 (2,29)	.620-625	.495-500
4328	.125 (3,18)	(15,75-15,88)	12,57-12,70)



\*Sealed to withstand wave soldering and cleaning processes.

B



### SPECIFICATIONS

#### CONTACT RATING:

Models ending in - 1: 1 AMP @ 120 V AC or 28 V DC or 0.4 VA max. @ 20 V AC or DC max.

Models ending in - 5: 0.4 VA max. @ 20 V AC or DC max.

NOTE: Break before make contacts. Multipole contacts do not make and break simultaneously.

ELECTRICAL LIFE: 60,000 actuations at full load.

CONTACT RESISTANCE: Below 50 milliohms typ. initial @ 2-4 V DC, 100 mA.

INSULATION RESISTANCE: 10<sup>9</sup> ohms min.

DIELECTRIC STRENGTH: 1,000 V RMS min. @ sea level.

OPERATING TEMPERATURE: -30°C to 75°C.

CAP INSTALLATION FORCE: 10 lbs. max. permissible.

#### NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

### MATERIALS

CASE & BUSHING: Glass filled nylon (UL 94V-0)

PLUNGER: Glass filled nylon or glass filled polyester.

SWITCH SUPPORT: Brass or steel, electrotin plated.

#### N.O. & N.C. CONTACTS:

Models ending in - 1: Coin silver, with gold plate over nickel plate (G cont. mat'l.).

Models ending in - 5: Brass, with gold plate over nickel plate (B cont. mat'l.).

#### COMMON CONTACT & ALL TERMINALS:

Brass, with gold plate over nickel plate.

TERMINAL SEAL: Epoxy.

DISPOSABLE BOOT: Vinyl.

## INTRODUCTION

Available options for E020 SERIES SEALED SNAP-ACTING MOMENTARY PUSHBUTTON SWITCHES are shown on pages B-18 thru B-22. Make selections from the following option sections: Models/Switching Function, Plungers, Bushings, Terminations, Contact

Materials and Epoxy Terminal Seal. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page B-22. Available caps and accessories shown on page B-22.

E121, E221 models UL/CSA listed with all options when ordered with mandatory G contact material. See HOW TO ORDER, page B-22.

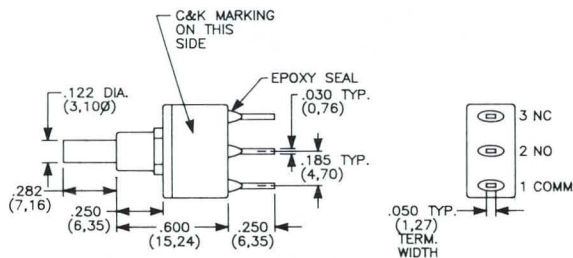
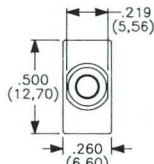
### MODEL/SW. FUNC.



## MODELS/SWITCHING FUNCTION

MODEL NO.	SWITCHING FUNC.	
	POS 1	POS 2
E121 E125	ON	MOM.
CONNECTED TERMINALS	1-3	1-2
SCHEMATIC 		
COMM.: 1 NC: 3 NO: 2		

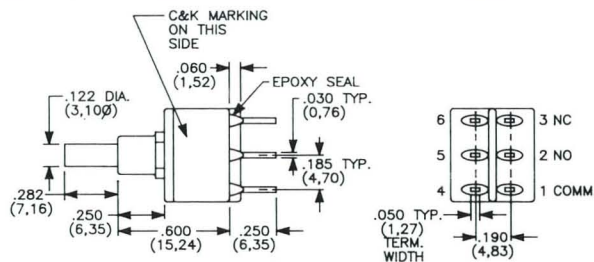
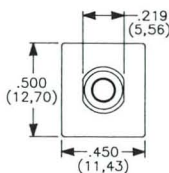
SPDT



MODEL SHOWN: E121-S-D1-C-G-E TERM. NOS. FOR REFERENCE ONLY

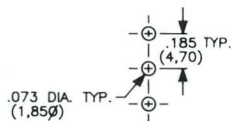
MODEL NO.	SWITCHING FUNC.	
	POS 1	POS 2
E221 E225	ON	MOM.
CONNECTED TERMINALS	1-3,4-6	1-2,4-5
SCHEMATIC 		
COMM.: 1,4 NC: 3,6 NO: 2,5		

DPDT

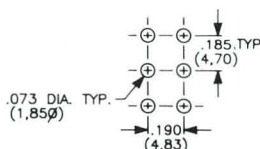


MODEL SHOWN: E221-S-D1-C-G-E TERM. NOS. FOR REFERENCE ONLY

### P.C. MOUNTING



SPDT



DPDT



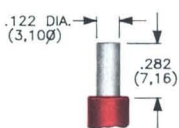
\* Sealed to withstand wave soldering and cleaning processes.

**PLUNGER**


E 2 [ ] D 1 [ ] [ ] [ ] [ ] [ ] E

**PLUNGER**

**S (Std.)**



**M SNAP FITTING**



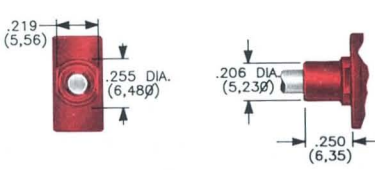
For available caps, see page B-22.

**BUSHING**

E 2 [ ] D 1 [ ] [ ] [ ] [ ] [ ] E

**BUSHING**

**D1 (Std.)**



Disposable splashproof vinyl boot over actuator and bushing supplied std., see page B-22.

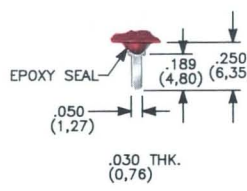
**B**

**TERMINATIONS**

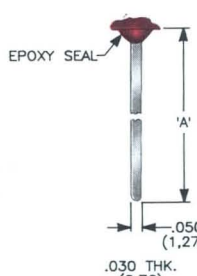
E 2 [ ] D 1 [ ] [ ] [ ] [ ] [ ] E

**TERMINATIONS**

**C**



**W-W4 WIRE-WRAP**

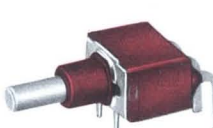

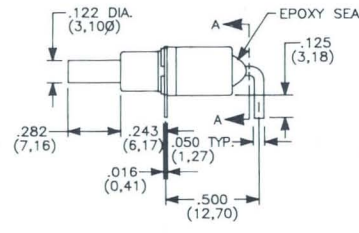


OPTION CODE	DIM. 'A'
W	.750(19,05)
W1	.964(24,48)
W3	.425(10,80)
W4	1.062(26,97)

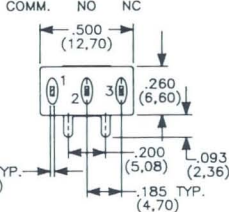
Wire-Wrap is a registered trademark of the Gardner-Denver Company.

**A**

**SPDT**

COMM. NO NC



**P.C. MOUNTING**

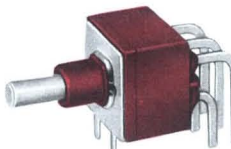

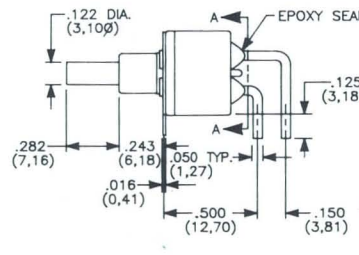
TERM. NOS. FOR REFERENCE ONLY

Section A-A

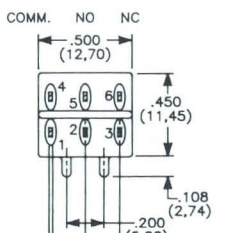
Term. bend radii mfg. option.

**A**

**DPDT**

COMM. NO NC



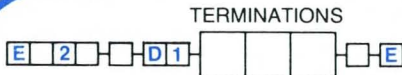
**P.C. MOUNTING**

TERM. NOS. FOR REFERENCE ONLY

Section A-A

Term. bend radii mfg. option.

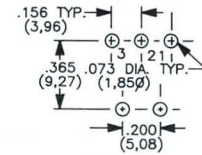
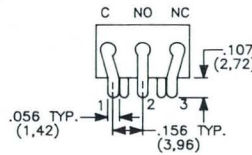
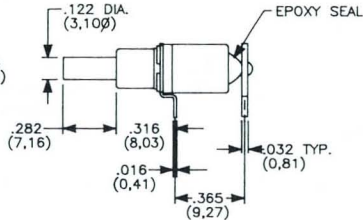
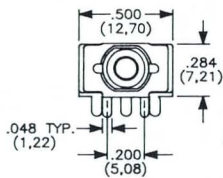
\* Sealed to withstand wave soldering and cleaning processes.



**TERMINATIONS (cont'd.)**

**R**

**P.C. MOUNTING**

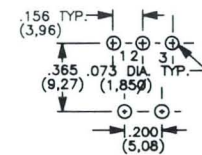
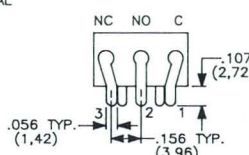
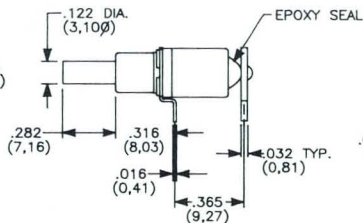
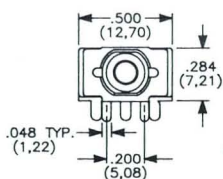


TERM. NOS. FOR REFERENCE ONLY

**SPDT**

**R2**

**P.C. MOUNTING**

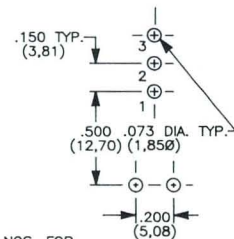
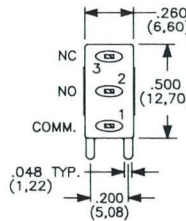
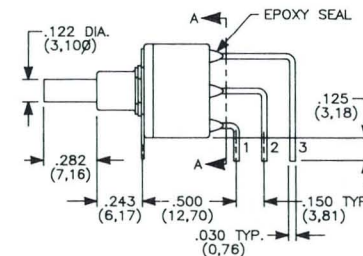
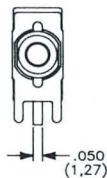
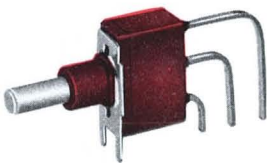


TERM. NOS. FOR REFERENCE ONLY

**SPDT**

**AV2**

**P.C. MOUNTING**



SECTION A-A

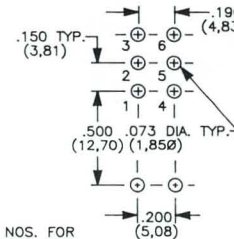
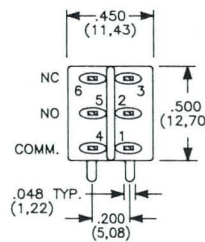
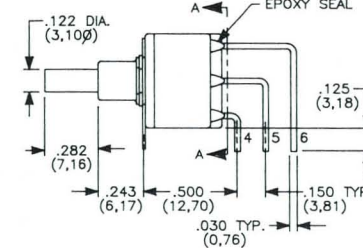
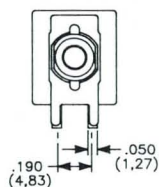
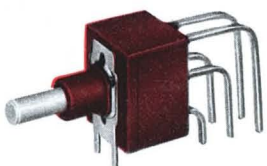
TERM. NOS. FOR REFERENCE ONLY

**SPDT**

Term. bend radii mfg. option.

**AV2**

**P.C. MOUNTING**



SECTION A-A

TERM. NOS. FOR REFERENCE ONLY

**DPDT**

Term. bend radii mfg. option.



\* Sealed to withstand wave soldering and cleaning processes.

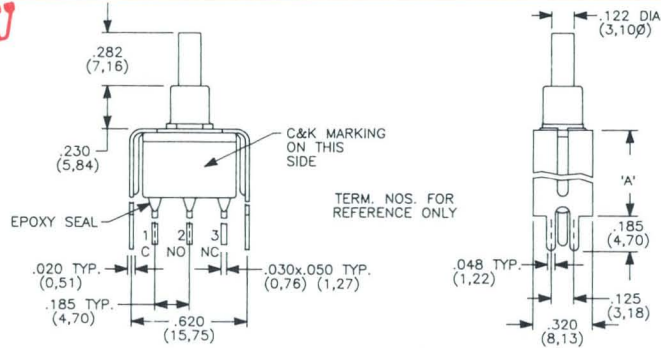


**TERMINATIONS (cont'd.)**

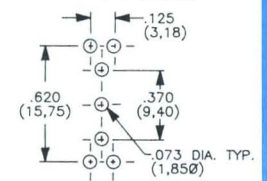
V30-V40-V90 **NEW**



SPDT

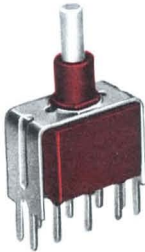


P.C. MOUNTING

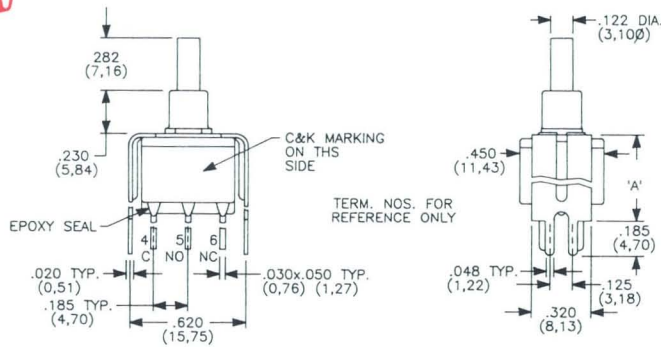


OPTION CODE	DIM. 'A'
V30	.460 (11,68)
V40	.630 (16,00)
V90	1.150 (29,21)

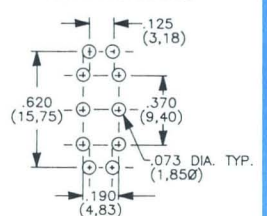
V30-V40-V90 **NEW**



DPDT

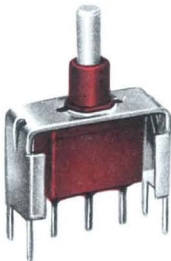


P.C. MOUNTING

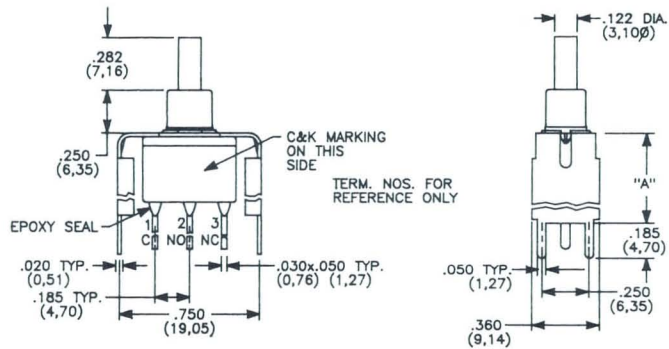


OPTION CODE	DIM. 'A'
V30	.460 (11,68)
V40	.630 (16,00)
V90	1.150 (29,21)

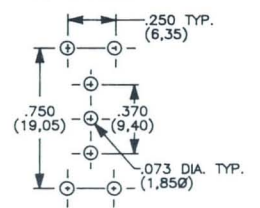
V60-V70-V80



SPDT

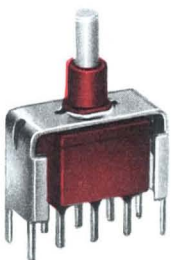


P.C. MOUNTING

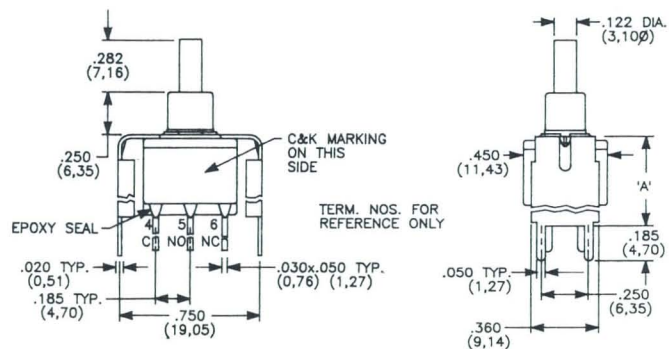


OPTION CODE	DIM. 'A'
V60	.460 (11,68)
V70	.630 (16,00)
V80	.953 (24,21)

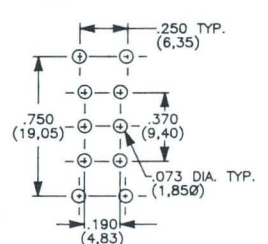
V60-V70-V80



DPDT



P.C. MOUNTING

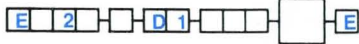


OPTION CODE	DIM. 'A'
V60	.460 (11,68)
V70	.630 (16,00)
V80	.953 (24,21)

\*Sealed to withstand wave soldering and cleaning processes.

B

CONT. MAT'L.



## CONTACT MATERIALS

- B** Models ending in -5 only:  
N.O. & N.C. CONTACTS: Brass, with gold plate over nickel plate.  
COMMON CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max.  
(Must be ordered with all models ending in -5)
- G** Models ending in -1 only:  
N.O. & N.C. CONTACTS: Coin silver, with gold plate over nickel plate.  
COMMON CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 1 AMP @ 120 V AC or 28 V DC or 0.4 VA max. @ 20 V AC or DC max.  
(Must be ordered with all models ending in -1)

**NOTE:** G contact material can be used where either dry circuit\*\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits.

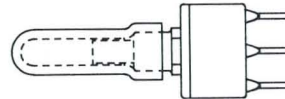
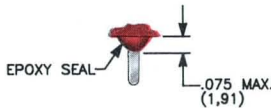
\*\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.

SEAL



## SEALING

E (Std.)



Disposable splashproof boot supplied std.

## HOW TO ORDER

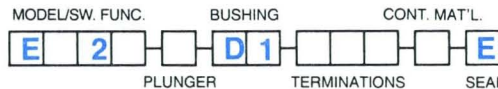
Complete the order number below by selecting the desired model no., plunger, bushing, termination, contact material, and sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled.

(Example: **E 2 2 1 S D 1 A G E**).

Note that **B** contact material must be ordered with all models ending in -5 (Example: **E 1 2 5 S D 1 C B E**). **G** contact material must be ordered with all models ending in -1 (Example: **E 1 2 1 S D 1 A G E**).

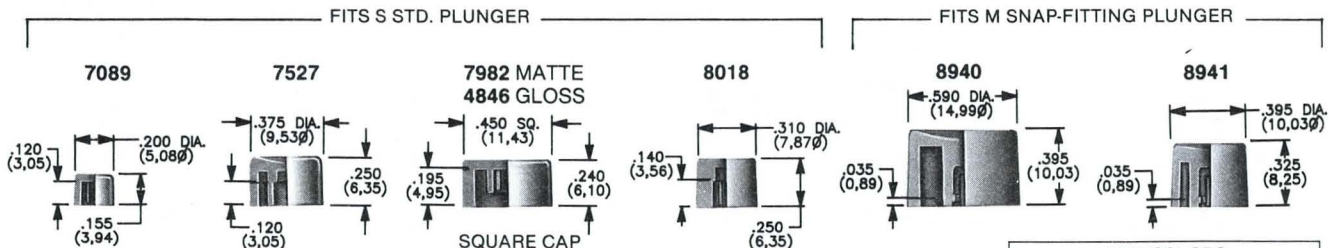
**S** plunger supplied if no option is specified. **D1** bushing, **E** epoxy terminal seal and disposable splashproof boot supplied standard.

**E121, E221** models UL/CSA listed with all options when ordered with mandatory **G** contact material.



## CAPS

The following caps are available separately. To order, write part nos., descriptions, and colors. All caps: finish, gloss, except where noted; material, nylon. See color chart below.



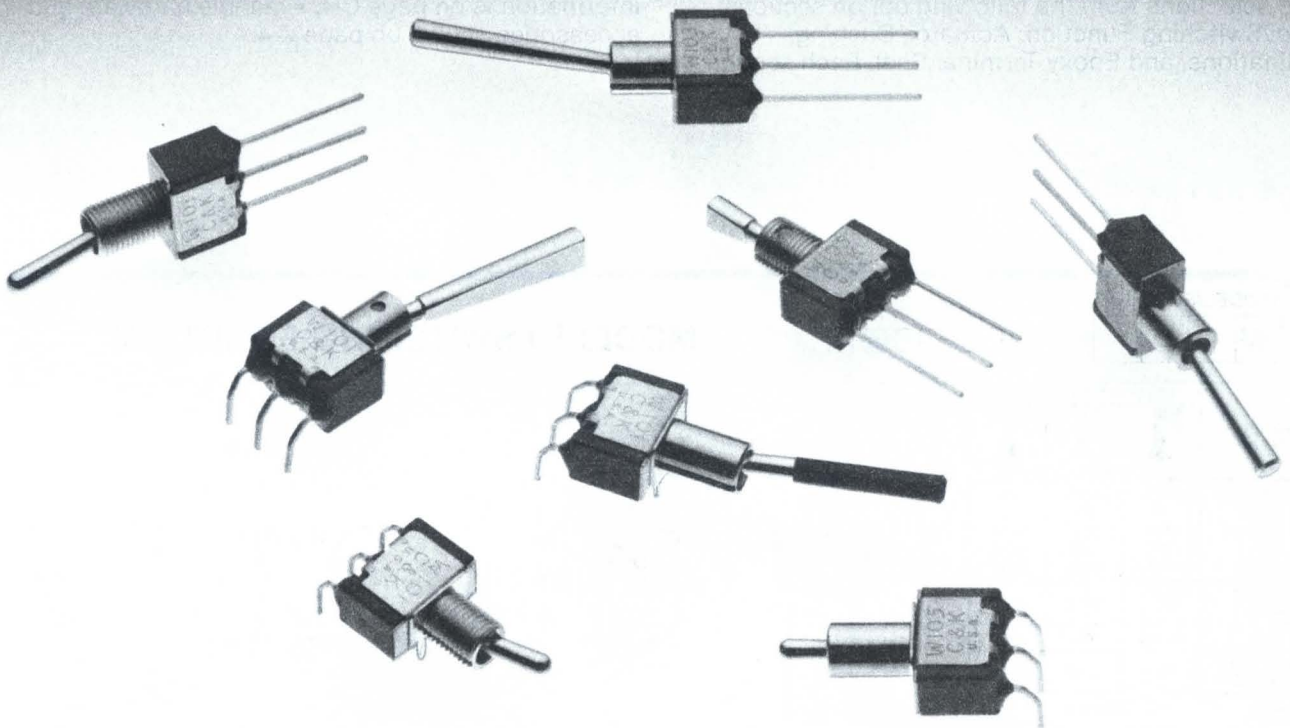
CAP COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		



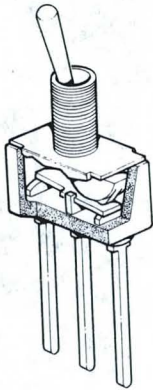
# W SERIES

## .025 WIRE-WRAP TOGGLE SWITCHES

C



SECTION C



### SPECIFICATIONS

- CONTACT RATING: 0.4 VA max. @ 20 V AC or DC max.
- ELECTRICAL LIFE: 100,000 make-and-break cycles at full load on all models ending in -01 (ON-NONE-ON). All other models, 40,000 cycles.
- CONTACT RESISTANCE: Below 10 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.
- INSULATION RESISTANCE:  $10^9$  ohms min.
- DIELECTRIC STRENGTH: 1,000 V RMS min. @ sea level.
- OPERATING TEMPERATURE:  $-30^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

### MATERIALS

- CASE: Glass filled nylon (UL 94V-0).
- ACTUATOR: Brass, chrome plated.
- BUSHING: Brass, nickel plated.
- HOUSING: Stainless steel.
- SWITCH SUPPORT: Brass or steel, electrotin plated.
- CONTACTS & TERMINALS: Brass, with gold plate over nickel plate (B cont. mat'l.).
- HARDWARE: Nut- Brass, nickel plated. Locking ring- Brass, bright nickel plated. Lockwasher- Steel, bright nickel plated.

### NOTE

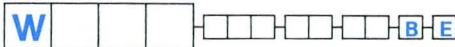
Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

### INTRODUCTION

Available options for W SERIES .025 WIRE-WRAP TOGGLE SWITCHES are shown on pages C-2 thru C-4. Make selections from the following option sections: Model/Switching Function, Actuator, Bushing, Terminations, and Epoxy Terminal Seal. Each section

begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page C-4. Available hardware and accessories shown on page C-4.

### MODEL/SW. FUNC.

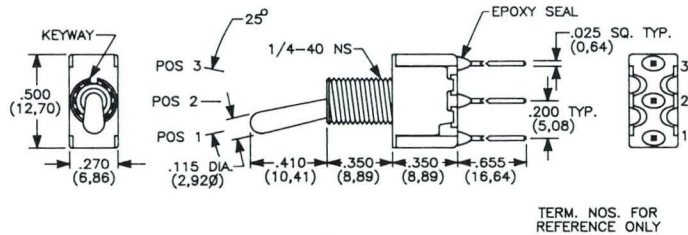


### MODELS / SWITCHING FUNCTION

MODEL NO.	SWITCHING FUNCTION		
	POS 1	POS 2	POS 3
	C&K MARKING	THIS SIDE	
W101	ON	NONE	ON
W103	ON	OFF	ON
W105	MOM.	OFF	MOM.
W107	ON	OFF	MOM.
W108	ON	NONE	MOM.
CONNECTED TERMINALS	2-3	OPEN	2-1
W109	NONE	ON	MOM.
CONNECTED TERMINALS	N/A	2-3	2-1
SCHEMATIC			
MOM. = MOMENTARY POSITION			



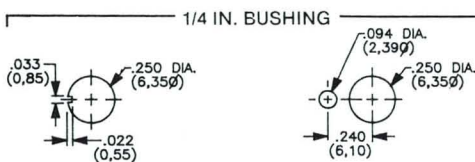
SPDT



TERM. NOS. FOR REFERENCE ONLY

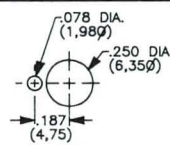
MODEL SHOWN: W101-S-Y-W6-B-E

### PANEL MOUNTING

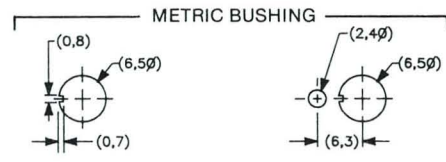


WITHOUT LOCKING RING

WITH STD. LOCKING RING



WITH SMALL LOCKING RING



WITHOUT LOCKING RING

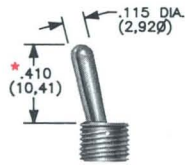
WITH LOCKING RING





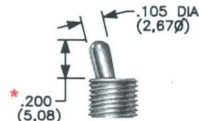
## ACTUATORS

**S**  
**SP** WITH ANTIROTATION



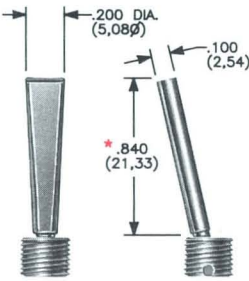
S actuator std. when ordered with W6 or W7 terminations.

**M**  
**MP** WITH ANTIROTATION



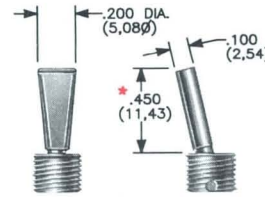
M actuator std. when ordered with A terminations.

**P1** WITH ANTIROTATION



Antirotation feature standard on P1, P3, P4 actuators. Hardware: P/N 7099 dress nut supplied standard with threaded bushings.

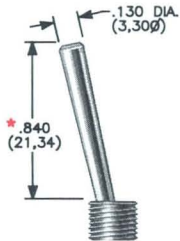
**P3** WITH ANTIROTATION



**P4** WITH ANTIROTATION



**L**  
**LP** WITH ANTIROTATION



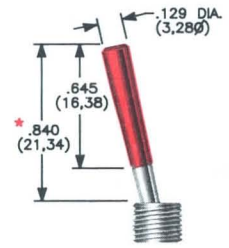
**L1**  
**L1P** WITH ANTIROTATION



**L2**  
**L2P** WITH ANTIROTATION



**L3** PLASTIC  
**L3P** WITH ANTIROTATION



**Antirotation:** Provides anti-'push-in' feature on actuator, reducing risk of internal switch damage from impact forces on the actuator.

\*Add .070 (1,78) for D, D9 bushings.

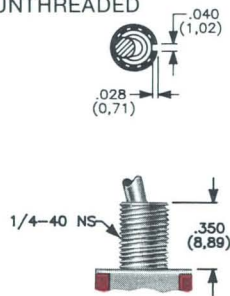
Add actuator color in word form after order number. If no color is specified, black will be supplied. Finish: gloss.

1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray



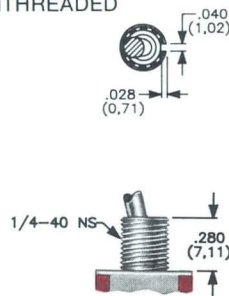
## BUSHINGS

**Y**  
**Y9** UNTHREADED



Y bushing std. with W6 or W7 terminations.

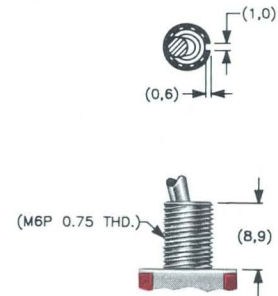
**D**  
**D9** UNTHREADED



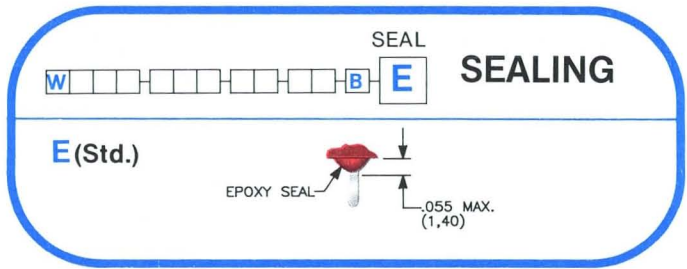
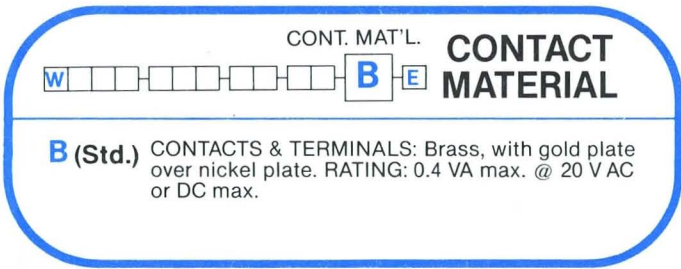
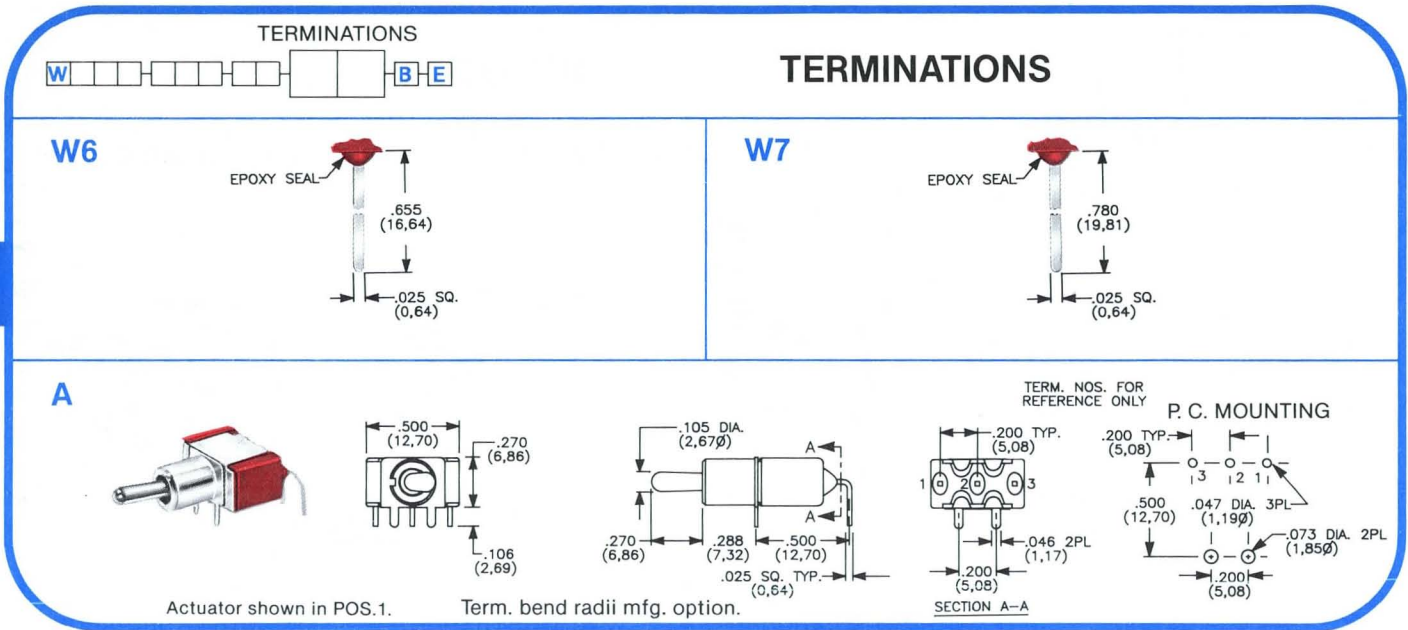
D9 bushing std. with A terminations.

Add .070 (1,78) to all actuator lengths for D, D9 bushings.

**Y3** METRIC

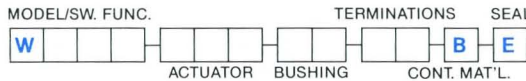


Not available with A terminations.



**HOW TO ORDER**

Complete the order number below by selecting the desired model no., actuator, bushing (where required) and termination options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Where applicable, write actuator color in word form after order number.  
 (Example: **W**105**L**3**D**9**A****B****E** with yellow actuator).  
 If no color is specified, black will be supplied.  
**B** contact material and **E** epoxy terminal seal are supplied standard. **S** actuator standard with **W6** or **W7** terminations, **M** actuator standard with **A** terminations.  
**HARDWARE:** Two mounting nuts, locking ring and lockwasher are supplied standard, where applicable (except **P1**, **P3**, **P4** actuators: one P/N 7099 dress nut, one hex nut, locking ring and lockwasher supplied standard). Optional mounting nut styles and locking rings available. Write part descriptions and part nos. in word form after order number. If nothing is specified, standard hardware will be supplied. Hardware is also available separately, see below.



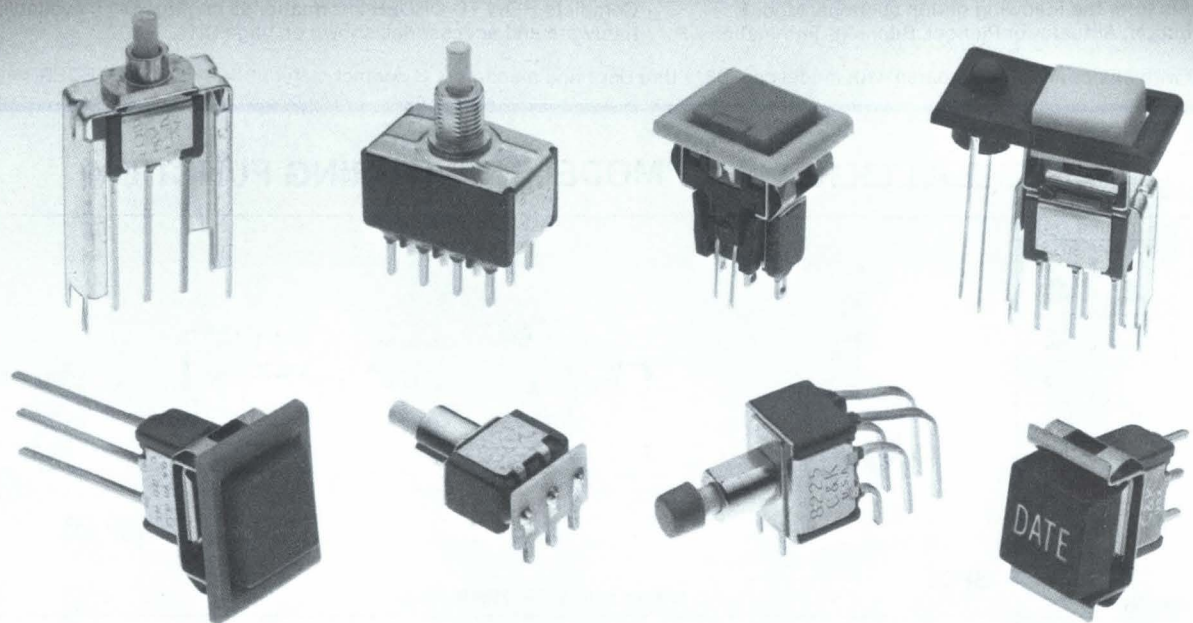
**AVAILABLE HARDWARE**

The following hardware is available separately. For illustrations and dimensions, see **HARDWARE**, page A-13. To order, write part nos. and descriptions in word form.  
**NUTS:** 7002, 7099, 7760, 7780, 7786, 7807, 7916, 7969.  
**LOCKING RINGS:** 7007, 7537, 7918.  
**LOCKWASHERS:** 7003-3  
**WRENCHES:** 4815, 7785, 8942.  
**TOGGLE CAPS:** 7062, 7637, 8968.



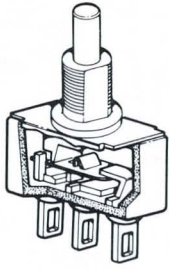
# 8020 SERIES

## SNAP-ACTING MOMENTARY PUSHBUTTON SWITCHES



SECTION D

# **C&K** 8020 Series Snap-Acting Momentary Pushbutton Switches



## SPECIFICATIONS

### CONTACT RATING:

Models ending in -1: 1 AMP @ 120 V AC or 28 V DC or 0.4 VA max. @ 20 V AC or DC max.  
 Models ending in -5: 0.4 VA max. @ 20 V AC or DC max.

**NOTE:** Break before make contacts. Multi-pole contacts do not make and break simultaneously.

ELECTRICAL LIFE: 60,000 actuations at full load.

CONTACT RESISTANCE: Below 50 milliohms typ. initial @ 2-4 V DC, 100 mA.

INSULATION RESISTANCE: 10<sup>9</sup> ohms min.

DIELECTRIC STRENGTH: 1,000 V RMS min. @ sea level.

OPERATING TEMPERATURE: All exc. UL models: -30°C to 75°C.

All UL models: -30°C to 65°C.

CAP INSTALLATION FORCE: 10 lbs. max. permissible.

## MATERIALS

CASE: SP & DP- diallyl phthalate (DAP) or melamine phenolic.

3P & 4P- diallyl phthalate (DAP).  
 PLUNGER: Glass filled nylon or glass filled polyester.

BUSHING: Brass, nickel plated.

HOUSING: Stainless steel.

SWITCH SUPPORT: Brass or steel, electroplated.

N.O. & N.C. CONTACTS:

Models ending in -5: Brass, with gold plate over nickel plate (B cont. mat'l.).

Models ending in -1: Coin silver, with gold plate over nickel plate (G cont. mat'l.).

COMMON CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.

TERMINAL SEAL: Epoxy.

HARDWARE: Nut- Brass, nickel plated.

Locking ring- Brass, bright nickel plated.

Lockwasher- Steel, bright nickel plated.

## NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

## INTRODUCTION

Available options for 8020 SERIES SNAP-ACTING MOMENTARY PUSHBUTTON SWITCHES are shown on pages D-2 thru D-12. Make selections from the following option sections: Model/Switching Function, Actuator or Plunger, Bushing, Terminations,

Contact Material and Epoxy Terminal Seal. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page D-13. Available hardware and accessories shown on page D-14.

UL/CSA listed with all options when ordered with model nos. U811 thru U841 and mandatory G contact material. See HOW TO ORDER, page D-13.

MODEL/SW. FUNC.

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## MODELS/SWITCHING FUNCTION

MODEL NO.	UL MODEL NO.	SWITCHING FUNC.	
		POS 1	POS 2
8121	UB11	ON	MOM.
8125	NOT UL	ON	MOM.
CONNECTED TERMINALS		1-3	1-2

SCHEMATIC

COMM.: 1  
NC: 3  
NO: 2

**SPDT**

MODEL SHOWN: 8121-S-H-Z-G-E

MODEL NO.	UL MODEL NO.	SWITCHING FUNC.	
		POS 1	POS 2
8221	UB21	ON	MOM.
8225	NOT UL	ON	MOM.
CONNECTED TERMINALS		1-3,4-6	1-2,4-5

SCHEMATIC

COMM.: 1,4  
NC: 3,6  
NO: 2,5

**DPDT**

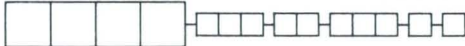
MODEL SHOWN: 8221-S-H-Z-G-E

**C&K** COMPONENTS, INC. 15 Riverdale Ave. Newton, MA 02158-1082 Tel: (617) 964-6400, Telex: 92-2544, TWX: 710-335-1163



# C&K 8020 Series Snap-Acting Momentary Pushbutton Switches

MODEL/SW. FUNC.



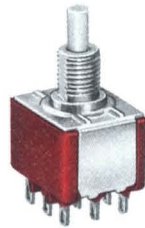
## MODELS/SWITCHING FUNCTION (cont'd.)

MODEL NO.	UL MODEL NO.	SWITCHING FUNC.	
		POS 1	POS 2
8321	UB31	ON	MOM.
8325	NOT UL	ON	MOM.

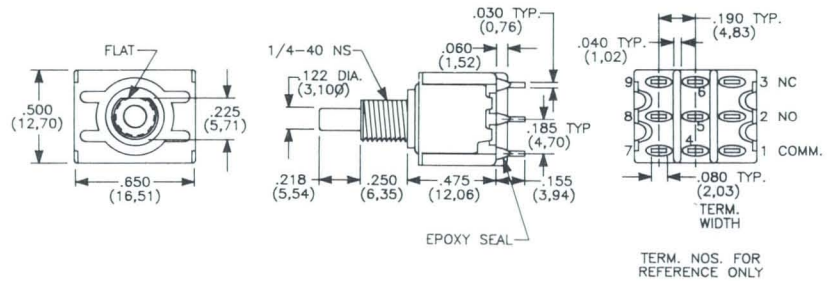
CONNECTED TERMINALS: 1-3,4-6, 7-9 | 1-2,4-5, 7-8

SCHEMATIC: 1 4 (COMM) 7 | 3 2 6 5 9 8

COMM.: 1,4,7  
NC: 3,6,9  
NO: 2,5,8



3 PDT



MODEL SHOWN: 8321-S-H-Z-G-E

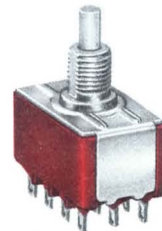
MOM. = MOMENTARY POSITION

MODEL NO.	UL MODEL NO.	POS 1	POS 2
8421	UB41	ON	MOM.
8425	NOT UL	ON	MOM.

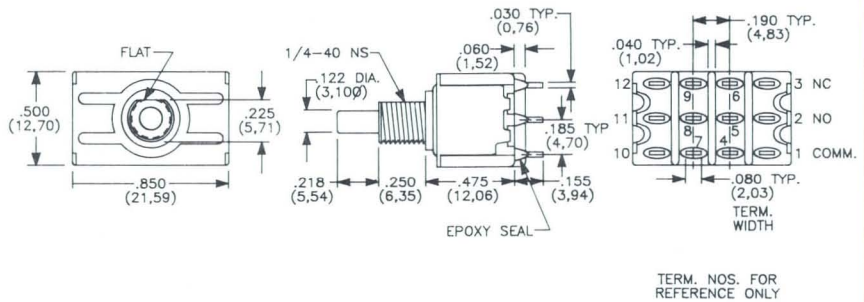
CONNECTED TERMINALS: 1-3,4-6, 7-9,10-12 | 1-2,4-5, 7-8,10-11

SCHEMATIC: 1 4 (COMM) 7 10 | 3 2 6 5 9 8 12 11

COMM.: 1,4,7,10  
NC: 3,6,9,12  
NO: 2,5,8,11

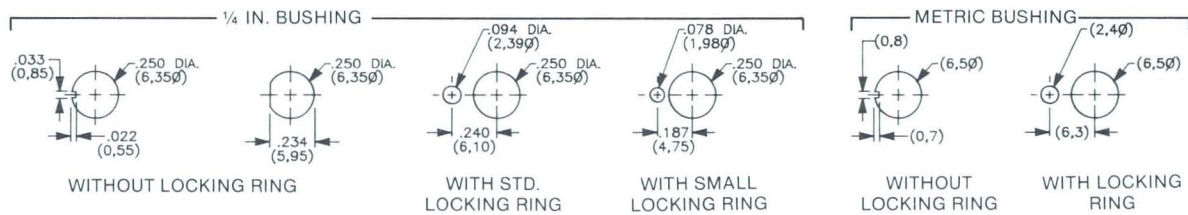


4 PDT



MODEL SHOWN: 8421-S-H-Z-G-E

## PANEL MOUNTING



## INTRODUCTION TO ACTUATOR AND PLUNGER OPTIONS

8020 Series ACTUATOR and PLUNGER OPTIONS are shown on pages D-4 thru D-6. Select *either* Actuator or Plunger option for desired configuration. Note available terminations with each option. Plunger lengths vary with bushing option selected, see page D-6. Where applicable, select cap and frame colors from chart at right. When ordering, write desired color(s) in word form after order number. If no color is specified, black will be supplied. See HOW TO ORDER, page D-13.

Caps available in seven styles for switches with bushing options, see HARDWARE, page D-14. L.E.D.'s not furnished with J82 and J84 actuator options. L.E.D.'s are built-in and not replaceable on J85 and J95 actuator options. See page D-5 for L.E.D. information and available colors.

CAP AND FRAME COLORS	
1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

## MATERIALS FOR ACTUATOR OPTIONS J80 thru J95

- MOUNTING SPRING: Steel, nickel plated or stainless steel.
- MOUNTING BRACKET: Stainless steel.
- CAP & FRAME: Nylon.
- L.E.D. SUPPORT: Nylon.

# C&K 8020 Series Snap-Acting Momentary Pushbutton Switches

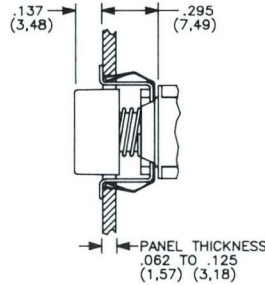
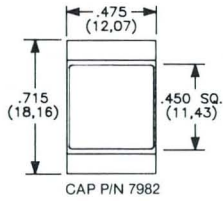
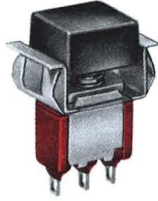
ACTUATOR OR  
PLUNGER

## ACTUATOR OPTIONS FOR SNAP-IN FRONT MOUNTING

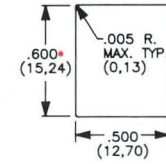
Available with Z, C, Z3 or W-W4 terminations.  
SPDT and DPDT models only.



**J80**



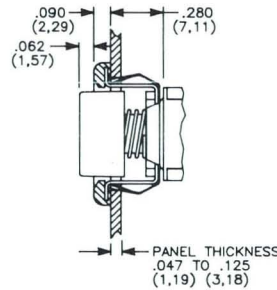
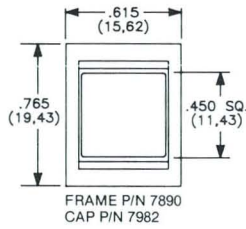
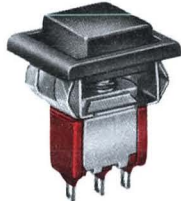
PANEL MOUNTING



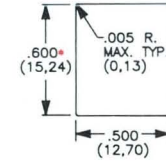
Cap finish: matte; available colors, see page D-3.

\* For .091/.125 (2,31/3,18) THK. panel, increase this DIM. to .620/.625 (15,75/15,88).

**J81 WITH FRAME AND RAISED CAP**



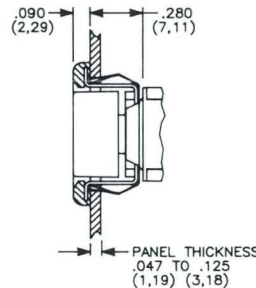
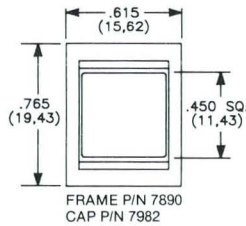
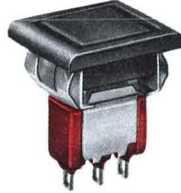
PANEL MOUNTING



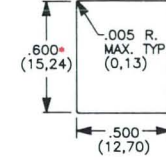
Cap and frame finish: matte; available colors, see page D-3.

\* For .091/.125 (2,31/3,18) THK. panel, increase this DIM. to .620/.625 (15,75/15,88).

**J83 WITH FRAME AND FLUSH CAP**



PANEL MOUNTING



Cap and frame finish: matte; available colors, see page D-3.

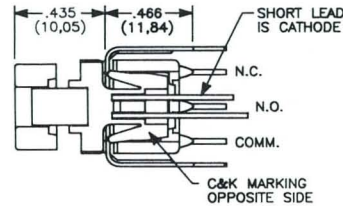
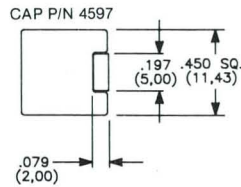
\* For .091/.125 (2,31/3,18) THK. panel, increase this DIM. to .620/.625 (15,75/15,88).

**J95 WITH BUILT-IN L.E.D.**

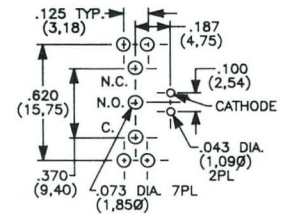


## ACTUATOR OPTION FOR P.C. MOUNTING

Available with V3 termination option only.



P.C. MOUNTING



Cap finish: matte; available colors, see page D-3.

### L.E.D. INFORMATION

COLOR	TYP. INTENSITY	TYP. FORWARD VOLTAGE	TYP. FORWARD CURRENT
Green	2.5 mcd	2.1V	20mA
Red	8.0 mcd	2.1V	20mA
Yellow	3.0 mcd	2.1V	20mA

Max. Forward Voltage 2.5V\*  
Max. Continuous Forward Current 50mA\*  
Power Dissipation 100mW\*  
\*Max. Ratings at 25°C Ambient Temp.  
Process information: Soldering to L.E.D. leads must be completed within 5 seconds at 500°F (260°C) maximum

### L.E.D. COLORS

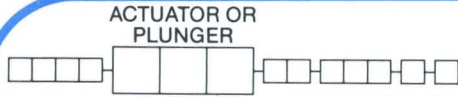
COLOR NO.	COLOR
3	Red (Std.)
5	Yellow
6	Green

**SPDT MODELS ONLY**

CAUTION: Circuit elements must limit forward current of L.E.D. to 50mA max. continuous.



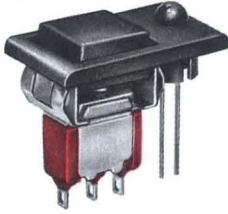
# C&K 8020 Series Snap-Acting Momentary Pushbutton Switches



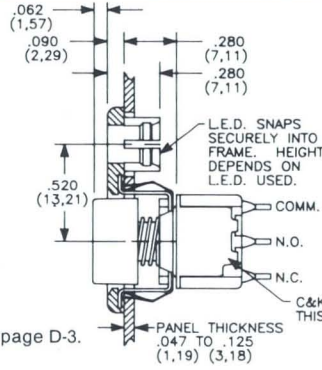
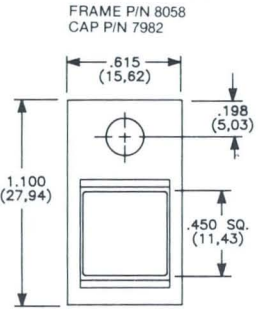
## ACTUATOR OPTIONS FOR SNAP-IN FRONT MOUNTING (cont'd.)

Available with Z, C, Z3 or W-W4 terminations. SPDT and DPDT models only.

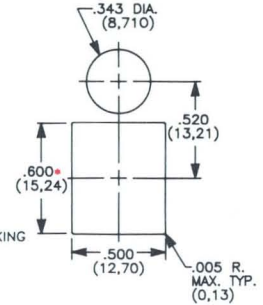
### J82 WITH FRAME FOR L.E.D. AND RAISED CAP



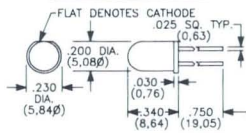
U.S. PAT. NO. 4,004,120 Cap and frame finish: matte; available colors, see page D-3.



### PANEL MOUNTING



### RECOMMENDED L.E.D. DIMENSIONS



### L.E.D. INFORMATION (L.E.D. NOT SUPPLIED)

#### SUGGESTED L.E.D. LAMP MODELS AND SUPPLIERS

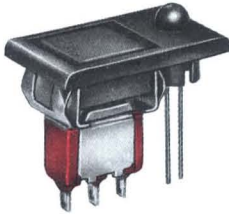
GEN. INSTRUMENT	XCITON	SIEMENS CORP.
MV5054-Red	XC556-Red	LD41-Red
MV5253-Green	XC556G-Green	LD57-Green
MV5353-Yellow	XC556Y-Yellow	LD55-Yellow

\* For .091/.125 (2.31/3.18) THK. panel, increase this DIM. to .620/.625 (15.75/15.88).

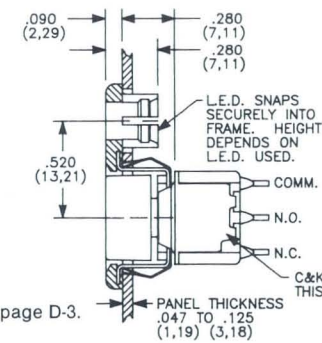
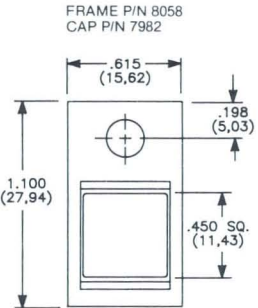
#### TYPICAL L.E.D. RATINGS

Forward Voltage	Current	Power	Max. Reverse Voltage
2.3V	50mA	100mW	5V

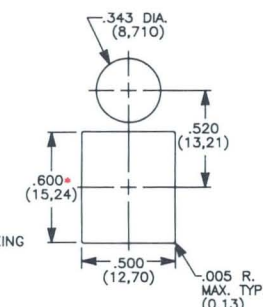
### J84 WITH FRAME FOR L.E.D. AND FLUSH CAP



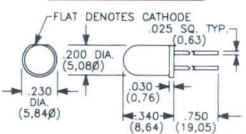
U.S. PAT. NO. 4,004,120 Cap and frame finish: matte; available colors, see page D-3.



### PANEL MOUNTING



### RECOMMENDED L.E.D. DIMENSIONS



### L.E.D. INFORMATION (L.E.D. NOT SUPPLIED)

#### SUGGESTED L.E.D. LAMP MODELS AND SUPPLIERS

GEN. INSTRUMENT	XCITON	SIEMENS CORP.
MV5054-Red	XC556-Red	LD41-Red
MV5253-Green	XC556G-Green	LD57-Green
MV5353-Yellow	XC556Y-Yellow	LD55-Yellow

\* For .091/.125 (2.31/3.18) THK. panel, increase this DIM. to .620/.625 (15.75/15.88).

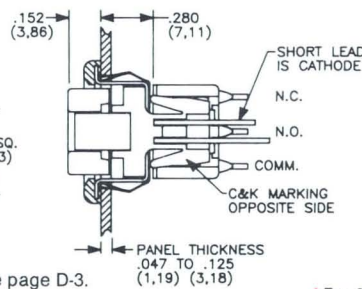
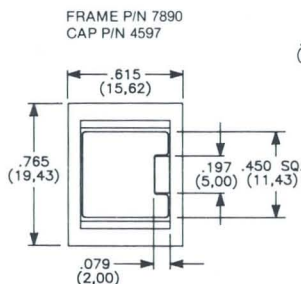
#### TYPICAL L.E.D. RATINGS

Forward Voltage	Current	Power	Max. Reverse Voltage
2.3V	50mA	100mW	5V

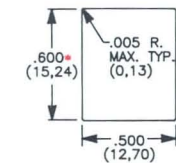
### J85 WITH BUILT-IN L.E.D. FRAME AND RAISED CAP



Cap and frame finish: matte; available colors, see page D-3.



### PANEL MOUNTING



\* For .091/.125 (2.31/3.18) THK. panel, increase this DIM. to .620/.625 (15.75/15.88).

### L.E.D. INFORMATION

COLOR	TYP. INTENSITY	TYP. FORWARD VOLTAGE	TYP. FORWARD CURRENT
Green	2.5 mcd	2.1V	20mA
Red	8.0 mcd	2.1V	20mA
Yellow	3.0 mcd	2.1V	20mA

Max. Forward Voltage 2.5V\*  
Max. Continuous Forward Current 50mA\*  
Power Dissipation 100mW\*

\*Max. Ratings at 25°C Ambient Temp.  
Process information: Soldering to L.E.D. leads must be completed within 5 seconds at 500°F (260°C) maximum

### L.E.D. COLORS

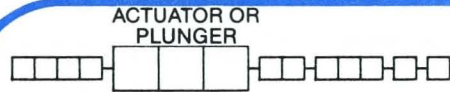
COLOR NO.	COLOR
3	Red (Std.)
5	Yellow
6	Green

### SPDT MODELS ONLY

CAUTION: Circuit elements must limit forward current of L.E.D. to 50mA max. continuous

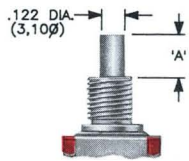


# 8020 Series Snap-Acting Momentary Pushbutton Switches

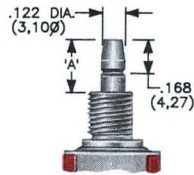


## PLUNGERS

**S (Std.)**  
**L**



**M** SNAP-FITTING



For avail. caps, see page D-14.

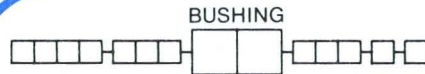
## PLUNGER OPTIONS

Select desired plunger options from chart below. Plunger lengths vary with bushing option selected. S plunger supplied std. Note that some opt. plunger lengths are not suitable for use with caps. Additional plunger lengths are available on SPDT and DPDT models, consult factory. When selecting plunger option, bushing selection must also be made.

PLUNGER OPTION CODE	PLUNGER HEIGHTS—'A' DIM.					
	BUSHING OPTIONS					
	D,D9	H,H9	Y,Y9	Y3	Y4	D2,D8
S (std.)	.244* (6,20)	.218* (5,54)	.203* (5,16)	(5,54)*	.185* (4,70)	.228** (5,79)
L	N.A.	N.A.	.178* (4,52)	N.A.	.090* (2,29)	N.A.
M	.297* (7,54)	.267* (6,78)	.252* (6,40)	(6,78)*	.234* (5,94)	.277** (7,04)

\* Subtract .020 (0,51) from plunger length when ordered with V30-V90 terminations. Subtract .016 (0,41) when ordered with A, A2, A4, A6, R, R2, or AV2 terminations.

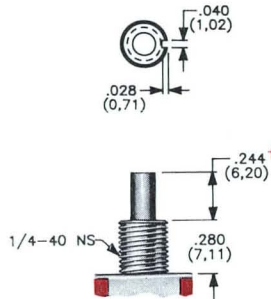
\*\* Add .004 (0,10) to plunger length when ordered with A, A2, A4, A6, R, R2, or AV2 terminations. Not all plunger lengths are sufficient for use with caps. Check cap dims. pg. D-14.



## BUSHINGS

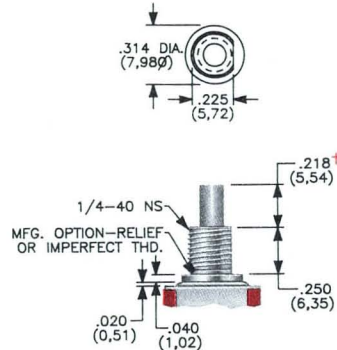
When selecting bushing option, plunger selection must also be made. Plunger lengths vary with bushing option selected. All bushings shown with std. S plunger.

**D**  
**D9** UNTHREADED



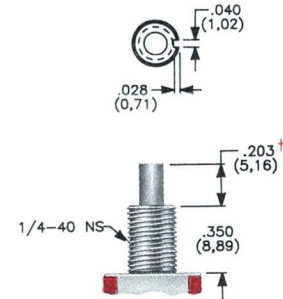
D9 bushing std. with A, A2, A4, A6, R, R2, AV2, or V30-V90 terminations.

**H**  
**H9** UNTHREADED



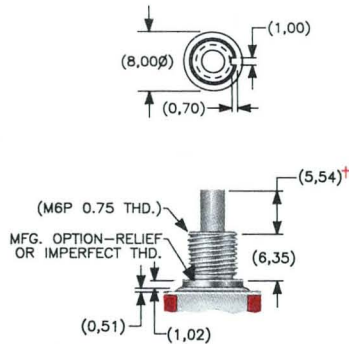
H bushing std. with Z, C, Z3, or W-W4 terminations.

**Y**  
**Y9** UNTHREADED



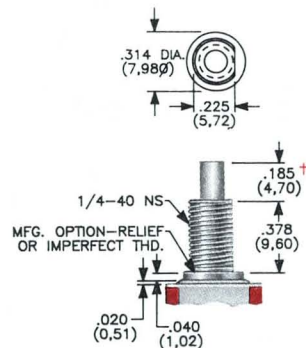
† Subtract .020 (0,51) from plunger lengths when ordered with V30-V90 terminations. Subtract .016 (0,41) when ordered with A, A2, A4, A6, R, R2, or AV2 terminations.

**Y3** METRIC

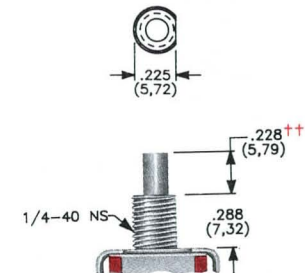


† Subtract .020 (0,51) from plunger lengths when ordered with V30-V90 terminations. Subtract .016 (0,41) when ordered with A, A2, A4, A6, R, R2, or AV2 terminations.

**Y4**



**D2**  
**D8** UNTHREADED

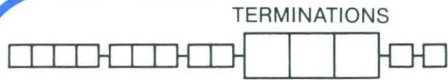


Not available with Z, C, Z3, or W-W4 terminations.

†† Add .004 (0,10) to plunger lengths when ordered with A, A2, A4, A6, R, R2 or AV2 terminations.

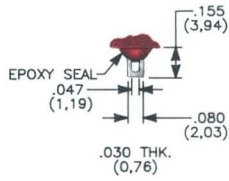


# C&K 8020 Series Snap-Acting Momentary Pushbutton Switches

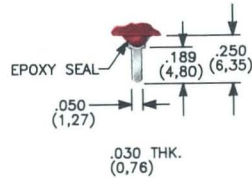


## TERMINATIONS

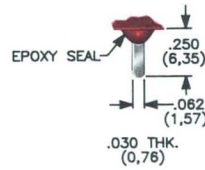
### Z (Std.)



### C

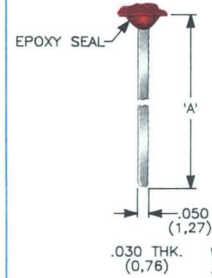


### Z3 QUICK CONNECT



Mating quick connector available; order part no. 5301.

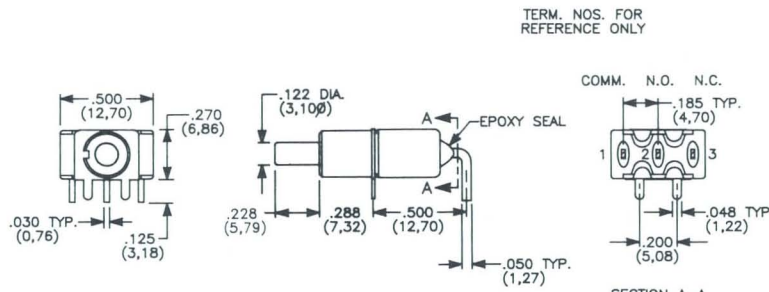
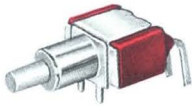
### W-W4 WIRE-WRAP



OPTION CODE	DIM. 'A'
W	.750 (19,05)
W1	.964 (24,48)
W3	.425 (10,80)
W4	1.062 (26,97)

Wire-Wrap is a registered trademark of the Gardner-Denver Company.

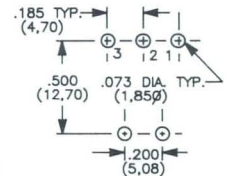
### A



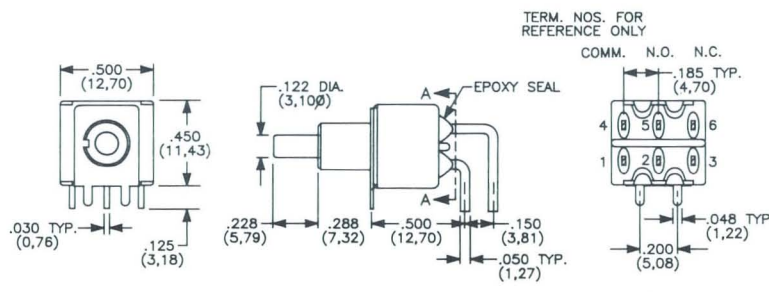
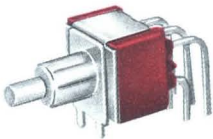
### SPDT

Term. bend radii mfg. option.

### P.C. MOUNTING



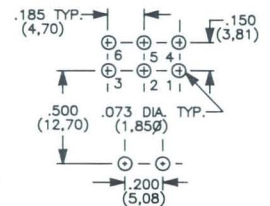
### A



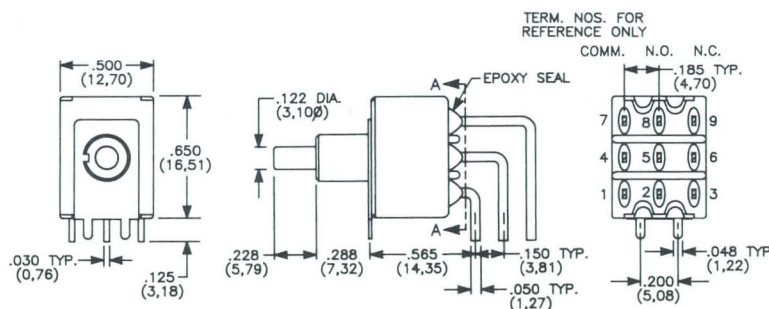
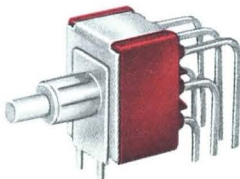
### DPDT

Term. bend radii mfg. option.

### P.C. MOUNTING



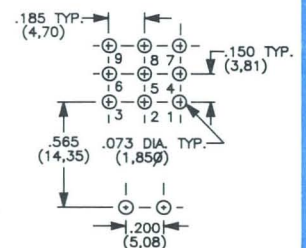
### A



### 3PDT

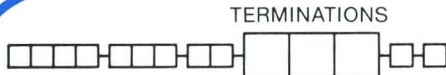
Term. bend radii mfg. option.

### P.C. MOUNTING



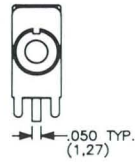
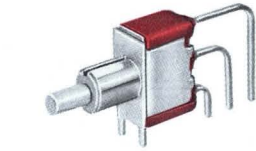


# 8020 Series Snap-Acting Momentary Pushbutton Switches

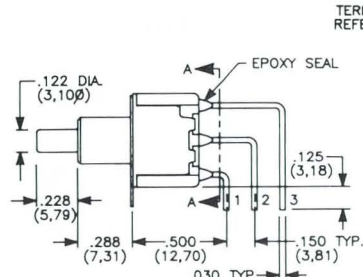


## TERMINATIONS (cont'd.)

AV2

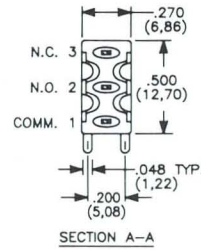


SPDT

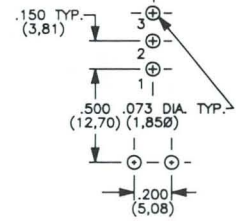


Term. bend radii mfg. option.

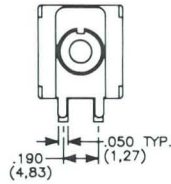
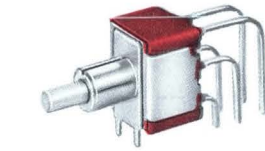
TERM. NOS. FOR REFERENCE ONLY



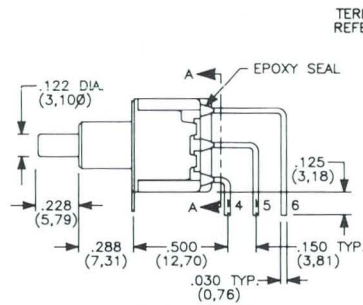
P.C. MOUNTING



AV2

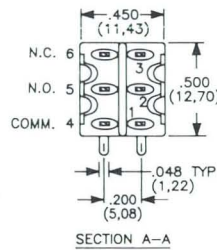


DPDT

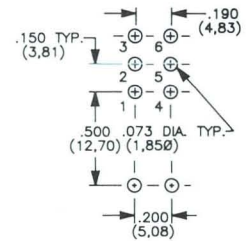


Term. bend radii mfg. option.

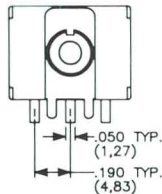
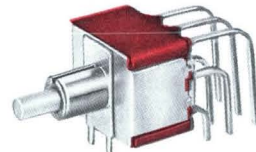
TERM. NOS. FOR REFERENCE ONLY



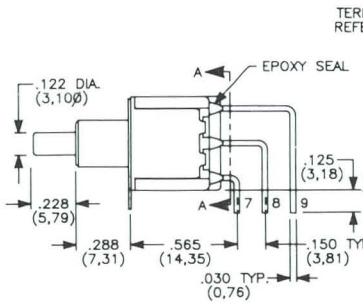
P.C. MOUNTING



AV2

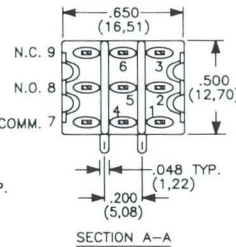


3PDT

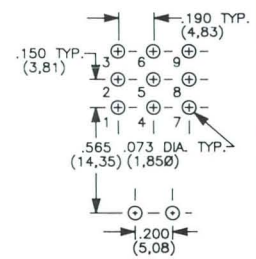


Term. bend radii mfg. option.

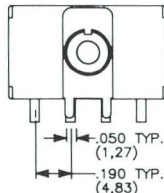
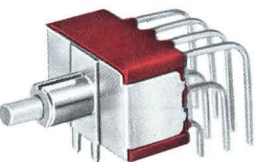
TERM. NOS. FOR REFERENCE ONLY



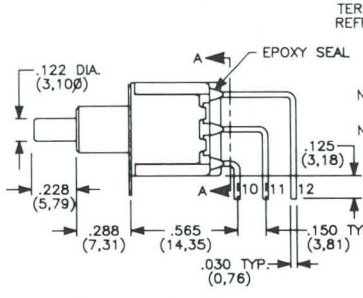
P.C. MOUNTING



AV2

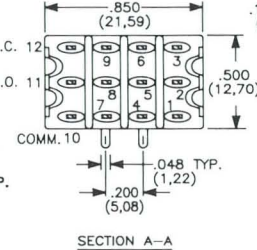


4PDT

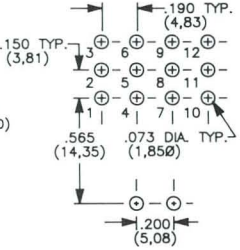


Term. bend radii mfg. option.

TERM. NOS. FOR REFERENCE ONLY

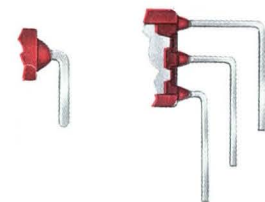


P.C. MOUNTING



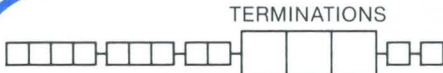
## EXTENDED TERMINAL OPTION

Switches with A or AV2 terminations may be ordered with extended terminals, as shown. This provides easier installation into P.C. boards. To order, specify 'Extended Terminals' in word form after order number.



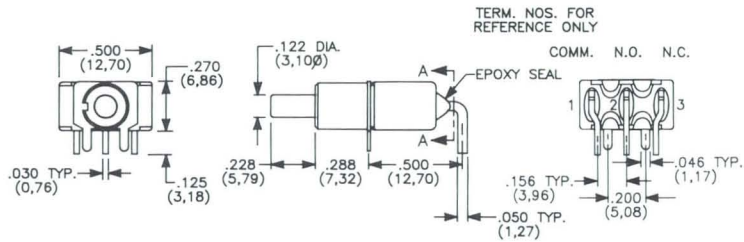
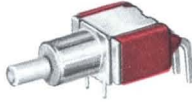


# C&K 8020 Series Snap-Acting Momentary Pushbutton Switches

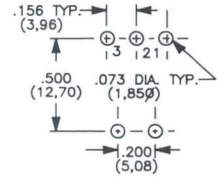


## TERMINATIONS (cont'd.)

**A2**



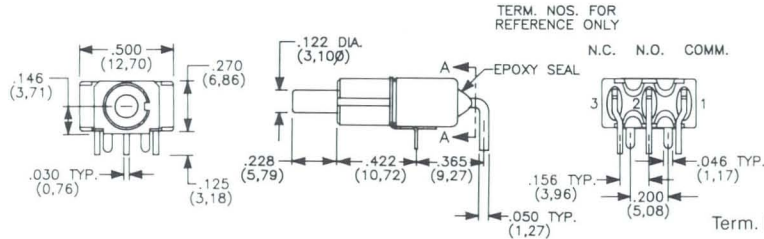
P.C. MOUNTING



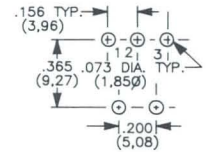
SPDT

Term. bend radii mfg. option.

**A4**



P.C. MOUNTING

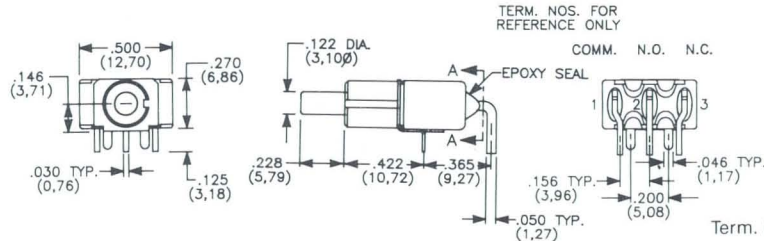


SPDT

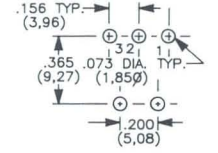
The A4 and R2 termination options are functionally identical and fit the same P.C. mounting pattern. The switches are shifted relative to the mounting hole, however. Unlike the R2, the A4 option is available with UL listing.

Term. bend radii mfg. option.

**A6**



P.C. MOUNTING

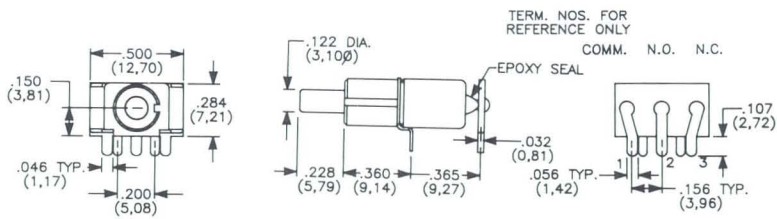
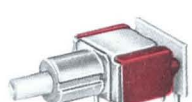


SPDT

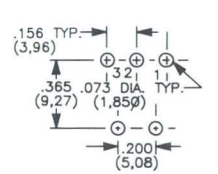
The A6 and R termination options are functionally identical and fit the same P.C. mounting pattern. The switches are shifted relative to the mounting hole, however. Unlike the R, the A6 option is available with UL listing.

Term. bend radii mfg. option.

**R**

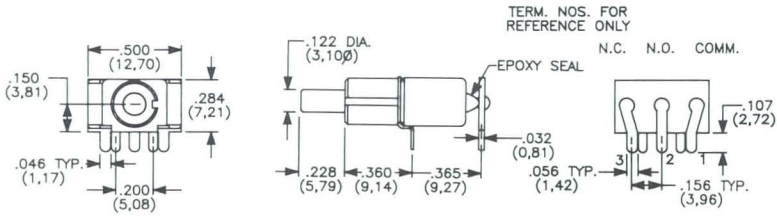
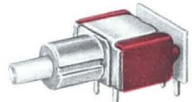


P.C. MOUNTING

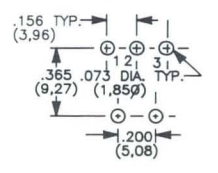


SPDT

**R2**



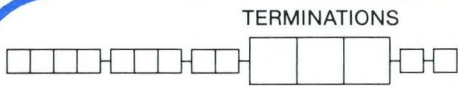
P.C. MOUNTING



SPDT



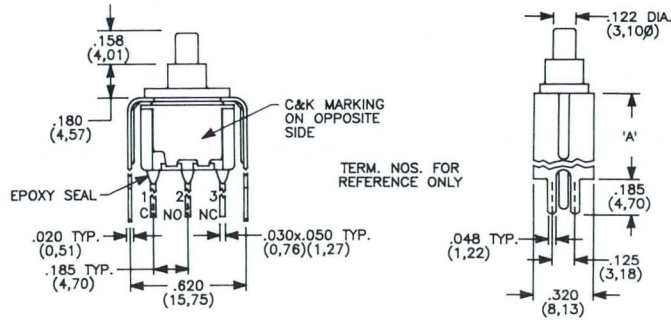
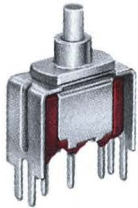
# 8020 Series Snap-Acting Momentary Pushbutton Switches



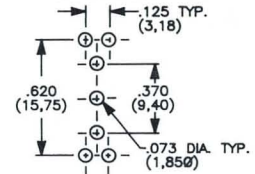
## TERMINATIONS (cont'd.)

Note: No bushing option code required on models with V3-V9 terminations. Plunger length insufficient for use with caps, consult factory.

### V3-V4-V9



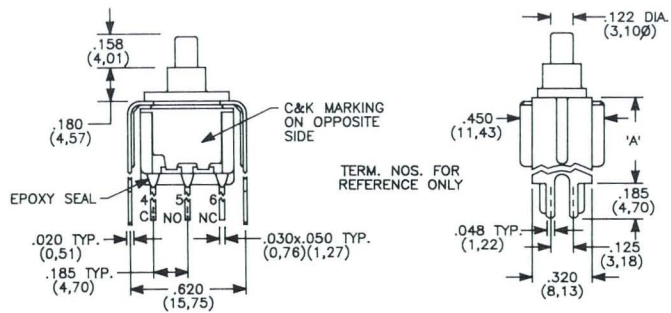
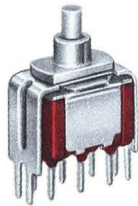
### P.C. MOUNTING



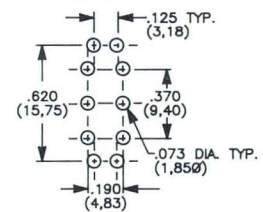
OPTION CODE	DIM. 'A'
V3	.460 (11,68)
V4	.630 (16,00)
V9	1.150 (29,21)

SPDT

### V3-V4-V9



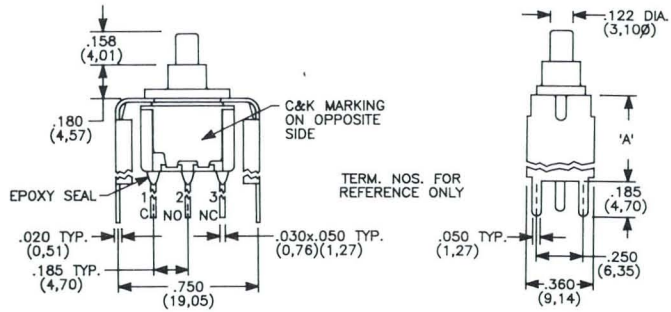
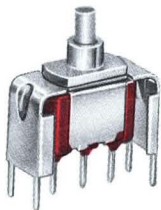
### P.C. MOUNTING



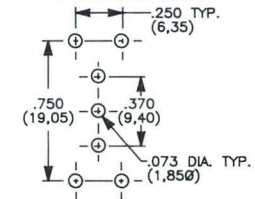
OPTION CODE	DIM. 'A'
V3	.460 (11,68)
V4	.630 (16,00)
V9	1.150 (29,21)

DPDT

### V6-V7-V8



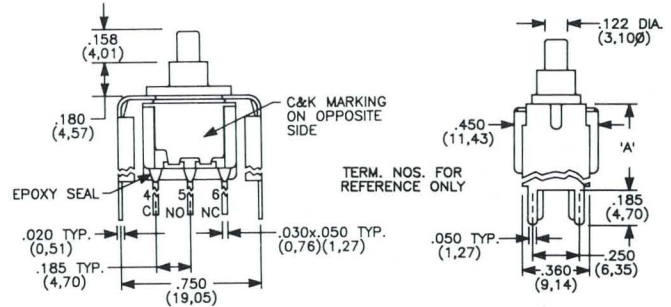
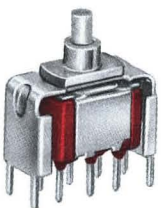
### P.C. MOUNTING



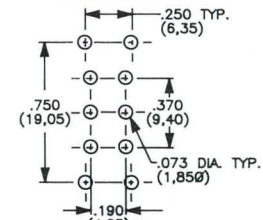
OPTION CODE	DIM. 'A'
V6	.460 (11,68)
V7	.630 (16,00)
V8	.953 (24,21)

SPDT

### V6-V7-V8



### P.C. MOUNTING

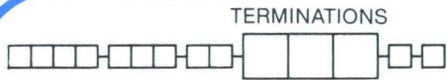


OPTION CODE	DIM. 'A'
V6	.460 (11,68)
V7	.630 (16,00)
V8	.953 (24,21)

DPDT

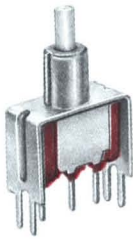


# C&K 8020 Series Snap-Acting Momentary Pushbutton Switches

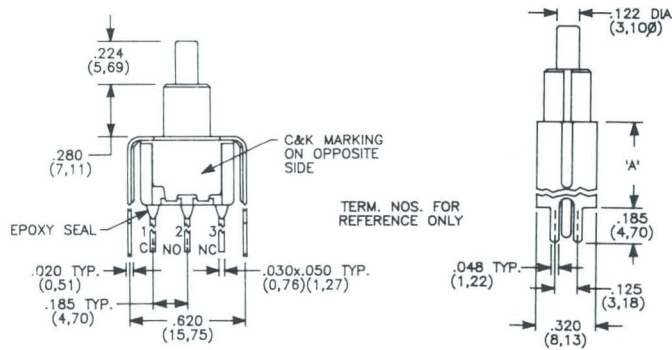


## TERMINATIONS (cont'd.)

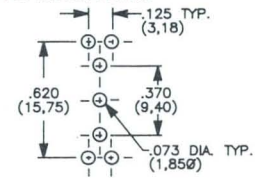
### V30-V40-V90



SPDT

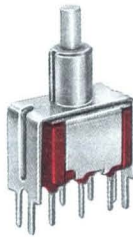


### P.C. MOUNTING

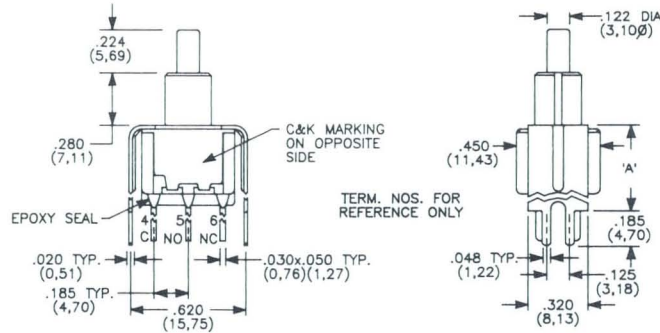


OPTION CODE	DIM. 'A'
V30	.460 (11,68)
V40	.630 (16,00)
V90	1.150 (29,21)

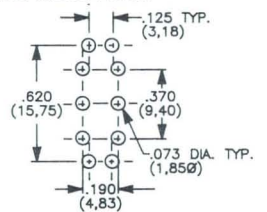
### V30-V40-V90



DPDT

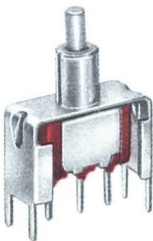


### P.C. MOUNTING

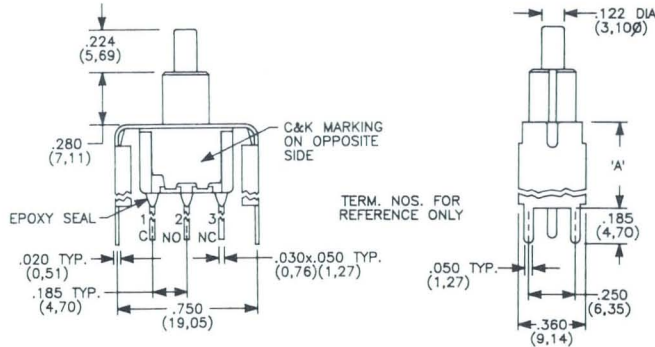


OPTION CODE	DIM. 'A'
V30	.460 (11,68)
V40	.630 (16,00)
V90	1.150 (29,21)

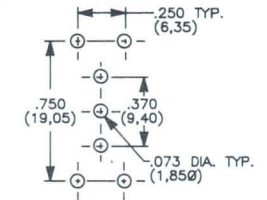
### V60-V70-V80



SPDT

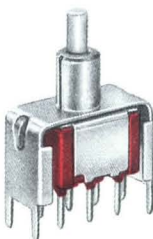


### P.C. MOUNTING

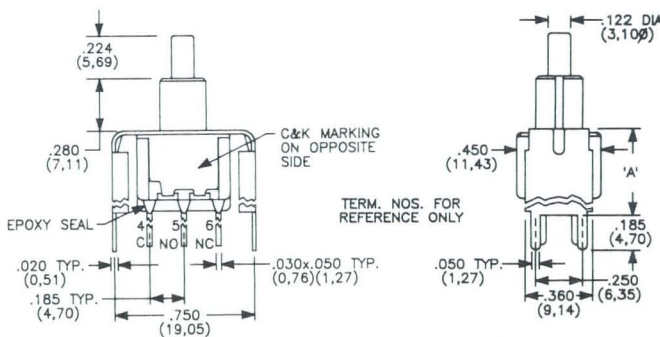


OPTION CODE	DIM. 'A'
V60	.460 (11,68)
V70	.630 (16,00)
V80	.953 (24,21)

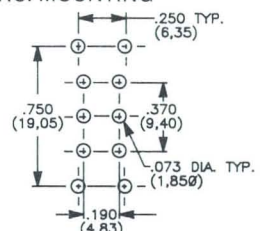
### V60-V70-V80



DPDT



### P.C. MOUNTING

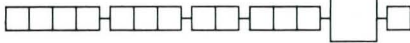


OPTION CODE	DIM. 'A'
V60	.460 (11,68)
V70	.630 (16,00)
V80	.953 (24,21)



# 8020 Series Snap-Acting Momentary Pushbutton Switches

CONT. MAT'L.



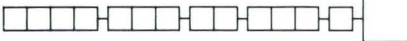
## CONTACT MATERIALS

- B** Models ending in -5 only:  
 N.O. & N.C. CONTACTS: Brass, with gold plate over nickel plate.  
 COMMON CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
 RATING: 0.4 VA max. @ 20 V AC or DC max.  
 (Must be ordered with all models ending in -5)
- G** Models ending in -1 only:  
 N.O. & N.C. CONTACTS: Coin silver, with gold plate over nickel plate.  
 COMMON CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
 RATING: 0.4 VA max. @ 20 V AC or DC max. or 1 AMP @ 120 V AC or 28 V DC.  
 (Must be ordered with all models ending in -1)

**Note:** 'G' contact material can be used where either dry circuit\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. The 'G' option, (all models ending in -1 only) should be specified where UL listing is required on a switch used in a dry circuit application.

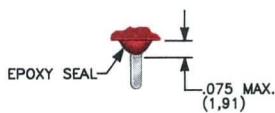
\*Dry circuit\* = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.

SEAL

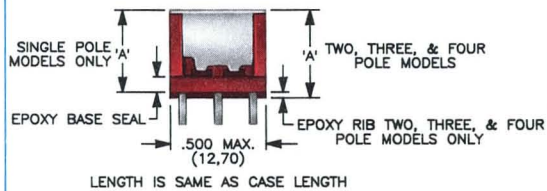


## SEALING

**E (Std.)**



**I**



POLES	DIM. 'A'
SP	.410 (10,41)
DP	.440 (11,18)
3P	.505 (12,83)
4P	.505 (12,83)

Available only with Z, C, Z3 or W-W4 terminations.



# C&K 8020 Series Snap-Acting Momentary Pushbutton Switches

## HOW TO ORDER

Complete the order number below by selecting the desired model no., actuator or plunger, bushing (with plunger options only), termination, contact material and terminal sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Where applicable, write cap and frame colors in word form after order number. (Example: **U8111-J81**-□-□-**Z**-□-□-**G-E** with orange cap and white frame). If no color is specified, black will be supplied.

For **J85** and **J95** actuator options, write L.E.D. color in word form after order number. L.E.D.'s not furnished with **J82** or **J84** actuator options. Plunger lengths vary with bushing option selected, some std. plunger lengths not suitable for caps. No bushing selection necessary with **V3-V9** termination options. See **PLUNGER** and **BUSHING** option sections.

Note that **B** contact material must be ordered with all models ending in **-5**, (Example: **8225-S**-□-□-**H**-□-□-**C**-□-□-**B-E**). **G** contact material must be ordered with all models ending in **-1**, (Example: **8221-S**-□-□-**H**-□-□-**C**-□-□-**G-E**).

**S** plunger, **H** bushing, **Z** terminations and **E** epoxy terminal seal are supplied if no options are specified.

UL listed with all options when ordered with model nos. **U811** thru **U841** and **G** contact material. Note: Custom markings and legends available, see inside front cover and consult factory.

**HARDWARE:** Two mounting nuts, locking ring and lockwasher are supplied standard, where applicable. Optional mounting nut styles, locking rings, frames and caps available. Write part descriptions and part nos. in word form after order number. If nothing is specified, standard hardware will be supplied. Hardware is also available separately, see **HARDWARE** section, page D-14.

## UNAVAILABLE OPTION COMBINATIONS

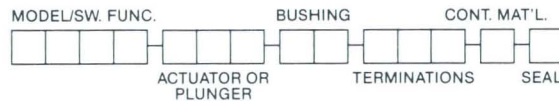
### Model or Option

8121 thru 8421, U811 thru U841  
8125 thru 8425  
I

### Options Not Available

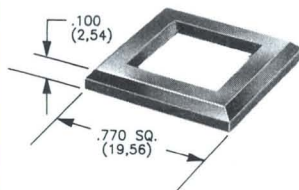
B\*  
G  
A, AV2, A2, A4, A6, R, R2, V3-V9, V30-V90

\*UL listed switches must be ordered with G contact material because UL considers for listing only those components suitable for power applications.



## SQUARE FRAME

**NEW**



Matte finish P/N 4867  
Gloss finish P/N 4868

Square frames available separately or installed on switch.

To order separately: specify 4 digit part number for frame (matte finish—P/N 4867, gloss finish—P/N 4868) and desired color in word form (Example: P/N 4867 RED). If no color is specified, black will be supplied.

To order switches with frames installed: specify switch order number, followed by 4 digit part number for frame. Write desired frame color and actuator color in word form (Example: 8121-J81-Z-G-E with GRAY ACTUATOR and BLACK FRAME P/N 4868). If no colors are specified, black will be supplied standard.



SWITCH SERIES	ACTUATOR OPTIONS AVAIL. WITH SQ. FRAME
8020	J80, J81, J83, J85

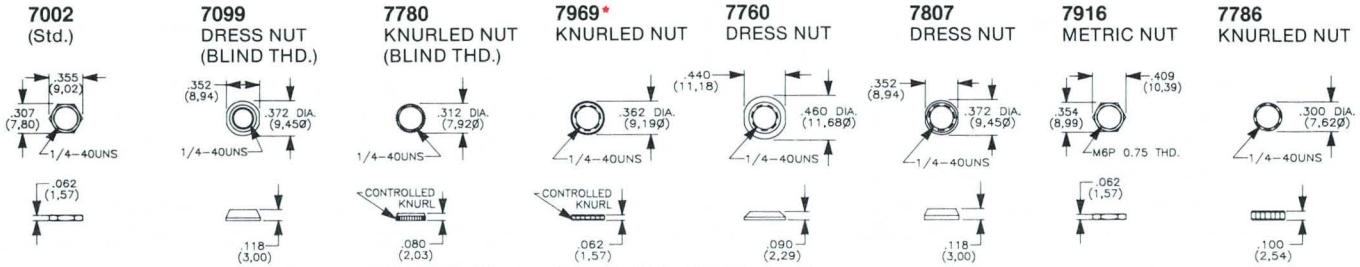


# 8020 Series Snap-Acting Momentary Pushbutton Switches

## AVAILABLE HARDWARE

The following hardware is available separately. To order, write part nos., descriptions and colors where applicable.

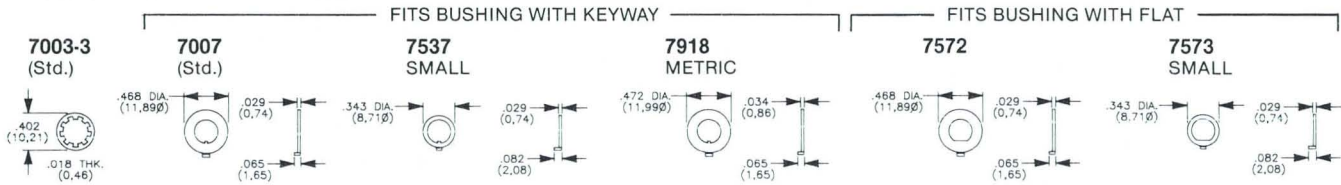
### NUTS



\* Controlled knurl pattern fits 'Gulmite' #12 socket.

### LOCKWASHER

### LOCKING RINGS



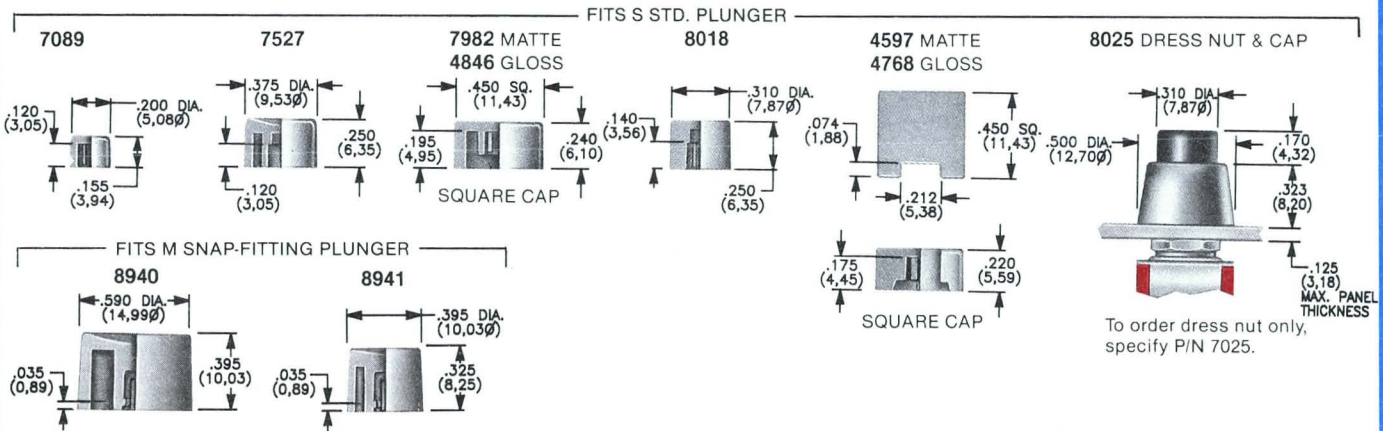
**MATERIALS** NUTS, LOCKING RINGS - Brass, nickel plated.  
LOCKWASHERS - Steel, bright nickel plated.

### WRENCHES

Wrenches are available to fit most nut styles. See page A-13.

### CAPS

All caps: finish, gloss, except where noted; material, nylon. See color chart below.



To order dress nut only, specify P/N 7025.

### FRAMES

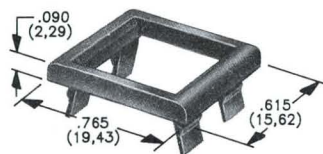
Frames for the following actuator options are available separately. Chart shows available colors. For illustrations and dimensions of parts not shown, see pages noted. Frame finish: matte; material, nylon.

FRAME P/N	FITS ACTUATOR OPTION	SEE PAGE NO.
7890	J81, J86	D-3, D-4
8058	J82	D-4

### SNAP-IN FRAMES

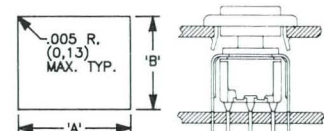
Frames below snap into panel opening and are independent from switch mounting. They are recommended for P.C. mounted switches with A, AV2, V3 - V9 or V30 - V90 terminations and square caps. Accurate positioning of the P.C. mounted switch relative to the panel opening is necessary to provide proper clearance between the cap and the frame. See charts for correct part no., panel thickness and available colors. Frame finish: matte; material, nylon.

CAP AND FRAME COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		



FRAME PART NO.	PANEL THICKNESS	DIM. 'A'	DIM. 'B'
4325	.047 (1,19)	.595-.605	.495-.500
4326	.062 (1,57)	(15,11-15,37)	(12,57-12,70)
4327	.090 (2,29)	.620-.625	.495-.500
4328	.125 (3,18)	(15,75-15,88)	(12,57-12,70)

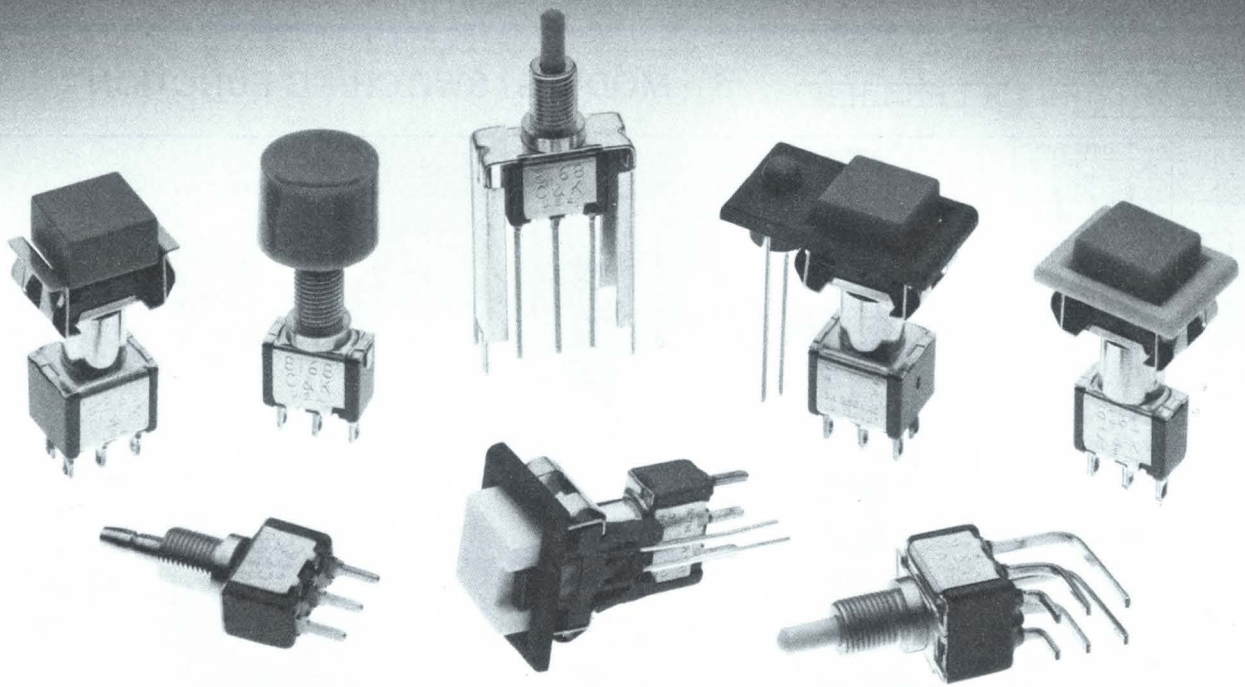
### MOUNTING INFORMATION



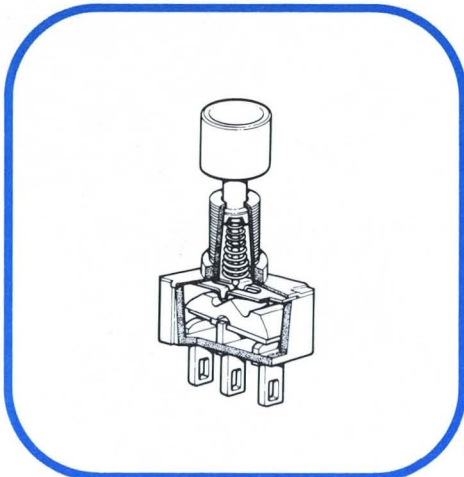


# 8060 SERIES

## ALTERNATE ACTION & MOMENTARY PUSHBUTTON SWITCHES



SECTION E



### SPECIFICATIONS

CONTACT RATING: 6 AMPS @ 120 V AC or 28 V DC; 3 AMPS @ 250 V AC.  
 ELECTRICAL LIFE: Models ending in -61 (alternate action): 100,000 actuations at full load. Models ending in -68 (momentary): 50,000 actuations.  
 CONTACT RESISTANCE: Below 20 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.  
 INSULATION RESISTANCE:  $10^9$  ohms min.  
 DIELECTRIC STRENGTH: 1,000 V RMS min. @ sea level.  
 OPERATING TEMPERATURE: -30°C to 65°C.

### MATERIALS

CASE: Diallyl phthalate (DAP) or melamine phenolic.  
 PLUNGER: Glass filled nylon or glass filled polyester.  
 BUSHING: Brass, nickel plated.  
 HOUSING: Stainless steel.  
 SWITCH SUPPORT: Brass or steel, electrotin plated.  
 END CONTACTS: Coin silver, silver plated (Q cont. mat'l.).  
 CENTER CONTACT & ALL TERMINALS: Brass, silver plated (Q cont. mat'l.).  
 TERMINAL SEAL: Epoxy.  
 HARDWARE: Nut-Brass, nickel plated.  
 Locking ring- Brass, bright nickel plated.  
 Lockwasher- Steel, bright nickel plated.

### NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

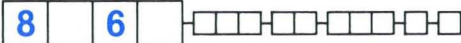
## E INTRODUCTION

Available options for 8060 SERIES ALTERNATE ACTION AND MOMENTARY PUSHBUTTON SWITCHES are shown on pages E-2 thru E-9. Make selections from the following option sections: Model/Switching Function, Actuator or Plunger, Bushing, Terminations, Contact Material and Epoxy Terminal

Seal. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page E-9. Available hardware and accessories shown on page E-10.

8161 and 8168 models UL / CSA listed with all options when ordered with G, Q, L or M contact material. Z termination option CSA listed only when ordered with I epoxy base seal. See HOW TO ORDER, page E-9.

### MODEL/SW. FUNC.

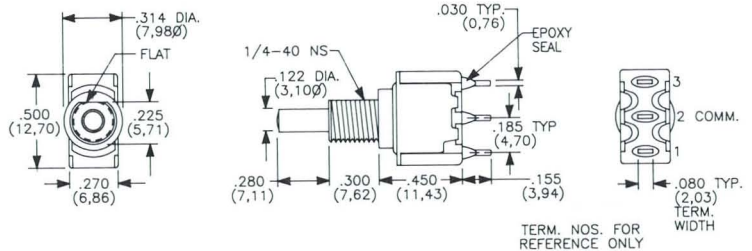


## MODELS / SWITCHING FUNCTION

MODEL NO.	SWITCHING FUNC.	
	POS 1	POS 2
8161	ON	ON
8168	POS 1	POS 2
	ON	MOM.
CONNECTED TERMINALS	2-3	2-1
SCHMATIC		
MOM. = MOMENTARY POSITION		



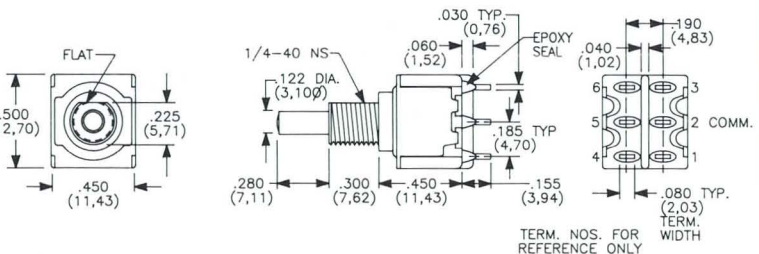
U.S. PAT. NO. 4,095,070  
**SPDT**



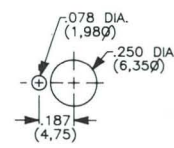
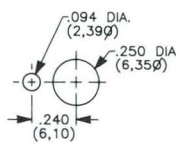
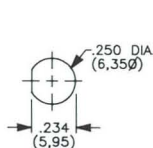
MODEL NO.	SWITCHING FUNC.	
	POS 1	POS 2
8261	ON	ON
CONNECTED TERMINALS	2-3,5-6	2-1,5-4
SCHMATIC		



U.S. PAT. NO. 4,095,070  
**DPDT**



### PANEL MOUNTING





# C&K 8060 Series Alternate Action and Momentary Pushbutton Switches

## INTRODUCTION TO ACTUATOR AND PLUNGER OPTIONS

8060 Series ACTUATOR and PLUNGER OPTIONS are shown below and on pages E-4 and E-5. Select *either* Actuator or Plunger option for desired configuration. Note available terminations with each option. Also note that caps are supplied with all switch models, see PLUNGER OPTIONS. Select cap and frame colors from chart at right. When ordering, write desired color(s) in word form after order number. If no color is specified, black will be supplied. See HOW TO ORDER, page E-9.

Caps available in 9 styles and 9 colors, see HARDWARE, page E-10. L.E.D.'s not furnished with J82 actuator option. L.E.D.'s are built-in and not replaceable on J86 and J96 actuator options. See page E-4 for L.E.D. information and available colors.

CAP AND FRAME COLORS	
1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

## MATERIALS FOR ACTUATOR OPTIONS J80 thru J96

MOUNTING SPRING: Steel, nickel plated or stainless steel.

MOUNTING BRACKET: Stainless steel.


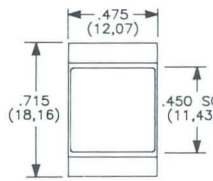
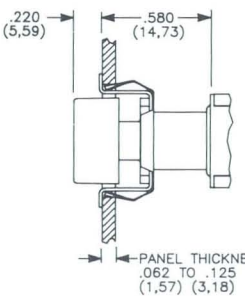
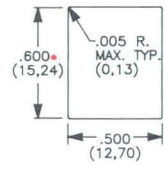
CAP & FRAME: Nylon.

L.E.D. SUPPORT: Nylon.

E

### ACTUATOR OR PLUNGER ACTUATOR OPTIONS FOR SNAP-IN FRONT MOUNTING Available with Z, C, Z3 or W-W5 terminations.

**J80**


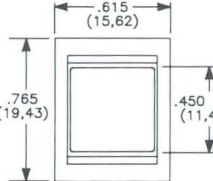
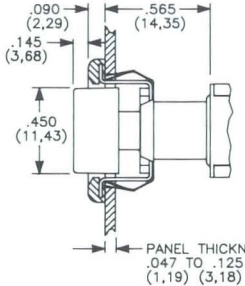
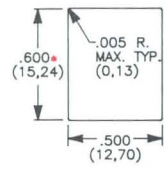
CAP P/N 7982

Panel Thickness: .062 TO .125 (1.57) (3.18)

Cap finish: matte; available colors, see above.

\* For .091/.125 (2.31/3.18) THK. panel, increase this DIM. to .620/.625 (15.75/15.88).

**J81 WITH FRAME**

FRAME P/N 7890  
CAP P/N 7982

Panel Thickness: .047 TO .125 (1.19) (3.18)

Cap and frame finish: matte; available colors, see above.

\* For .091/.125 (2.31/3.18) THK. panel, increase this DIM. to .620/.625 (15.75/15.88).

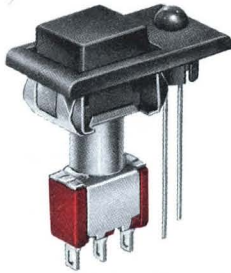
ACTUATOR OR PLUNGER



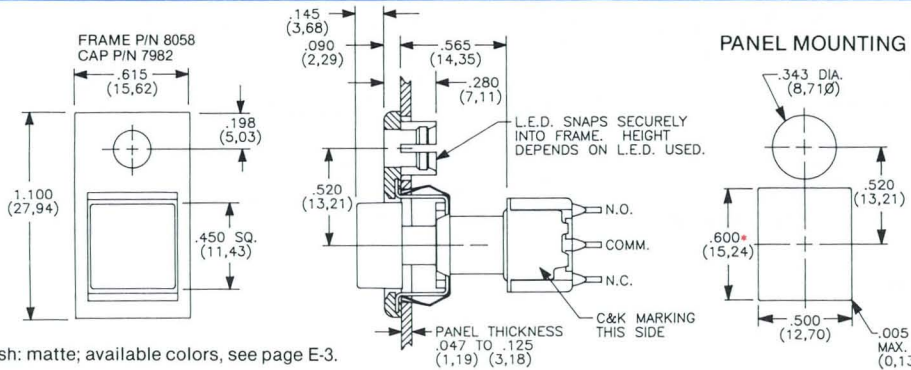
## ACTUATOR OPTIONS FOR SNAP-IN FRONT MOUNTING (cont'd.)

Available with Z, C, Z3 or W-W5 terminations.

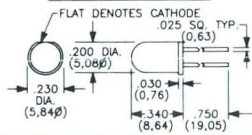
### J82 WITH FRAME FOR L.E.D.



U.S. PAT. NO. 4,004,120 Cap and frame finish: matte; available colors, see page E-3.



#### RECOMMENDED L.E.D. DIMENSIONS



#### L.E.D. INFORMATION (L.E.D. NOT SUPPLIED)

##### SUGGESTED L.E.D. LAMP MODELS AND SUPPLIERS

GEN. INSTRUMENT	XCITON	SIEMENS CORP.
MV5054-Red	XC556-Red	LD41-Red
MV5253-Green	XC556G-Green	LD57-Green
MV5353-Yellow	XC556Y-Yellow	LD55-Yellow

##### TYPICAL L.E.D. RATINGS

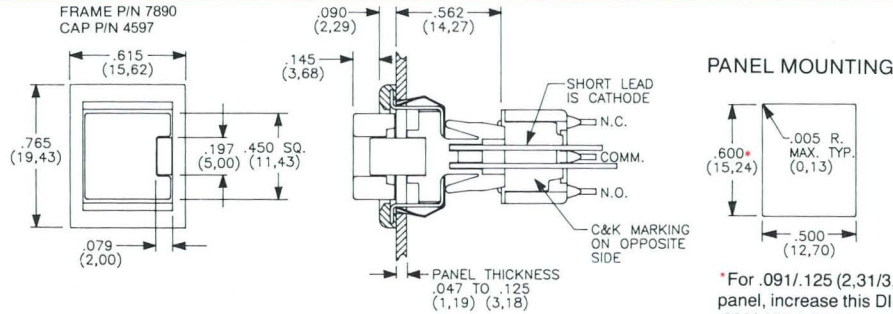
Forward Voltage	Current	Power	Max. Reverse Voltage
2.3V	50mA	100mW	5V

\*For .091/.125 (2,31/3,18) THK. panel, increase this DIM. to .620/.625 (15,75/15,88).

### J86 WITH BUILT-IN L.E.D.



Cap and frame finish: matte; available colors, see page E-3.



#### L.E.D. INFORMATION

COLOR	TYP. INTENSITY	TYP. FORWARD VOLTAGE	TYP. FORWARD CURRENT
Green	2.5 mcd	2.1V	20mA
Red	8.0 mcd	2.1V	20mA
Yellow	3.0 mcd	2.1V	20mA

Max. Forward Voltage 2.5V\*  
Max. Continuous Forward Current 50mA\*  
Power Dissipation 100mW\*  
\*Max. Ratings at 25°C Ambient Temp.  
Process information: Soldering to L.E.D. leads must be completed within 5 seconds at 500°F (260°C) maximum

#### L.E.D. COLORS

COLOR NO.	COLOR
3	Red (Std.)
5	Yellow
6	Green

CAUTION: Circuit elements must limit forward current of L.E.D. to 50mA max. continuous

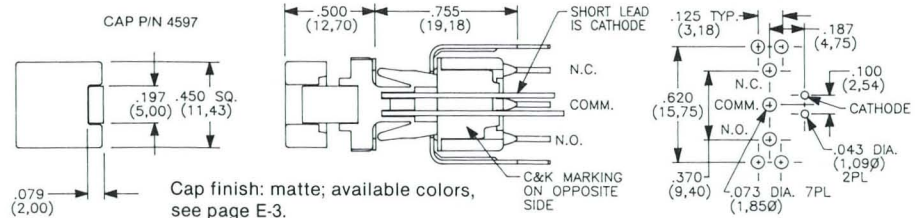
### J96 WITH BUILT-IN L.E.D.



SPDT MODELS ONLY

## ACTUATOR OPTION FOR P.C. MOUNTING

Available with V30 termination option only.



#### L.E.D. INFORMATION

COLOR	TYP. INTENSITY	TYP. FORWARD VOLTAGE	TYP. FORWARD CURRENT
Green	2.5 mcd	2.1V	20mA
Red	8.0 mcd	2.1V	20mA
Yellow	3.0 mcd	2.1V	20mA

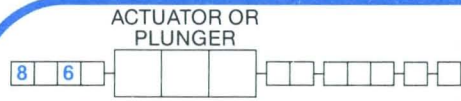
Max. Forward Voltage 2.5V\*  
Max. Continuous Forward Current 50mA\*  
Power Dissipation 100mW\*  
\*Max. Ratings at 25°C Ambient Temp.  
Process information: Soldering to L.E.D. leads must be completed within 5 seconds at 500°F (260°C) maximum

#### L.E.D. COLORS

COLOR NO.	COLOR
3	Red (Std.)
5	Yellow
6	Green

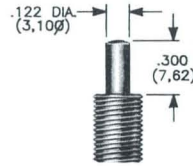
CAUTION: Circuit elements must limit forward current of L.E.D. to 50mA max. continuous.





## PLUNGERS

### S (Std.)



Black cap, P/N 7527 supplied std. Other caps available, see HARDWARE, page E-10.

Plunger material: glass filled nylon or glass filled polyester.

### L SNAP FITTING



Black cap, P/N 8941 supplied std. Other caps available, see HARDWARE, page E-10.

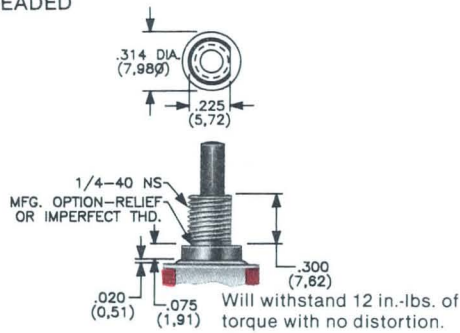
Plunger material, brass, nickel plated.

When selecting plunger option, bushing selection must also be made, see below.



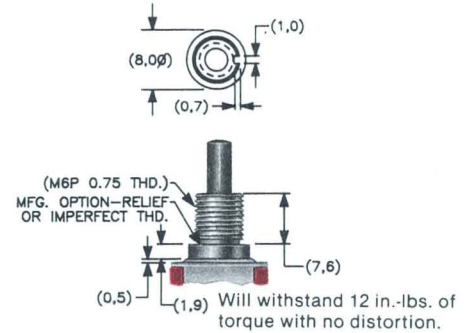
## BUSHINGS

### H H9 UNTHREADED

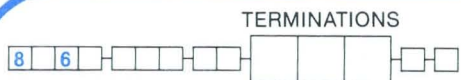


H bushing std. with Z, C, Z3 or W-W5 terminations.  
H9 bushing std. with A, AV2 or V30-V90 terminations.

### Y3 METRIC

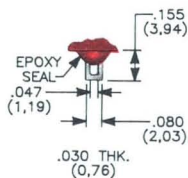


When selecting bushing option, plunger selection must also be made, see above. Std. S plunger shown.



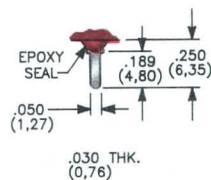
## TERMINATIONS

### Z (Std.)



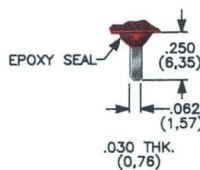
'Q' Contact Material Std.  
Not available with 'K',  
'L' or 'M' Contact Material.

### C



'Q' Contact Material Std.

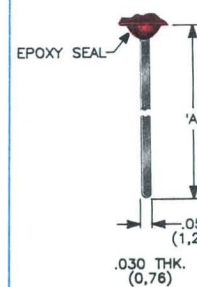
### Z3 QUICK CONNECT



Mating quick connector available; order part no. 5301.

'Q' Contact Material Std.  
Not available with 'K',  
'L' or 'M' Contact Material.

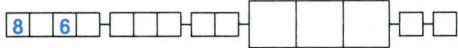
### W-W5 WIRE-WRAP



OPTION CODE	DIM. 'A'
W	.750(19,05)
W1	.964(24,48)
W3	.425(10,80)
W4	1.062(26,97)
W5	1.305(33,15)

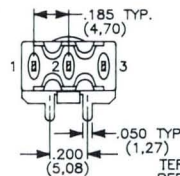
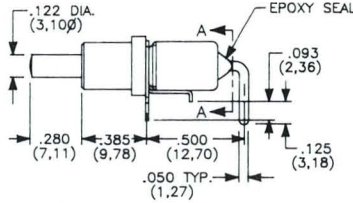
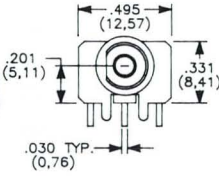
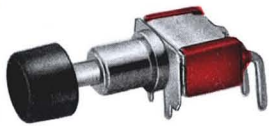
Wire-Wrap is a registered trademark of the Gardner-Denver Company.  
'B' Contact Material Std.

TERMINATIONS

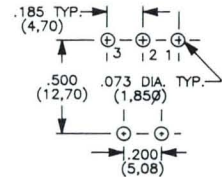


TERMINATIONS (cont'd.)

A



P.C. MOUNTING



TERM. NOS. FOR REFERENCE ONLY

SECTION A-A

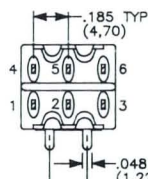
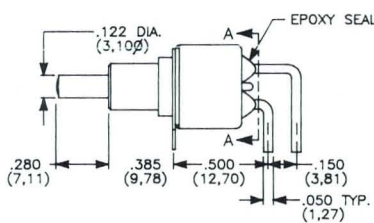
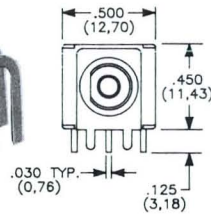
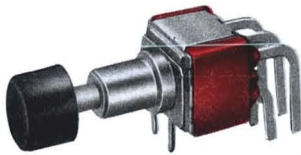
SPDT

'B' Contact Material Std.

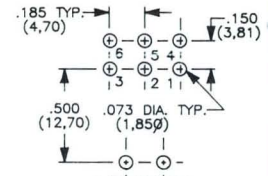
Term. bend radii mfg. option.

E

A



P.C. MOUNTING



TERM. NOS. FOR REFERENCE ONLY

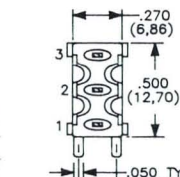
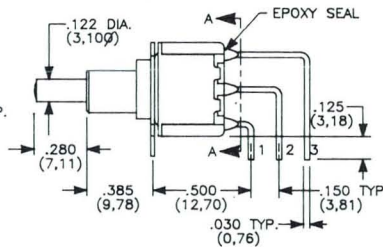
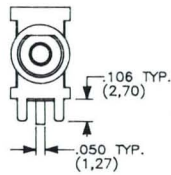
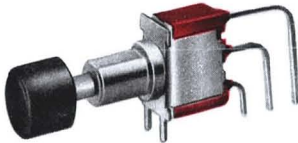
SECTION A-A

DPDT

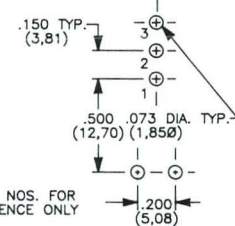
'B' Contact Material Std.

Term. bend radii mfg. option.

AV2



P.C. MOUNTING



TERM. NOS. FOR REFERENCE ONLY

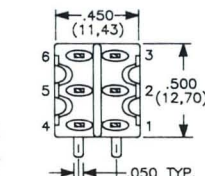
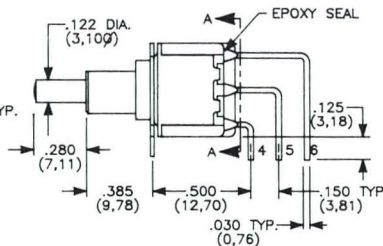
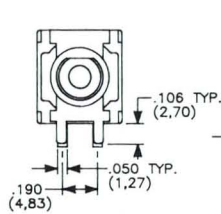
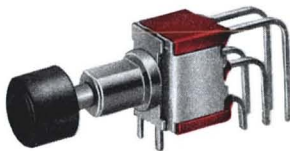
SECTION A-A

SPDT

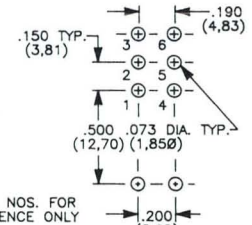
'B' Contact Material Std.

Term. bend radii mfg. option.

AV2



P.C. MOUNTING



TERM. NOS. FOR REFERENCE ONLY

SECTION A-A

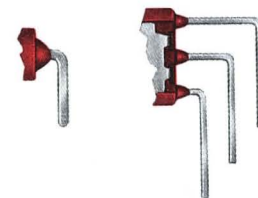
DPDT

'B' Contact Material Std.

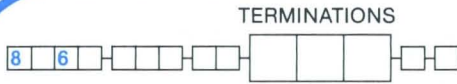
Term. bend radii mfg. option.

EXTENDED TERMINAL OPTION

Switches with A or AV2 terminations may be ordered with extended terminals, as shown. This provides easier installation into P.C. boards. To order, specify 'Extended Terminals' in word form after order number.





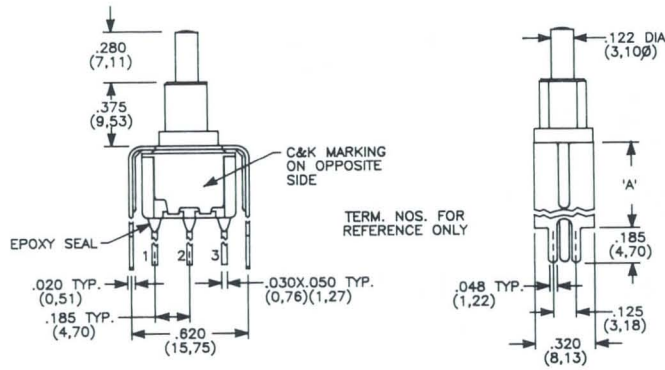


TERMINATIONS (cont'd.)

V30-V40-V90

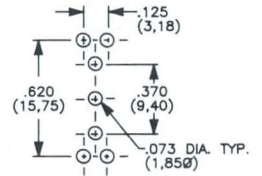


SPDT



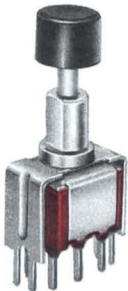
'B' Contact Material Std.

P.C. MOUNTING

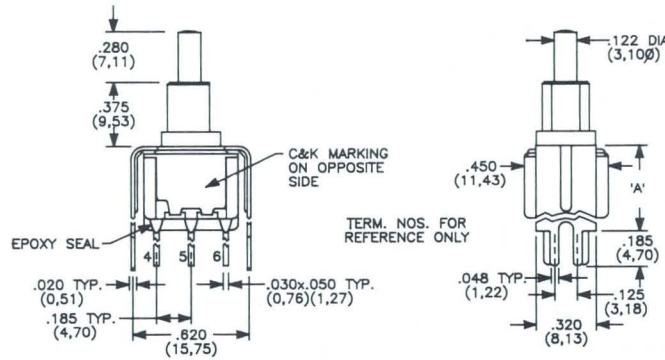


OPTION CODE	DIM. 'A'
V30	.460 (11,68)
V40	.630 (16,00)
V90	1.150 (29,21)

V30-V40-V90

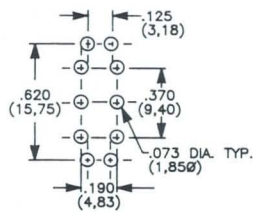


DPDT



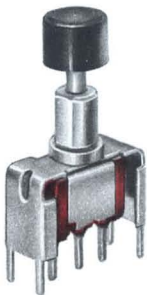
'B' Contact Material Std.

P.C. MOUNTING

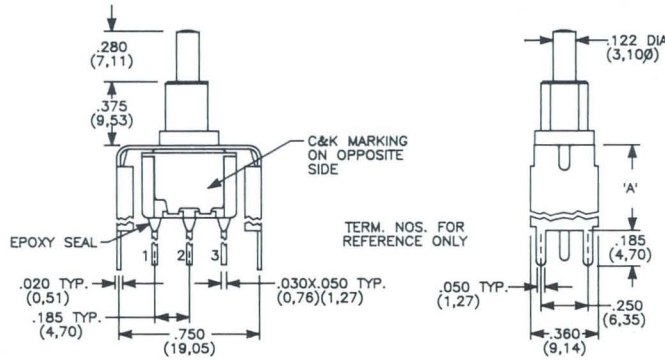


OPTION CODE	DIM. 'A'
V30	.460 (11,68)
V40	.630 (16,00)
V90	1.150 (29,21)

V60-V70-V80

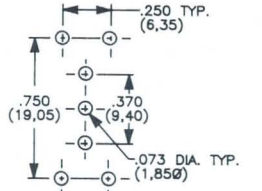


SPDT



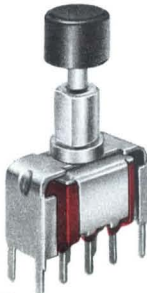
'B' Contact Material Std.

P.C. MOUNTING

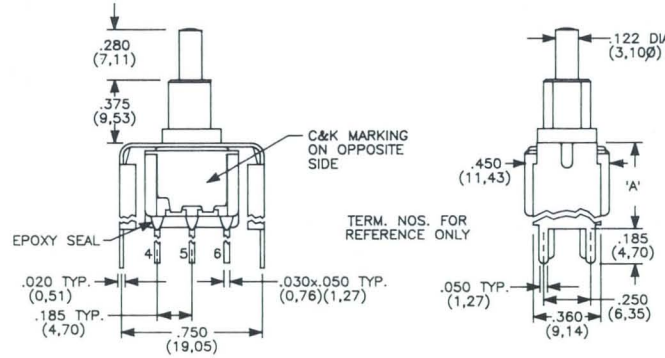


OPTION CODE	DIM. 'A'
V60	.460 (11,68)
V70	.630 (16,00)
V80	.953 (24,21)

V60-V70-V80

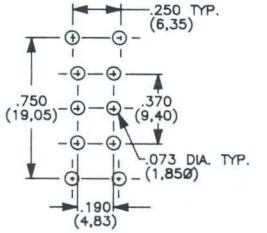


DPDT



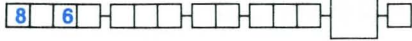
'B' Contact Material Std.

P.C. MOUNTING



OPTION CODE	DIM. 'A'
V60	.460 (11,68)
V70	.630 (16,00)
V80	.953 (24,21)

CONT. MAT'L.


**NEW TIN-LEAD TERMINATIONS**
**CONTACT MATERIALS**

- B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Std. with all termination options exc. Z, C, Z3)
- Q** END CONTACTS: Coin silver, silver plated.  
CENTER CONTACT & ALL TERMINALS: Brass, silver plated.  
RATING: 6 AMPS @ 120 V AC or 28 V DC; 3 AMPS @ 250 V AC. (Std. with termination options Z, C, Z3)
- G** END CONTACTS: Coin silver, with gold plate over nickel plate.  
CENTER CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 6 AMPS @ 120 V AC or 28 V DC; 3 AMPS @ 250 V AC.

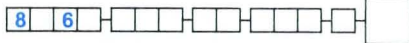
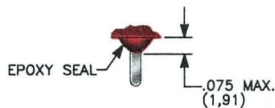
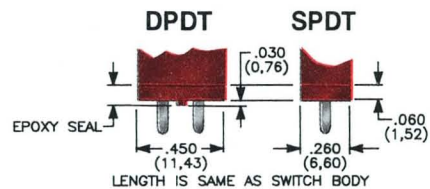
**NEW TIN-LEAD PLATED TERMINATIONS**

- K** CONTACTS: Brass, with gold plate over nickel plate (same as B contact material).  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Available with C, W-W5, A, AV2, V30-V90 termination options only)
- M** END CONTACTS: Coin silver, silver plated. ] (same as Q contact material)  
CENTER CONTACT: Brass, silver plated. ]  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 6 AMPS @ 120 V AC or 28 V DC; 3 AMPS @ 250 V AC. (Available with C, W-W5, A, AV2, V30-V90 termination options only)
- L** END CONTACTS: Coin silver, with gold plate over nickel plate. ] (same as G contact material)  
CENTER CONTACT: Brass, with gold plate over nickel plate. ]  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 6 AMPS @ 120 V AC or 28 V DC; 3 AMPS @ 250 V AC. (Available with C, W-W5, A, AV2, V30-V90 termination options only)

**Note:** G and L contact materials are electrically equivalent to B, Q, K and M contact materials and can be used where either dry circuit\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. These options should be specified where UL or CSA listing is required on a switch used in a dry circuit application.

\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.

SEAL


**SEALING**
**E (Std.)**

**I**


Available only with Z, C, Z3 or W-W5 terminations.



**HOW TO ORDER**

Complete the order number below by selecting the desired model no., actuator or plunger, bushing (with plunger options only), termination, contact material and terminal sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Where applicable, write cap and frame colors in word form after order number.

(Example:  with red cap and white frame).

If no color is specified, black will be supplied. Black cap, P/N 7527, supplied standard, not installed, on all models with **S** plunger option. Black cap, P/N 8941, supplied with **L** plunger option.

For **J86** and **J96** actuator options, write L.E.D. color in word form after order number. L.E.D.'s not furnished with **J82** actuator option.

**S** plunger, **H** bushing, **Z** terminations, **Q** contact material and **E** epoxy terminal seal are supplied if no options are specified. **H9** bushing standard with **A**, **AV2** and **V30-V90** terminations.

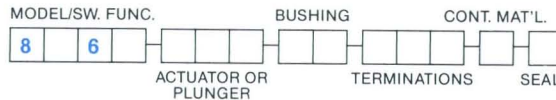
**8161** and **8168** models UL/CSA listed with all options when ordered with **G**, **Q**, **L** or **M** contact material. **Z** termination option CSA listed only when ordered with **I** epoxy base seal.

Note: Custom markings and legends available, see inside front cover and consult factory.

**HARDWARE:** Two mounting nuts, locking ring and lockwasher are supplied standard, where applicable. Optional mounting nut styles, locking rings, frames and caps available. Write part descriptions and part nos. in word form after order number. If nothing is specified, standard hardware will be supplied. Hardware is also available separately, see **HARDWARE** section, page E-10.

**UNAVAILABLE OPTION COMBINATIONS**

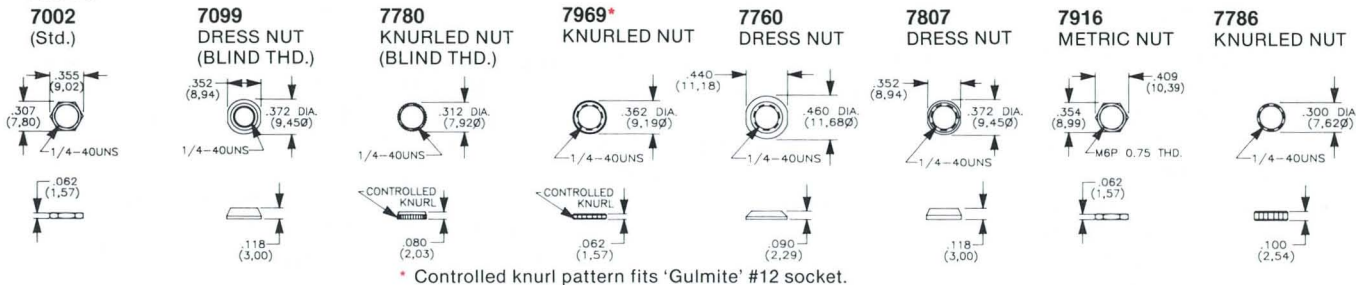
<u>Model or Option</u>	<u>Options Not Available</u>
I	A, AV2, V30-V90
Z, Z3	K, L, M



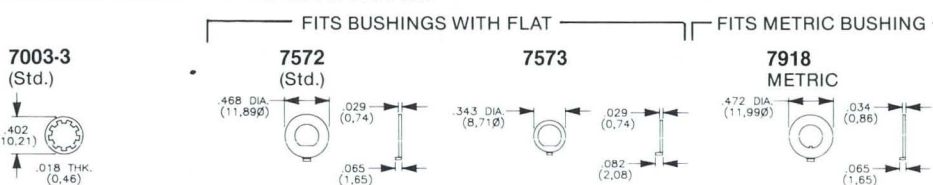
## AVAILABLE HARDWARE

The following hardware is available separately. To order, write part nos., descriptions and colors where applicable.

### NUTS



### LOCKWASHER LOCKING RINGS



### MATERIALS

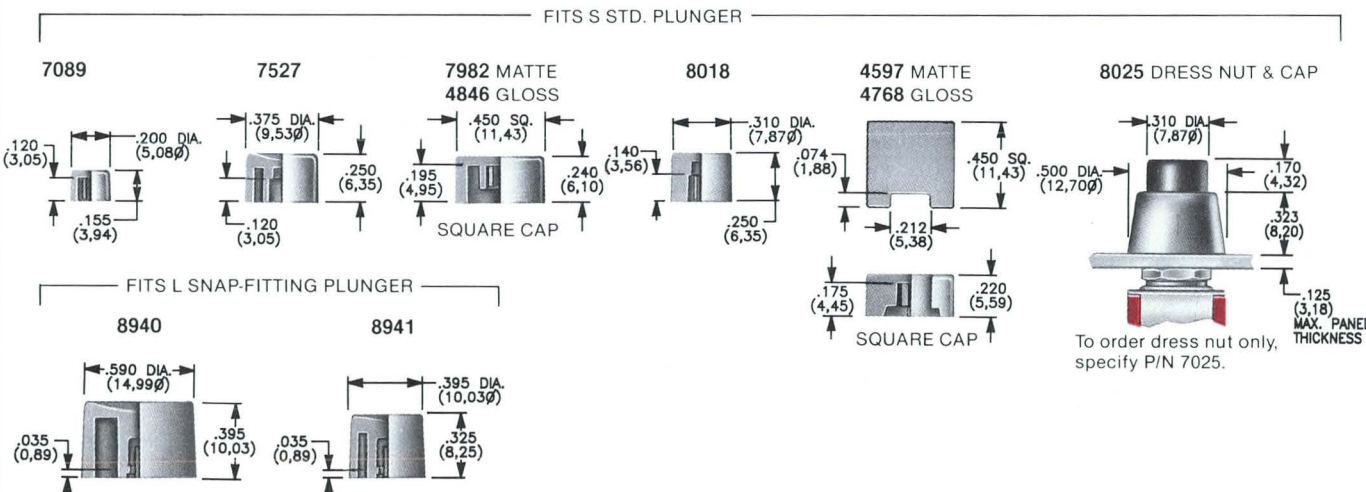
NUTS, LOCKING RINGS - Brass, nickel plated.  
LOCKWASHERS - Steel, bright nickel plated.

### WRENCHES

Wrenches are available to fit most nut styles. See page A-13.

### CAPS

All caps: finish, gloss, except where noted; material, nylon. See color chart below.



### FRAMES

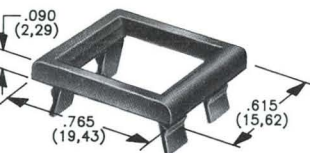
Frames for the following actuator options are available separately. Chart shows available colors. For illustrations and dimensions of parts not shown, see pages noted. Frame finish: matte; material, nylon.

FRAME P/N	FITS ACTUATOR OPTION	SEE PAGE NO.
7890	J81, J86	E-3, E-4
8058	J82	E-4

### SNAP-IN FRAMES

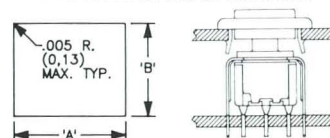
Frames below snap into panel opening and are independent from switch mounting. They are recommended for P.C. mounted switches with A, AV2 or V30 - V90 terminations and square caps. Accurate positioning of the P.C. mounted switch relative to the panel opening is necessary to provide proper clearance between the cap and the frame. See charts for correct part no., panel thickness and available colors. Frame finish: matte; material, nylon.

CAP AND FRAME COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		



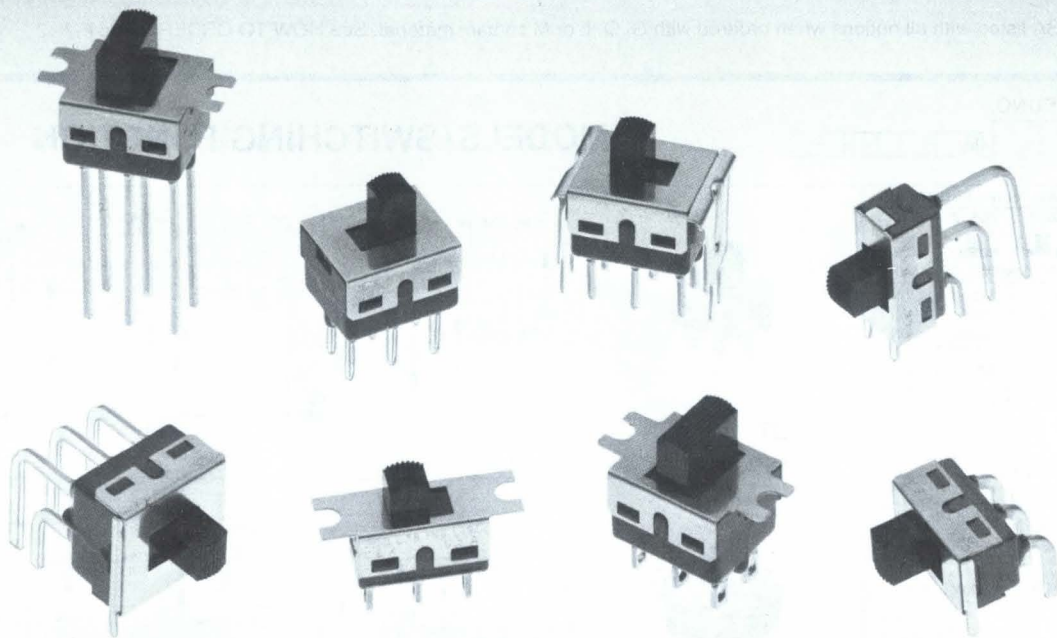
FRAME PART NO.	PANEL THICKNESS	DIM. 'A'	DIM. 'B'
4325	.047 (1,19)	.595-.605	.495-.500
4326	.062 (1,57)	(15,11-15,37)	(12,57-12,70)
4327	.090 (2,29)	.620-.625	.495-.500
4328	.125 (3,18)	(15,75-15,88)	(12,57-12,70)

### MOUNTING INFORMATION





# 1000 SERIES MINIATURE SLIDE SWITCHES



SECTION F

F

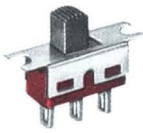




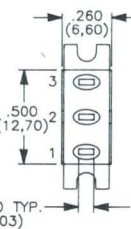
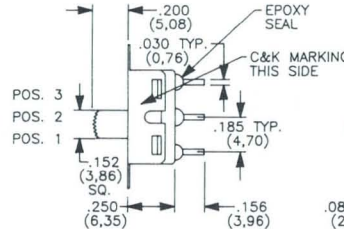
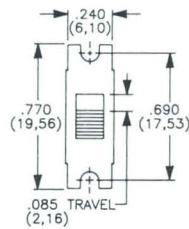


## MOUNTING STYLE

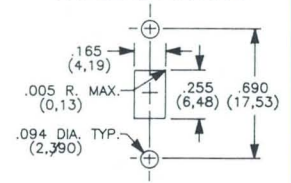
**M1**



**SPDT**



**PANEL MOUNTING**



TERM. NOS. FOR REFERENCE ONLY

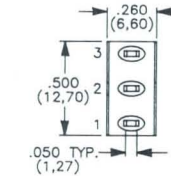
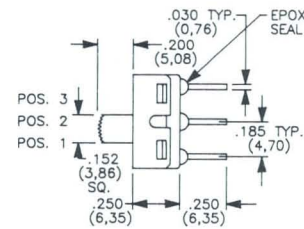
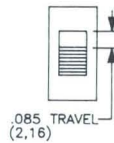
Available with Z, C, Z3 or W-W5 terminations.

**M2**

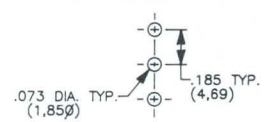
1101 - M2 - C - QE - 9



**SPDT**



**P.C. MOUNTING**



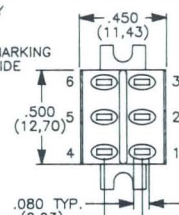
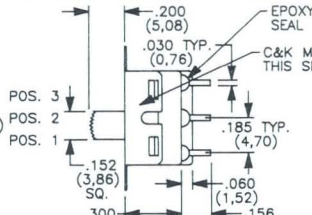
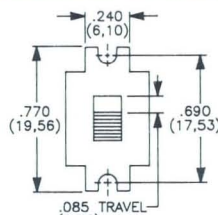
TERM. NOS. FOR REFERENCE ONLY

Available with C, A, AV2, V3, V4 or W-W5 terminations.

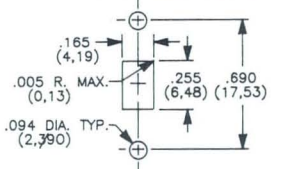
**M1**



**DPDT  
1201 MODEL ONLY**



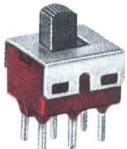
**PANEL MOUNTING**



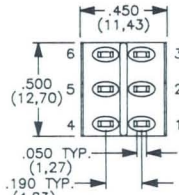
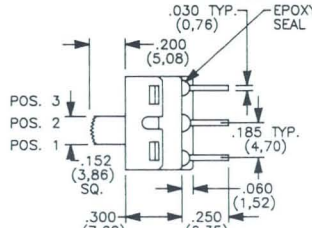
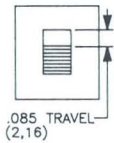
TERM. NOS. FOR REFERENCE ONLY

Available with Z, C, Z3 or W-W5 terminations.

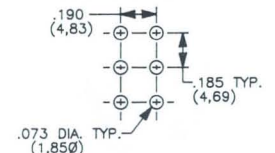
**M2**



**DPDT  
1201 MODEL ONLY**



**P.C. MOUNTING**



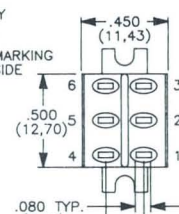
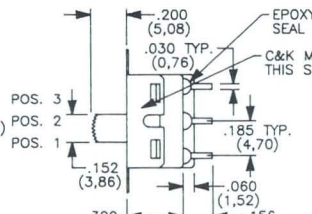
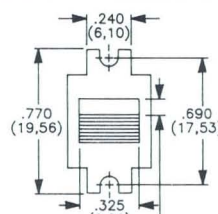
TERM. NOS. FOR REFERENCE ONLY

Available with C, A, AV2, V3, V4 or W-W5 terminations.

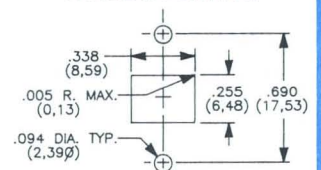
**M1**



**DPDT  
1203 MODEL ONLY**



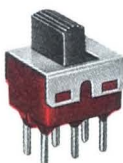
**PANEL MOUNTING**



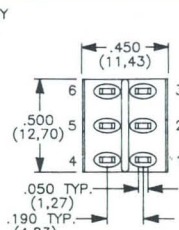
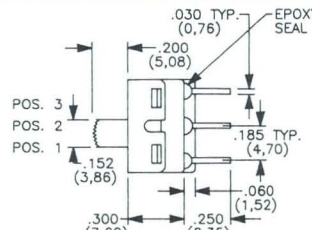
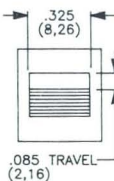
TERM. NOS. FOR REFERENCE ONLY

Available with Z, C, Z3 or W-W5 terminations.

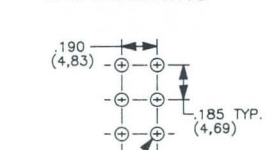
**M2**



**DPDT  
1203 MODEL ONLY**

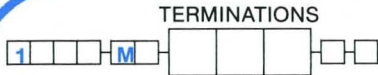


**P.C. MOUNTING**



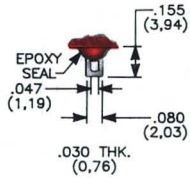
TERM. NOS. FOR REFERENCE ONLY

Available with C, A, AV2, V3, V4 or W-W5 terminations.



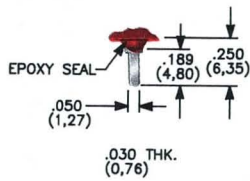
## TERMINATIONS

**Z**



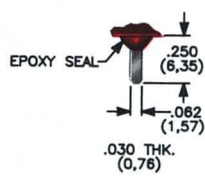
'Q' Contact Material Std.  
Not avail. with 'K', 'L' or 'M' Contact Material.

**C**



'Q' Contact Material Std.

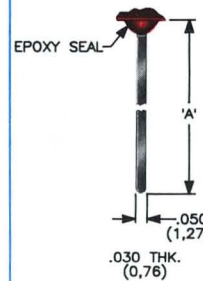
**Z3 QUICK CONNECT**



Mating quick connector available; order part no. 5301.

'Q' Contact Material Std.  
Not avail. with 'K', 'L' or 'M' Contact Material.

**W-W5 WIRE-WRAP**



OPTION CODE	DIM. 'A'
W	.750 (19,05)
W1	.964 (24,48)
W3	.425 (10,80)
W4	1.062 (26,97)
W5	1.305 (33,15)

Wire-Wrap is a registered trademark of the Gardner-Denver Company.

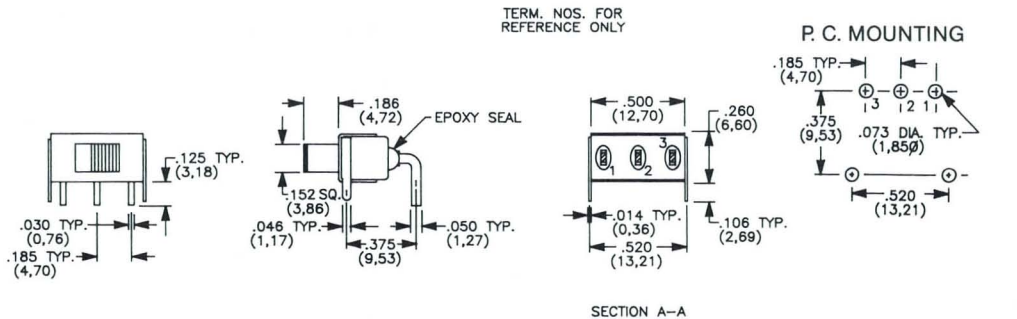
'B' Contact Material Std.

**A**



**SPDT**

Actuator shown in POS.1.



'B' Contact Material Std.

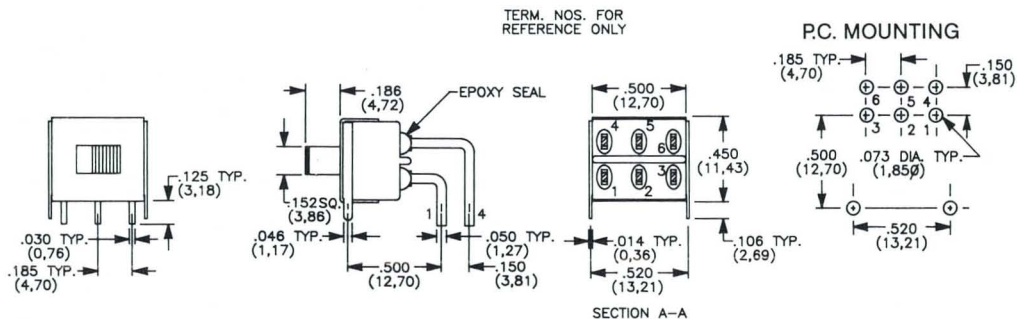
Term. bend radii mfg. option.

**A**



**DPDT  
1201 MODEL ONLY**

Actuator shown in POS.1.



'B' Contact Material Std.

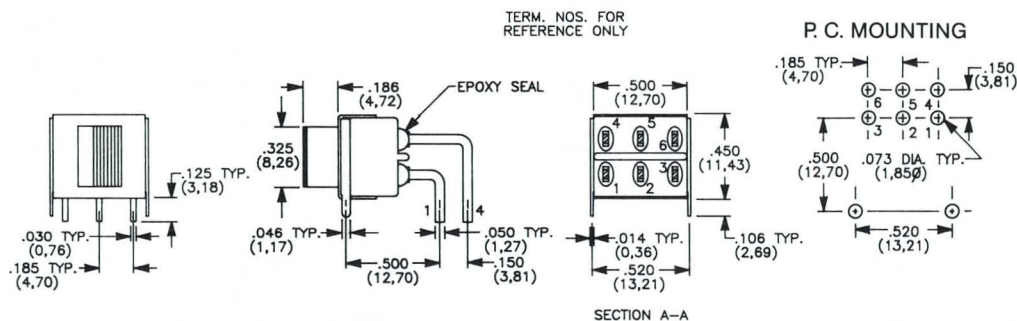
Term. bend radii mfg. option.

**A**



**DPDT  
1203 MODEL ONLY**

Actuator shown in POS.1.



'B' Contact Material Std.

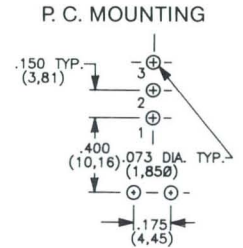
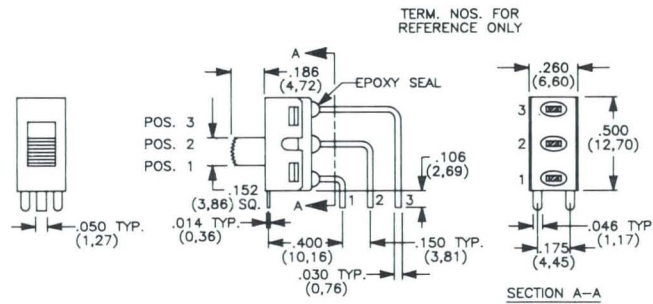
Term. bend radii mfg. option.





**TERMINATIONS (cont'd.)**

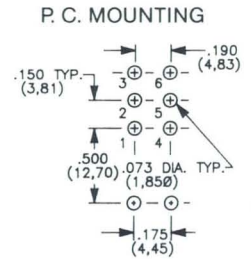
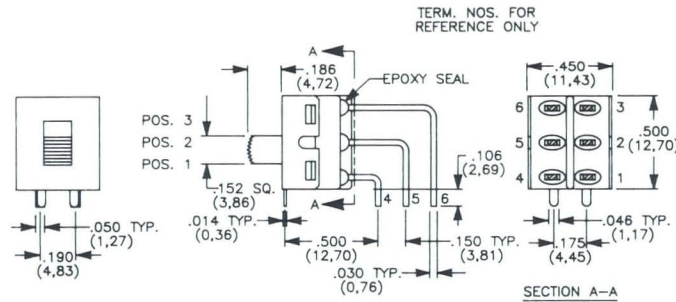
**AV2**



**SPDT**

'B' Contact Material Std. Term. bend radii mfg. option.

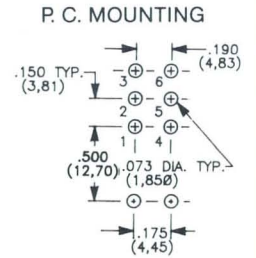
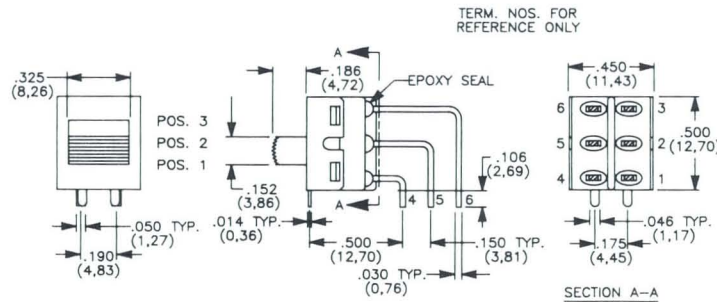
**AV2**



**DPDT  
1201 MODEL ONLY**

'B' Contact Material Std. Term. bend radii mfg. option.

**AV2**

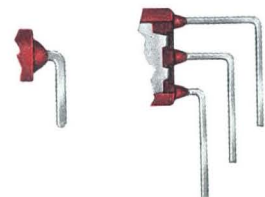


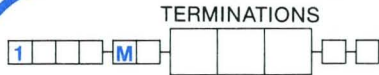
**DPDT  
1203 MODEL ONLY**

'B' Contact Material Std. Term. bend radii mfg. option.

**EXTENDED TERMINAL OPTION**

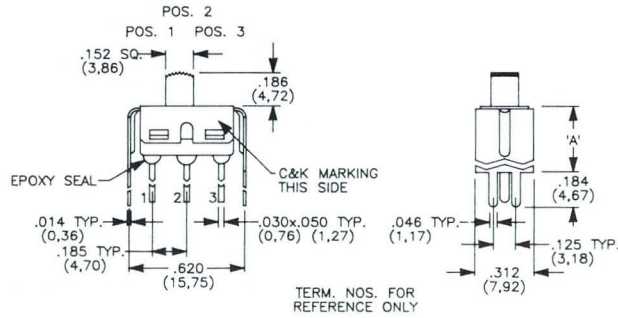
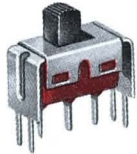
Switches with A or AV2 terminations may be ordered with extended terminals, as shown. This provides easier installation into P.C. boards. To order, specify 'Extended Terminals' in word form after order number.



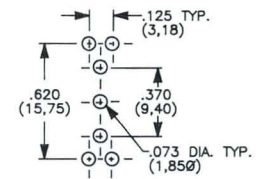


**TERMINATIONS (cont'd.)**

**V3-V4**



**P. C. MOUNTING**

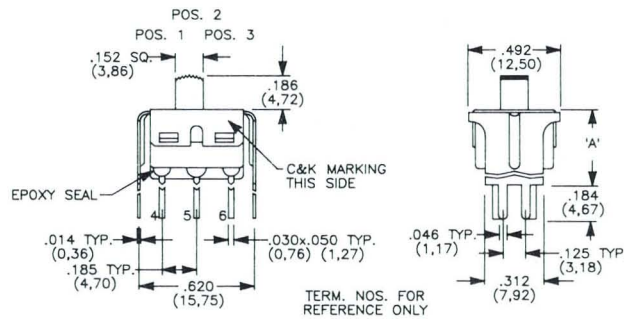
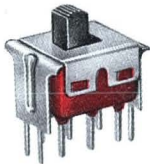


OPTION CODE	DIM. 'A'
V3	.350 (8,89)
V4	.525 (13,34)

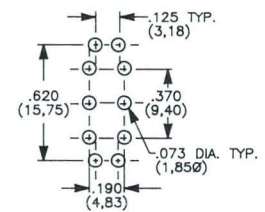
**SPDT**

'B' Contact Material Std.

**V3-V4**



**P. C. MOUNTING**

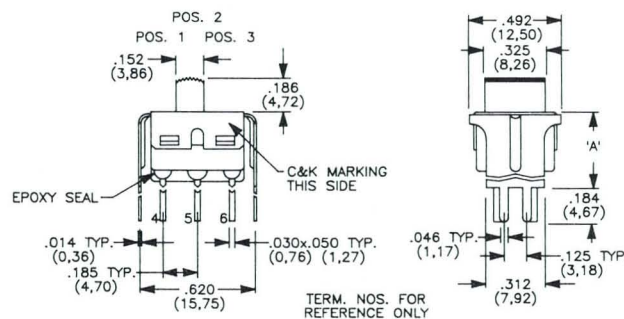
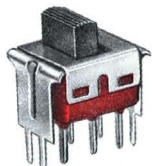


OPTION CODE	DIM. 'A'
V3	.400 (10,16)
V4	.575 (14,61)

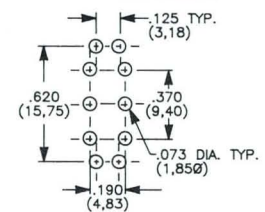
**DPDT  
1201 MODEL ONLY**

'B' Contact Material Std.

**V3-V4**



**P. C. MOUNTING**



OPTION CODE	DIM. 'A'
V3	.400 (10,16)
V4	.575 (14,61)

**DPDT  
1203 MODEL ONLY**

'B' Contact Material Std.



CONT. MAT'L.



**CONTACT MATERIALS**

- B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Std. with all termination options exc. Z, C, Z3)
- Q** END CONTACTS: Coin silver, silver plated.  
CENTER CONTACT & ALL TERMINALS: Brass, silver plated.  
RATING: 6 AMPS @ 120 V AC or 28 V DC; 3 AMPS @ 250 V AC (UL/CSA). (Std. with termination options Z, C, Z3)
- G** END CONTACTS: Coin silver, with gold plate over nickel plate.  
CENTER CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 6 AMPS @ 120 V AC or 28 V DC; 3 AMPS @ 250 V AC (UL/CSA).

**NEW TIN-LEAD PLATED TERMINATIONS**

- K** CONTACTS: Brass, with gold plate over nickel plate (same as B contact material).  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Available with C, W-W5, A, AV2, V3-V4 termination options only)
- M** END CONTACTS: Coin silver, silver plated. ] (same as Q contact material)  
CENTER CONTACT: Brass, silver plated. ]  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 6 AMPS @ 120 V AC or 28 V DC; 3 AMPS @ 250 V AC (UL/CSA). (Available with C, W-W5, A, AV2, V3-V4 termination options only)
- L** END CONTACTS: Coin silver, with gold plate over nickel plate. ] (same as G contact material)  
CENTER CONTACT: Brass, with gold plate over nickel plate. ]  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 6 AMPS @ 120 V AC or 28 V DC; 3 AMPS @ 250 V AC (UL/CSA). (Available with C, W-W5, A, AV2, V3-V4 termination options only)

**Note:** G and L contact materials are electrically equivalent to B, Q, K and M contact materials and can be used where either dry circuit\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. These options should be specified where UL or CSA listing is required on a switch used in a dry circuit application.

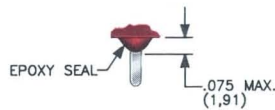
\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.

SEAL

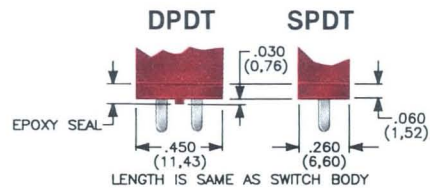


**SEALING**

**E (Std.)**



**I**



Available only with Z, C, Z3 or W-W5 terminations.

**HOW TO ORDER**

Complete the order number below by selecting the desired model no., mounting style, termination, contact material and terminal sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Write actuator color in word form after order number.

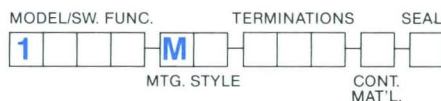
(Example: 1 2 0 1 M 1 Z 1 G E with blue actuator).

If no color is specified, black will be supplied.

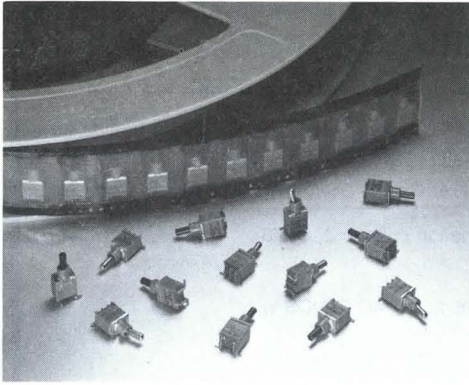
M1 mounting style, Q contact material and E epoxy terminal seal are supplied if no options are specified. No hardware is supplied.

All models UL/CSA listed with all options when ordered with G, Q, L or M contact material.

ACTUATOR COLORS	
1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray



# C&K ET & EP Series **NEW** Surface Mount Subminiature Switches



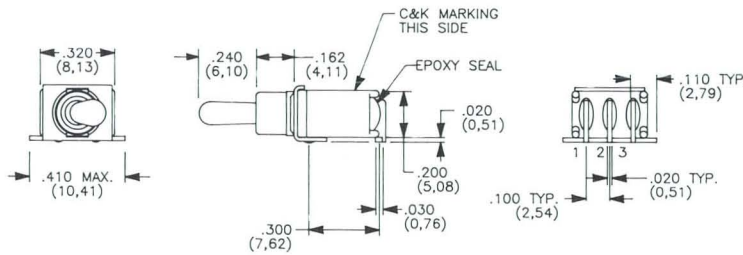
C&K's NEW ET AND EP SERIES SURFACE MOUNT SUBMINIATURE SWITCHES are designed and packaged with the industry's high speed automatic component placement equipment in mind. The switches can withstand both vapor phase and infrared reflow soldering methods and are sealed to eliminate the intrusion of flux during cleaning processes. All surface mounted models are supplied on embossed antistatic tape and reels per EIA 481A.

- SURFACE MOUNTING STYLE WITH TIN/LEAD PLATED TERMINALS.
- SWITCHES SEALED TO WITHSTAND WAVE SOLDERING AND CLEANING PROCESSES WITH STANDARD O-RING ACTUATOR SEAL, WELDED HOUSING AND EPOXY TERMINAL SEAL.
- SUPPLIED ON EMBOSSED ANTISTATIC TAPE AND REELS PER EIA 481A.
- SUBMINIATURE TOGGLE AND PUSHBUTTON MODELS—6 SWITCHING FUNCTIONS INCLUDING MOMENTARY MODELS.
- RATING: 0.4 VA max. @ 20V AC or DC max. WITH STANDARD CONTACT MATERIAL. POWER RATINGS ALSO AVAILABLE, CONSULT FACTORY.

SEE CATALOG SECTION G, PAGES G-3 AND G-10 FOR COMPLETE INFORMATION AND SPECIFICATIONS.

## ET SERIES SURFACE MOUNT TOGGLE SWITCHES

**NEW**



ORDER NO.	SWITCHING FUNCTION		
	POS 1 	POS 2 	POS 3 
ET01-M-D1-SA-K-E	ON	NONE	ON
ET03-M-D1-SA-K-E	ON	OFF	ON
ET05-M-D1-SA-K-E	MOM.	OFF	MOM.
ET07-M-D1-SA-K-E	ON	OFF	MOM.
ET08-M-D1-SA-K-E	ON	NONE	MOM.
CONNECTED TERMINALS	2-3	OPEN	2-1
SCHEMATIC			
MOM. = MOMENTARY POSITION			

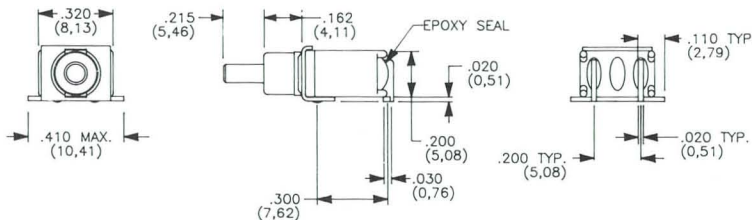
SPDT

ACTUATOR SHOWN IN POS. 1.

MODEL SHOWN: ET01-M-D1-SA-K-E

## EP SERIES SURFACE MOUNT PUSHBUTTON SWITCHES

**NEW**



ORDER NO.	SWITCHING FUNC.	
	POS 1 	POS 2 
EP11-D1-SA-K-E	OFF	MOM.
SCHEMATIC		
MOM. = MOMENTARY POSITION		

SPST

N.O. MOMENTARY

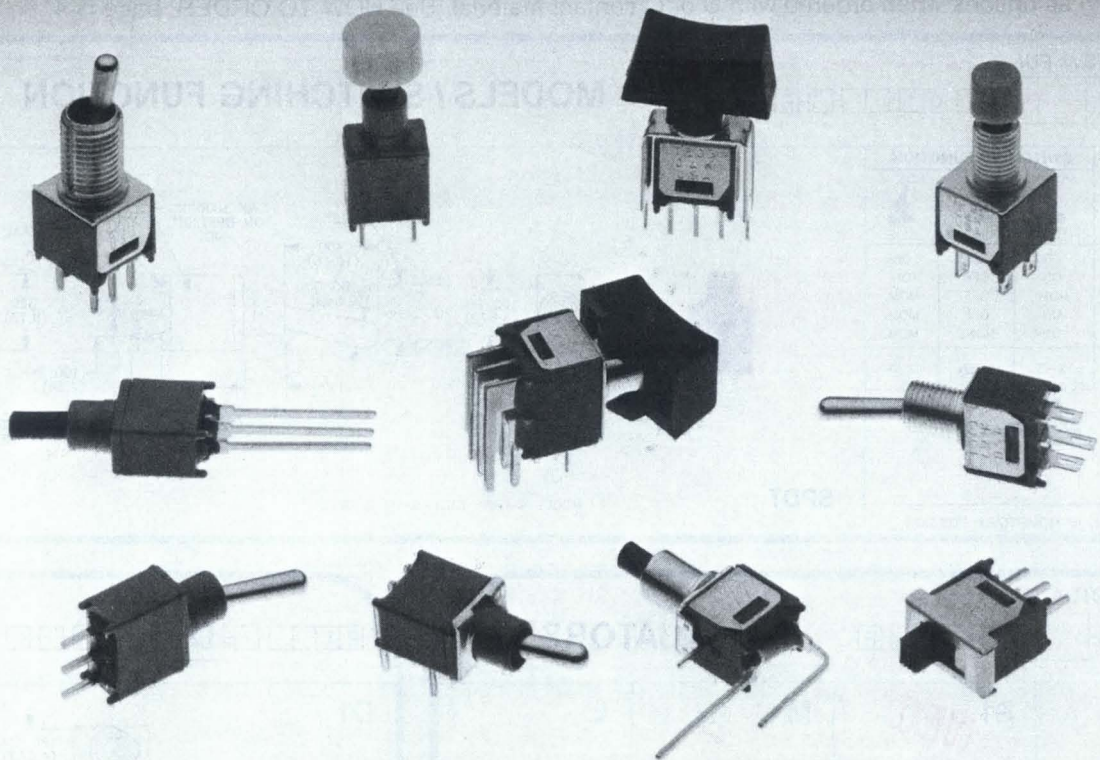
MODEL SHOWN: EP11-D1-SA-K-E

### HOW TO ORDER

Complete order numbers for selected ET and EP Series Surface Mount Toggle and Pushbutton Switches are provided above. See catalog section G for complete ET and EP Series specifications and other options.



# ET / EP / T / TP / TS SERIES TINY SWITCHES



## SECTION G INDEX

ET Series Sealed Tiny Toggle Switches .....	G-2 thru G-4
ET Series Sealed Tiny Rocker Switches .....	G-5 thru G-8
EP Series Sealed Tiny Pushbutton Switches .....	G-9 thru G-12
T Series Tiny Toggle Switches .....	G-13 thru G-17
T Series Tiny Rocker Switches .....	G-18 thru G-21
TP Series Tiny Pushbutton Switches .....	G-22 thru G-28
TS Series Tiny Slide Switches .....	G-29 thru G-30



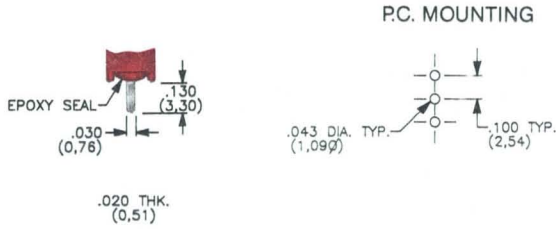






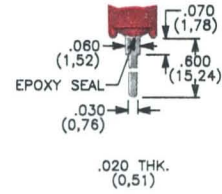
**TERMINATIONS**

**C**



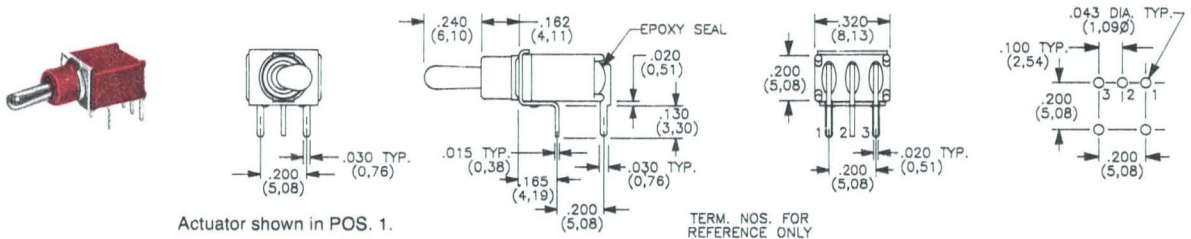
'B' Contact Material Std.

**W**



'B' Contact Material Std.

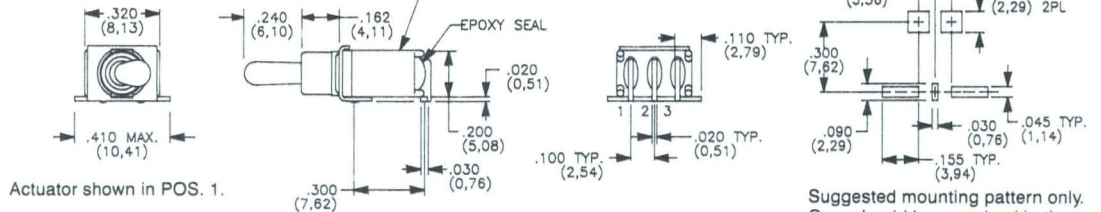
**A**



'B' Contact Material Std.

**SPDT**

**SA SURFACE MOUNT MODELS**



Must be ordered with M actuator. K contact material standard. Other contact materials avail., consult factory.

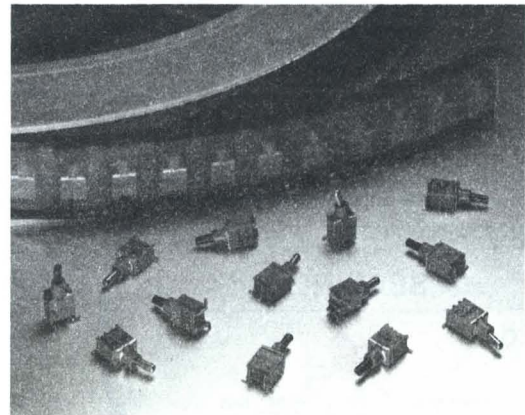
**SPDT**

Suggested mounting pattern only. Care should be exercised in the design and location of P.C. board lands. Orientation relative to reflow direction may significantly impact solder joint integrity.

Designed and packaged with the industry's high speed automatic component placement equipment in mind. The switches can withstand both vapor phase and infrared reflow soldering methods and are sealed to eliminate the intrusion of flux during cleaning processes.

**SPECIFICATIONS AND MATERIALS**

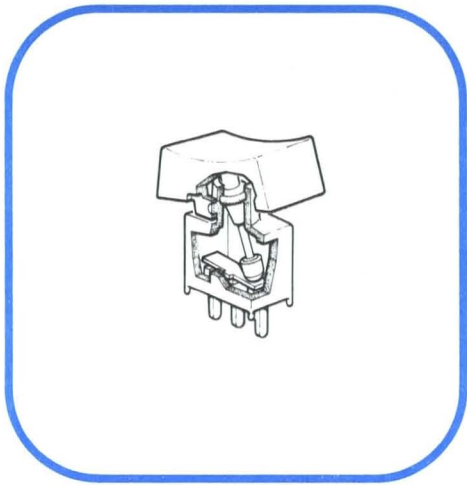
- Standard ET Series switch specifications apply (see p. G-2), with the following exceptions:
- SWITCH CONTACTS:** Brass, with gold plate over nickel plate (K, cont. mat'l.).
- SWITCH TERMINALS:** Brass, with tin-lead plating (K cont. mat'l.).
- PACKAGING:** Switches are supplied on tape and reels standard.
- REEL:** 13 in. dia. reel per EIA 481A, 600 pcs. per reel.
- TAPE:** 32 mm wide, pitch of switch pockets on tape 16 mm. Tape carrier and cover are conductive for use around statically sensitive components.







\* Sealed to withstand wave soldering and cleaning processes.



### SPECIFICATIONS

**CONTACT RATING:** 0.4 VA max. @ 20 V AC or DC max.  
**ELECTRICAL LIFE:** 60,000 make-and-break cycles at full load on all models ending in -01 (ON-NONE-ON). All other models, 30,000 cycles.  
**CONTACT RESISTANCE:** Below 20 milli-ohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.  
**INSULATION RESISTANCE:** 10<sup>9</sup> ohms min.  
**DIELECTRIC STRENGTH:** 1,000 V RMS min. @ sea level.  
**OPERATING TEMPERATURE:** -30°C to 85°C.

### MATERIALS

**CASE & BUSHING:** Glass filled nylon 6/6, flame retardant, heat stabilized (UL 94V-0).  
**ACTUATOR:** Nylon, black, std. Internal o-ring seal std.  
**SWITCH SUPPORT:** Brass, electrotin plated.  
**CONTACTS & TERMINALS:** Brass, with gold plate over nickel plate (B cont. mat'l.).  
**TERMINAL SEAL:** Epoxy.

### NOTE

Specifications and materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

## INTRODUCTION

Available options for ET SERIES SEALED TINY ROCKER SWITCHES are shown on pages G-5 thru G-7. Make selections from the following option sections: Model/Switching Function, Actuator,

Terminations, Contact Material and Epoxy Terminal Seal. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page G-8.

UL listed with all options when ordered with G or Q contact material. See HOW TO ORDER, page G-8.

### MODEL/SW. FUNC.

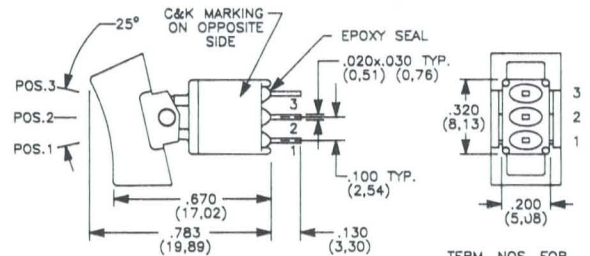
**E T**    **J**    **E**

## MODELS/SWITCHING FUNCTION

MODEL NO.	SWITCHING FUNCTION		
	POS 1	POS 2	POS 3
ET01	ON	NONE	ON
ET03	ON	OFF	ON
ET05	MOM.	OFF	MOM.
ET07	ON	OFF	MOM.
ET08	ON	NONE	MOM.
CONNECTED TERMINALS	2-3	OPEN	2-1
SCHMATIC			
MOM. = MOMENTARY POSITION			

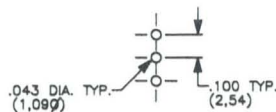


SPDT

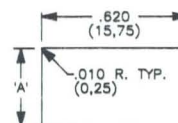


MODEL SHOWN: ET01-J1-C-B-E

### P.C. MOUNTING



### PANEL OPENING



ACTUATOR	DIM. 'A'
J1	.350 (8,89)
J6	.280 (7,11)

\*Sealed to withstand wave soldering and cleaning processes.

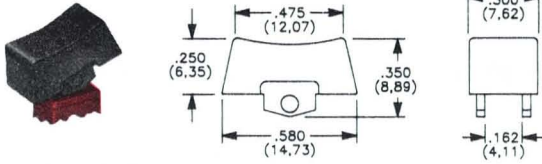
ACTUATOR



**ACTUATORS**

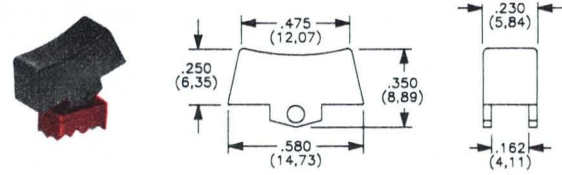
Available actuator colors. see page G-8.

**J1**



Std. with C, W, AV, or V3 terminations.

**J6**



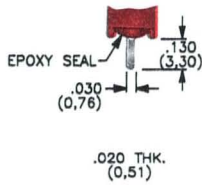
Std. with A terminations.

TERMINATIONS



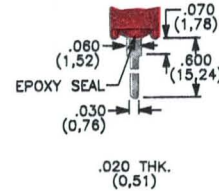
**TERMINATIONS**

**C**



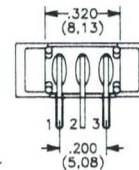
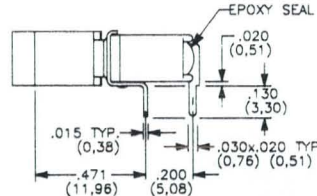
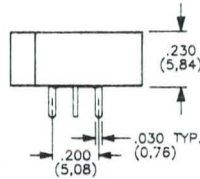
'B' Contact Material Std.

**W**

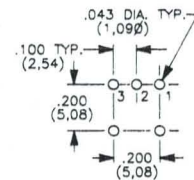


'B' Contact Material Std.

**A**



P.C. MOUNTING



TERM. NOS. FOR REFERENCE ONLY

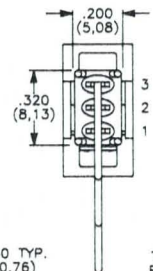
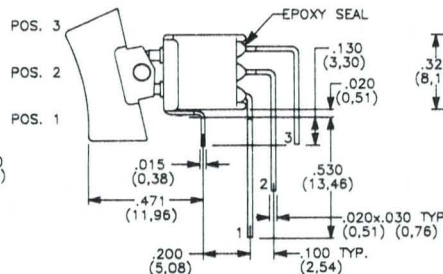
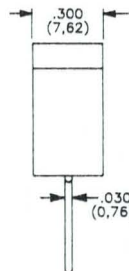
**SPDT**

Note: J6 actuator std. only on models with A terminations.

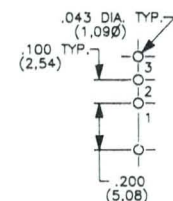
Actuator shown in POS. 1.

'B' Contact Material Std.

**AV**



P.C. MOUNTING



TERM. NOS. FOR REFERENCE ONLY

**SPDT**

Term. bend radii mfg. option

'B' Contact Material Std.



\* Sealed to withstand wave soldering and cleaning processes.

## TERMINATIONS

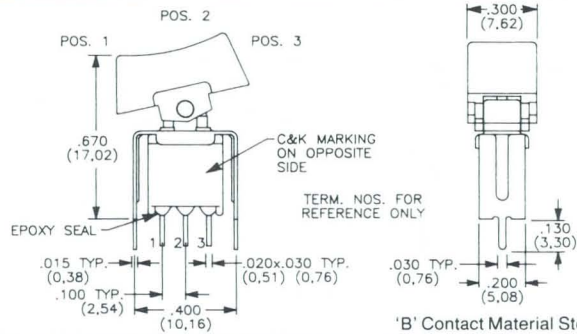


## TERMINATIONS (cont'd.)

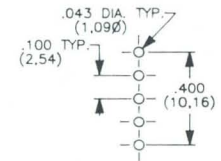
V3



SPDT



## P.C. MOUNTING



## CONT. MAT'L.



## CONTACT MATERIALS

- B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 VAC or DC max. (Std. with all termination options).
- Q** END CONTACTS: Coin silver, silver plated.  
CENTER CONTACTS & ALL TERMINALS: Brass, silver plated.  
RATING: 3 AMPS @ 120 VAC or 28 V DC on all models ending in -01 (ON-NONE-ON).  
All other models, 2 AMPS @ 120 VAC or 28 V DC.
- G** END CONTACTS: Coin silver, with gold plate over nickel plate.  
CENTER CONTACTS & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 VAC or DC max. or 3 AMPS @ 120 VAC or 28 V DC on all models ending in -01 (ON-NONE-ON).  
All other models, 2 AMPS @ 120 VAC or 28 V DC.

**Note:** G contact material can be used where either dry circuit\*\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits.

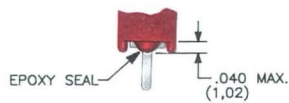
\*\* Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 VAC or DC max.

## SEAL



## SEALING

E (Std.)



**HOW TO ORDER**

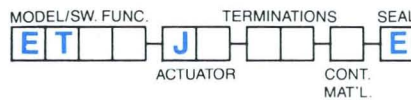
Complete the order number below by selecting the desired model no., actuator, terminations, contact material, and sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Write actuator color in word form after order number. (Example: **ET03-J6-C-G-E** with blue actuator). If no color is specified, black will be supplied.

**C** terminations and **B** contact material are supplied if no options are specified. **E** epoxy terminal seal and internal actuator o-ring seal supplied standard. **J1** actuator (black) standard on all models except models with **A** termination option: **J6** actuator (black) standard.

UL listed with all options when ordered with **G** or **Q** contact material.

Note: Custom actuator markings and legends available, consult factory.

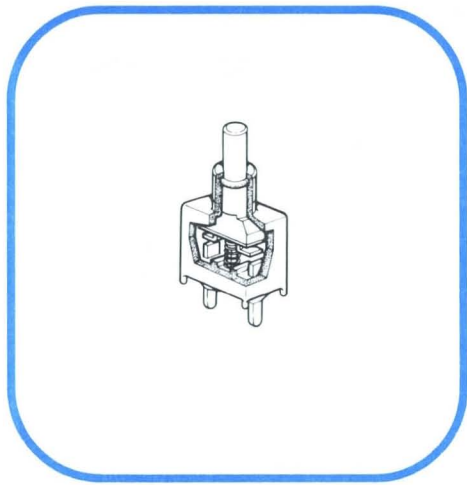
ACTUATOR COLORS	
1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray



G



\* Sealed to withstand wave soldering and cleaning processes.



## SPECIFICATIONS

**CONTACT RATING:** 0.4 VA max. @ 20 V AC or DC max.  
**ELECTRICAL LIFE:** 60,000 make-and-break cycles at full load on all models ending in - 11 (SPST). 30,000 cycles on all models ending in - 12 (SPDT).  
**CONTACT RESISTANCE:** Below 20 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.  
**INSULATION RESISTANCE:** 10<sup>9</sup> ohms min.  
**DIELECTRIC STRENGTH:** 1,000 V RMS min. @ sea level.  
**OPERATING TEMPERATURE:** -30°C to 85°C.

## MATERIALS

**CASE & BUSHING:** Glass filled nylon 6/6, flame retardant, heat stabilized (UL 94V-0).  
**PLUNGER:** Thermoplastic polyester (UL 94V-0), black, with internal o-ring seal.  
**SWITCH SUPPORT:** Brass electrotin plated.  
**CONTACTS & TERMINALS:** Brass, with gold plate over nickel plate (B cont. mat'l.).  
**TERMINAL SEAL:** Epoxy.

## NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

## INTRODUCTION

Available options for EP SERIES SEALED TINY PUSHBUTTON SWITCHES are shown on pages G-9 thru G-12. Make selections from the following option sections: Model/Switching Function, Bushing, Terminations, Contact Material and

Epoxy Terminal Seal. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page G-12. Available caps shown on page G-12.

UL listed with all options when ordered with G or Q contact material. See HOW TO ORDER, page G-12.

MODEL/SW. FUNC.

E	P			D1			E
---	---	--	--	----	--	--	---

## MODELS / SWITCHING FUNCTION

MODEL NO.	SWITCHING FUNC.	
	POS 1	POS 2
EP11	OFF	MOM.

SCHEMATIC

MOM. = MOMENTARY POSITION

MODEL	ON	MOM.
EP12	ON	MOM.

CONNECTED TERMINALS

2-1	2-3
-----	-----

SCHEMATIC

MOM. = MOMENTARY POSITION

**SPST**

MODEL SHOWN: EP11-D1-C-B-E

**SPDT**

MODEL SHOWN: EP12-D1-C-B-E

TERM. NOS. FOR REFERENCE ONLY

### P.C. MOUNTING

EP11

EP12

\*Sealed to withstand wave soldering and cleaning processes.

**BUSHING**

EP **D1** E **BUSHING**

**D1 (Std.)**

Internal o-ring seal std.

**TERMINATIONS**

EP **D1** E **TERMINATIONS**

**C**

'B' Contact Material Std.

**W**

'B' Contact Material Std.

**A**

**SPST EP11 MODEL ONLY**

**P.C. MOUNTING**

'B' Contact Material Std.

**A**

**SPDT EP12 MODEL ONLY**

**P.C. MOUNTING**

TERM. NOS. FOR REFERENCE ONLY

'B' Contact Material Std.

**SA SURFACE MOUNT MODELS**

**NEW**

**SPST EP11 MODEL ONLY**

**P.C. MOUNTING**

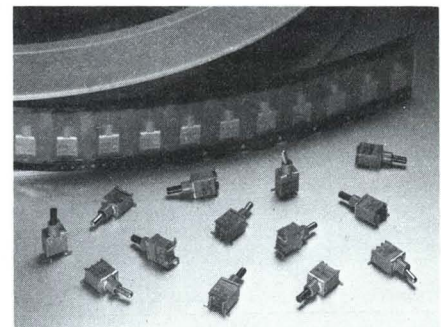
Suggested mounting pattern only. Care should be exercised in the design and location of P.C. board lands. Orientation relative to reflow direction may significantly impact solder joint integrity.

EP11 model only avail. K contact material standard. Other contact materials avail., consult factory.

Designed and packaged with the industry's high speed automatic component placement equipment in mind. The switches can withstand both vapor phase and infrared reflow soldering methods and are sealed to eliminate the intrusion of flux during cleaning processes.

**SPECIFICATIONS AND MATERIALS**

- Standard EP Series switch specifications apply (see p. G-9), with the following exceptions:
- SWITCH PLUNGER: Glass filled nylon 6/6 (UL 94V-0), black, with internal 0-ring seal.
- SWITCH CONTACTS: Brass, with gold plate over nickel plate (K cont. mat'l.).
- SWITCH TERMINALS: Brass, with tin-lead plating (K cont. mat'l.).
- PACKAGING: Switches are supplied on tape and reels standard.
- REEL: 13 in. dia. reel per EIA 481A, 600 pcs. per reel.
- TAPE: 32 mm wide, pitch of switch pockets on tape 16 mm. Tape carrier and cover are conductive for use around statically sensitive components.





\* Sealed to withstand wave soldering and cleaning processes.

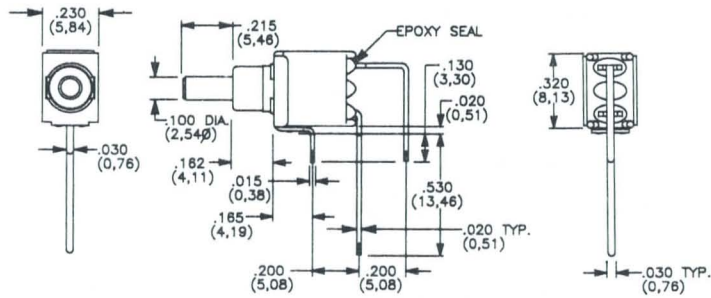


**TERMINATIONS (cont'd.)**

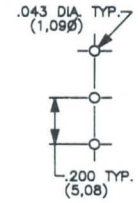
**AV**



**SPST  
EP11 MODEL ONLY**



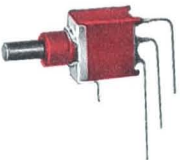
**P.C. MOUNTING**



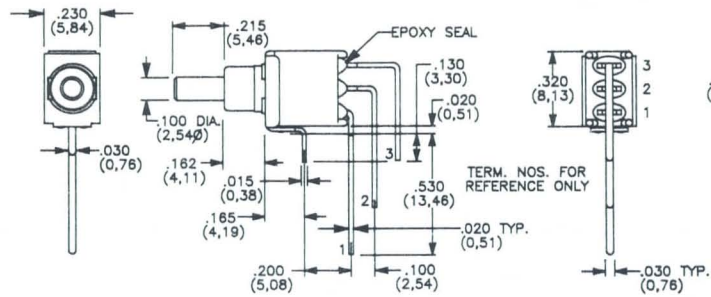
'B' Contact Material Std.

Term. bend radii mfg. option.

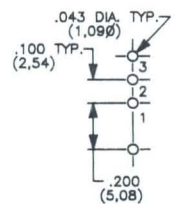
**AV**



**SPDT  
EP12 MODEL ONLY**



**P.C. MOUNTING**



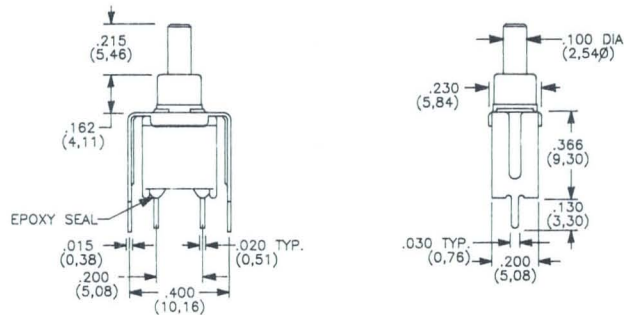
'B' Contact Material Std.

Term. bend radii mfg. option.

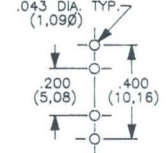
**V3**



**SPST  
EP11 MODEL ONLY**



**P.C. MOUNTING**

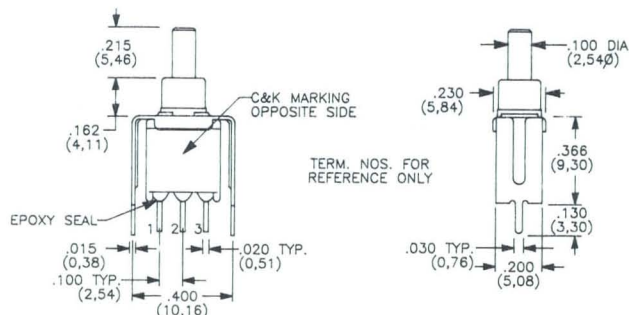


'B' Contact Material Std.

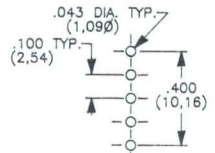
**V3**



**SPDT  
EP12 MODEL ONLY**



**P.C. MOUNTING**



'B' Contact Material Std.

\* Sealed to withstand wave soldering and cleaning processes.

CONT. MAT'L.



## CONTACT MATERIALS

- B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Std. with all termination options except SA; not available with SA surface mount termination option)
- Q** END CONTACTS: Coin silver, silver plated.  
CENTER CONTACT & ALL TERMINALS: Brass, silver plated.  
RATING: 1 AMP @ 120 V AC or 28 V DC. (Not available with SA surface mount termination option)
- G** END CONTACTS: Coin silver, with gold plate over nickel plate.  
CENTER CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 1 AMP @ 120 V AC or 28 V DC. (Not available with SA surface mount termination option)

## NEW TIN-LEAD PLATED TERMINATIONS FOR SURFACE MOUNT SWITCHES

- K** CONTACTS: Brass, with gold plate over nickel plate (same as B contact material).  
TERMINALS: Brass, with tin-lead alloy over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Std. with SA surface mount termination option; not available with all other termination options) (Other contact materials avail., consult factory.)

**Note:** G contact material is electrically equivalent to B, Q, and K contact materials and can be used where either dry circuit\*\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. These options should be specified where UL listing is required on a switch used in a dry circuit application.

\*\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.



## SEALING

E (std.)



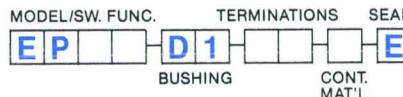
## HOW TO ORDER

Complete the order number below by selecting the desired model no., bushing, termination, contact material and sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled.  
(Example: EP111-D1-C-G-E)

C terminations and B contact material are supplied if no options are specified. D1 bushing, E epoxy terminal seal and plunger internal o-ring seal supplied standard.

SA surface mount termination option supplied standard with K contact material. Other contact materials available, consult factory.

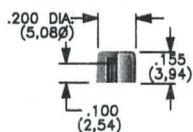
UL listed with all options when ordered with G or Q contact material.



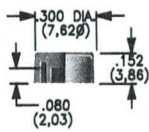
## AVAILABLE HARDWARE

The following hardware is available separately. To order, write part nos., descriptions and colors where applicable.

### 5081 SM. CAP



### 4658 LG. CAP



Cap finish: gloss; material, nylon.

### CAP COLORS

1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		





## ACTUATOR



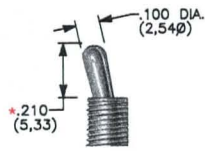
## ACTUATORS

**S**



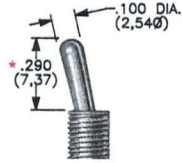
Std. with Z, C or W terminations.

**M**

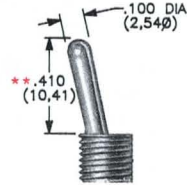


Std. with A, AV or V3 terminations.

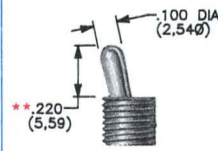
**L**



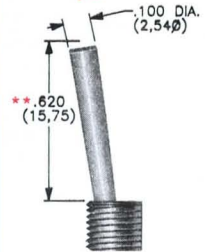
**S1**



**M1**



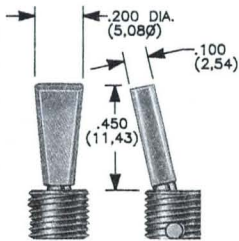
**L1** **NEW**



\* Actuators shown with std. H bushing. Subtract .040 (1,02) for TD and D9 bushings, subtract .090 (2,29) for T, T9, TK and K9 bushings.

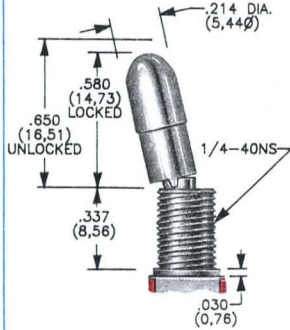
\*\* Actuators shown with T and TK bushings. Add .050 (1,27) for TD and D9 bushings, add .090 (2,29) for H, H9, Y and Y9 bushings.

**P3 WITH ANTIROTATION**



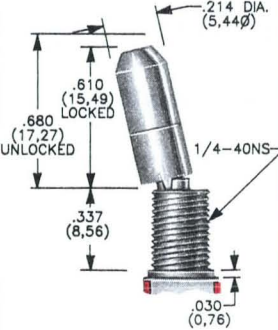
Avail. with T, T9 bushing options only.

**K LOCKING LEVER**



Bushing option code not required with K, K1 actuator options.

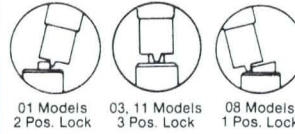
**K1 LOCKING LEVER**



K & K1 options

To prevent accidental actuation, toggles must be lifted before being actuated. When released, toggles again lock in place.

Add cap color in word form after order number. If no color is specified, natural aluminum will be supplied. Keyway on right side.



CAP COLORS	
Natural AL.	(Std.)
Black Anodized AL.	
Red Anodized AL.	
Blue Anodized AL.	

## BUSHING



## BUSHINGS

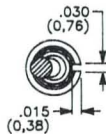
**H**  
**H9** UNTHREADED



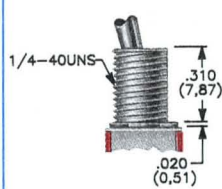
H std. with Z, terminations.

H9 std. with A, AV or V3 terminations.

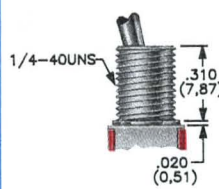
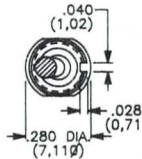
**Y**  
**Y9** UNTHREADED



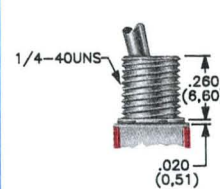
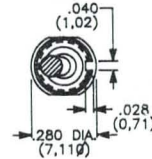
**T**  
**T9** UNTHREADED



**TK**  
**K9** UNTHREADED



**TD**  
**D9** UNTHREADED

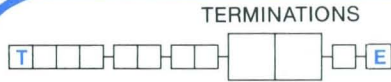


**CW** SPLASHPROOF



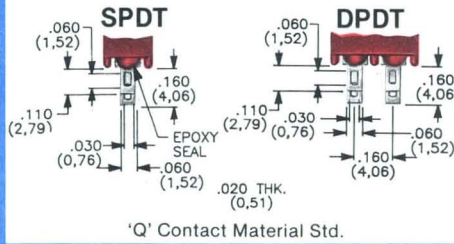
Internal actuator seal std.



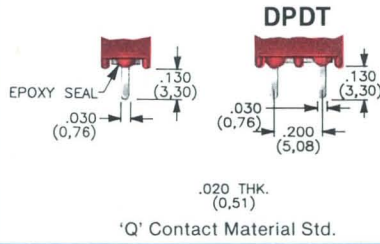


## TERMINATIONS

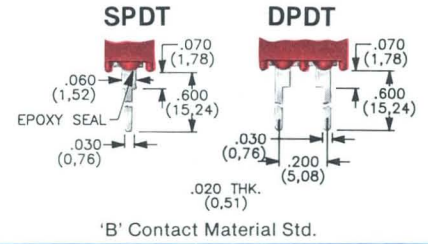
### Z (Std.)



### C



### W

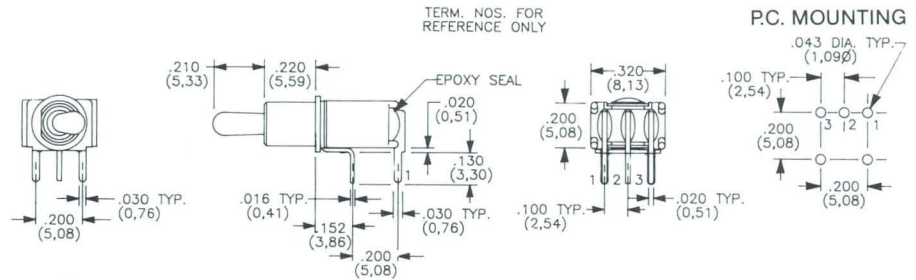


### A

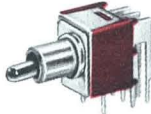


### SPDT

Actuator shown in POS.1. 'B' Contact Material Std.

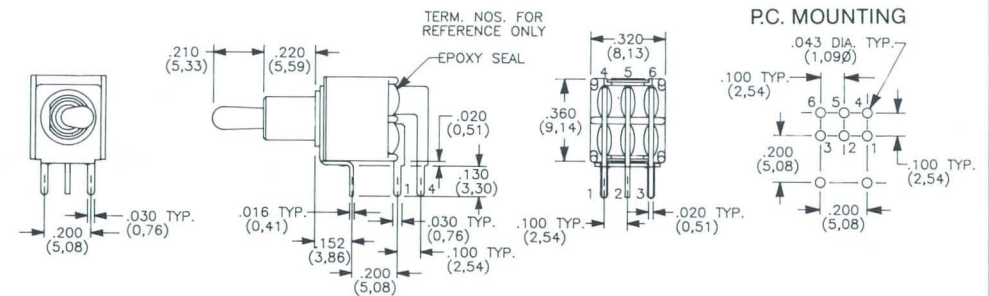


### A

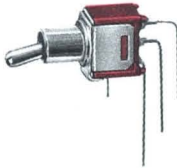


### DPDT

Actuator shown in POS.1. 'B' Contact Material Std.



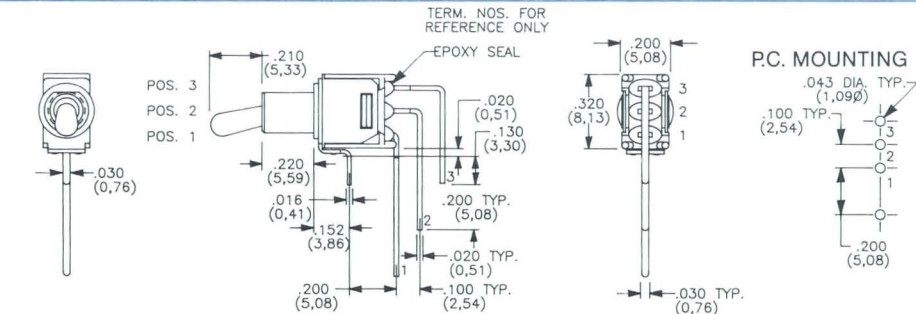
### AV



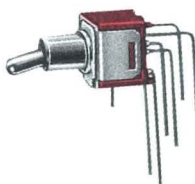
### SPDT

'B' Contact Material Std.

Term. bend radii mfg. option.



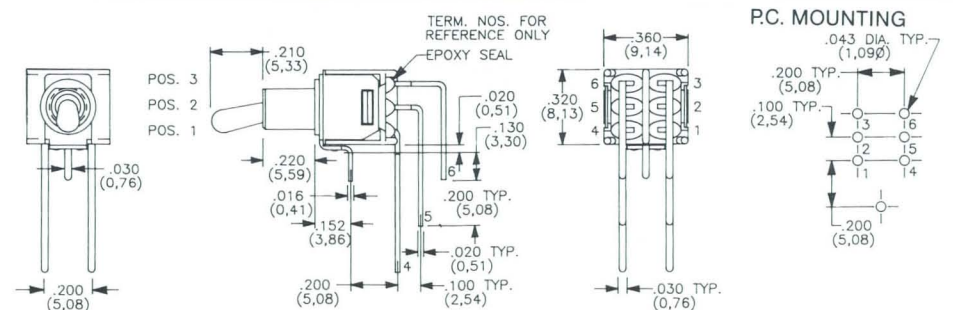
### AV

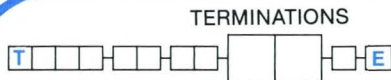


### DPDT

'B' Contact Material Std.

Term. bend radii mfg. option.



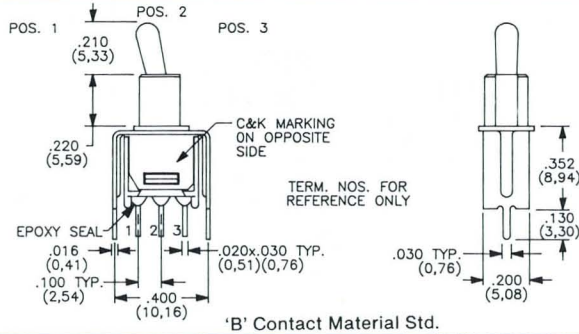


## TERMINATIONS (cont.)

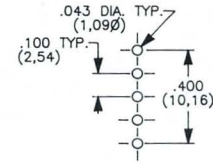
V3



SPDT



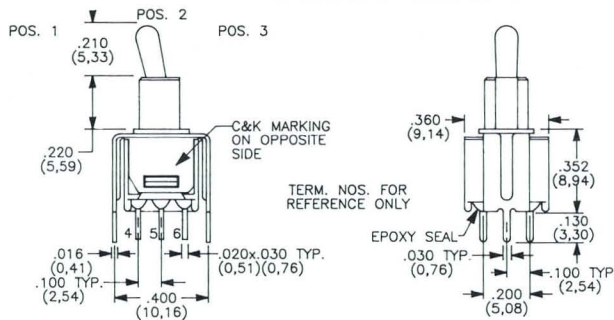
### P.C. MOUNTING



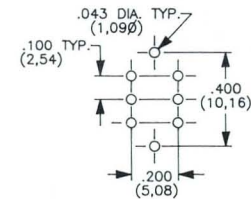
V3



DPDT



### P.C. MOUNTING



'B' Contact Material Std.

## CONT. MAT'L.



## CONTACT MATERIALS

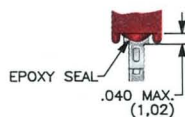
- B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Std. with all termination options exc. Z, C)
- Q** END CONTACTS: Coin silver, silver plated.  
CENTER CONTACT & ALL TERMINALS: Brass, silver plated.  
RATING: 3 AMPS @ 120 V AC or 28 V DC on all models ending in -01 (ON-NONE-ON). All other models, 2 AMPS @ 120 V AC or 28 V DC.  
(Std. with termination options Z, C)
- G** END CONTACTS: Coin Silver, with gold plate over nickel plate.  
CENTER CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 3 AMPS @ 120 V AC or 28 V DC on all models ending in -01 (ON-NONE-ON). All other models, 2AMPS @ 120 V AC or 28 V DC.

**NOTE:** 'G' contact material is equivalent to both 'B' and 'Q' contact materials and can be used where either dry circuit\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. This option should be specified where UL listing is required on a switch used in a dry circuit application.

\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.

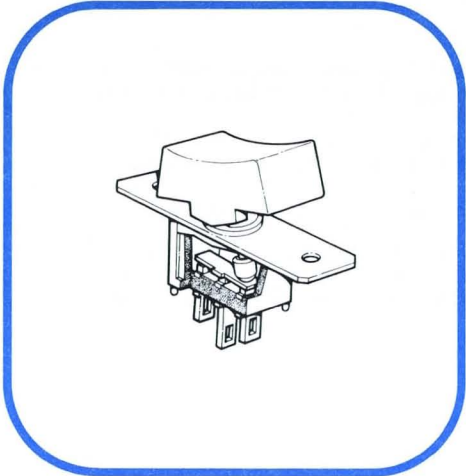


E (Std.)









### SPECIFICATIONS

**CONTACT RATING:** 3 AMPS @ 120 V AC or 28 V DC on all models ending in -01 (ON-NONE-ON). All other models, 2 AMPS @ 120 V AC or 28 V DC.

**ELECTRICAL LIFE:** 60,000 make-and-break cycles at full load on all models ending in -01 (ON-NONE-ON). All other models, 30,000 cycles.

**CONTACT RESISTANCE:** Below 20 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.

**INSULATION RESISTANCE:** 10<sup>9</sup> ohms min.

**DIELECTRIC STRENGTH:** 1,000 V RMS min. @ sea level.

**OPERATING TEMPERATURE:** -30°C to 85°C.

### MATERIALS

**CASE:** Glass filled nylon or diallyl phthalate (DAP).

**ACTUATOR:** Nylon, black, std.

**BUSHING:** Brass, nickel plated.

**HOUSING:** Stainless steel.

**SWITCH SUPPORT:** Brass, electrotin plated.

**MOUNTING BRACKET:** Stainless steel.

**END CONTACTS:** Coin silver, silver plated (Q cont. mat'l.).

**CENTER CONTACT & ALL TERMINALS:** Brass, silver plated (Q cont. mat'l.).

**TERMINAL SEAL:** Epoxy.

**HARDWARE:** Nut—Brass, nickel plated.  
Screw—Stainless Steel.  
Lockwasher—Steel, bright nickel plated.  
Standoff—Aluminum or nylon.

### NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

### INTRODUCTION

Available options for T SERIES TINY ROCKER SWITCHES are shown on pages G-18 thru G-21. Make selections from the following option sections: Model/Switching Function, Actuator, Terminations, Contact Material and Epoxy Terminal

T101, T103, T105, T107, T108, T201, T203, T211 models UL listed with all options when ordered with G or Q contact material. See HOW TO ORDER, page G-21.

Seal. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page G-21. Available hardware and accessories shown on page G-21.

G

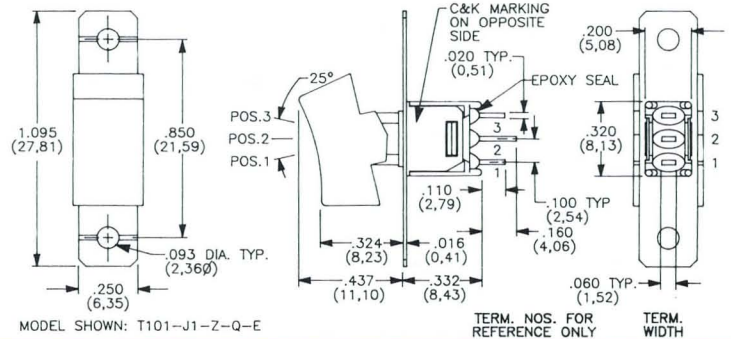
### MODEL/SW. FUNC.



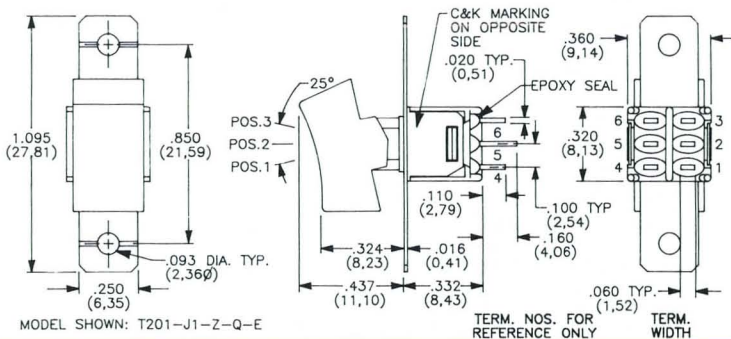
### MODELS / SWITCHING FUNCTION

MODEL NO.	SWITCHING FUNCTION		
	POS 1	POS 2	POS 3
	C&K MARKING THIS SIDE		
T101	ON	NONE	ON
T103	ON	OFF	ON
T105	MOM.	OFF	MOM.
T107	ON	OFF	MOM.
T108	ON	NONE	MOM.
CONNECTED TERMINALS	2-3	OPEN	2-1
SCHEMATIC			
MOM. = MOMENTARY POSITION			
T201	ON	NONE	ON
T203	ON	OFF	ON
T205	MOM.	OFF	MOM.
T207	ON	OFF	MOM.
T208	ON	NONE	MOM.
CONNECTED TERMINALS	2-3,5-6	OPEN	2-1,5-4
T211 *	ON	ON	ON
CONNECTED TERMINALS	2-3,5-6	2-3,5-4	2-1,5-4
SCHEMATIC			
MOM. = MOMENTARY POSITION			

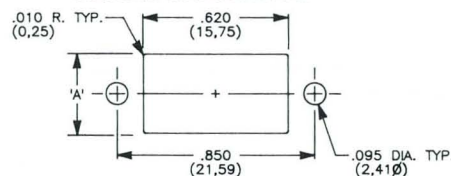
SPDT



DPDT



### PANEL MOUNTING



ACTUATOR	DIM. 'A'
J1	.350 (8,89)
J6	.280 (7,11)

\* WIRING FOR 3-WAY SWITCH, SEE PAGE VIII

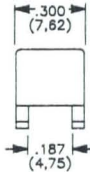
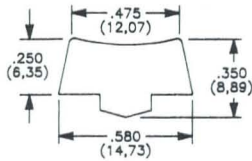




## ACTUATORS

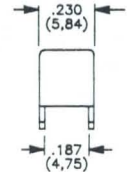
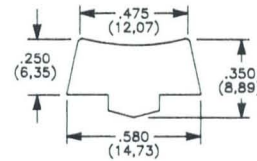
Available actuator colors, see page G-21.

J1



Std. all models except SPDT models with A terminations.

J6



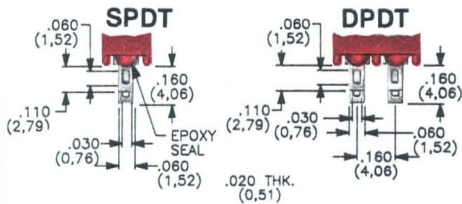
Std. on SPDT models with A terminations.



## TERMINATIONS

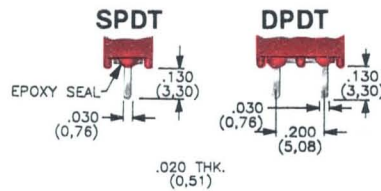
Note: Models with Z, C or W terminations supplied with panel mounting bracket standard, as shown on page G-18.

Z (Std.)



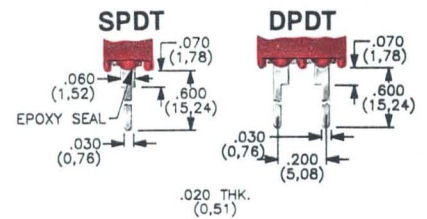
'Q' Contact Material Std.

C



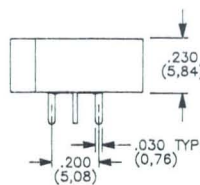
'Q' Contact Material Std.

W



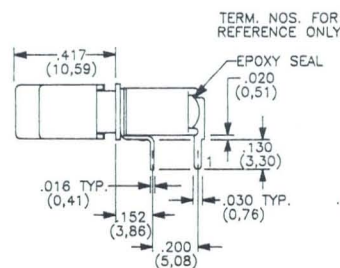
'B' Contact Material Std.

A



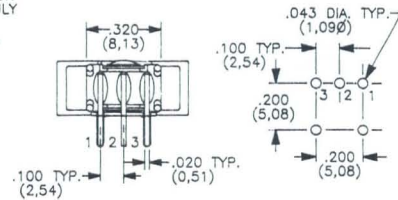
SPDT

Note: J6 actuator std. only on SPDT models with A terminations.



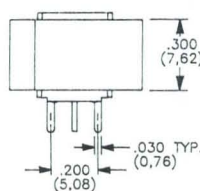
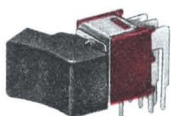
'B' Contact Material Std.

P.C. MOUNTING

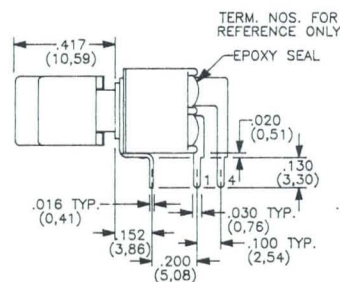


Actuator shown in POS.1.

A

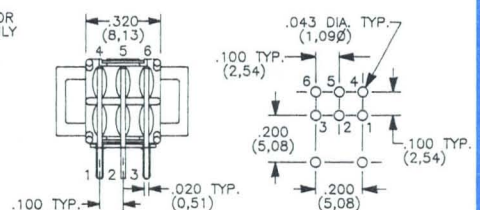


DPDT

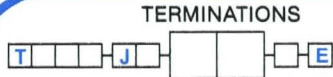


'B' Contact Material Std.

P.C. MOUNTING

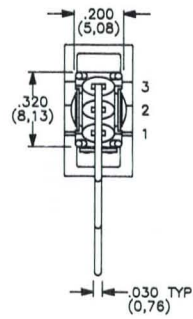
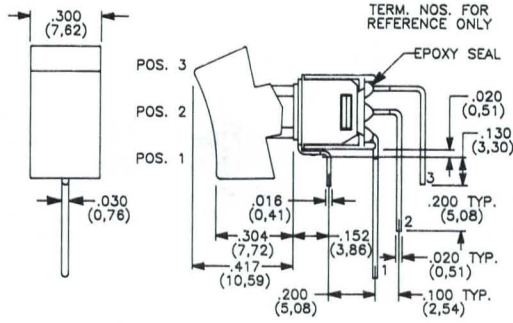
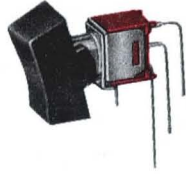


Actuator shown in POS.1.

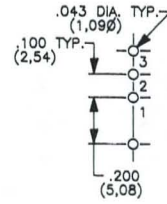


**TERMINATIONS (cont'd.)**

**AV**



**P.C. MOUNTING**

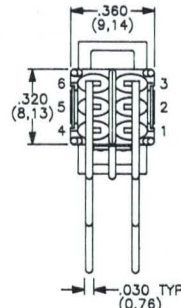
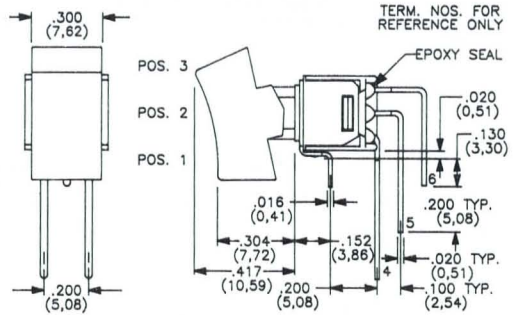


**SPDT**

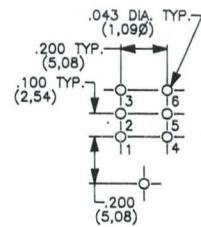
'B' Contact Material Std.

Term. bend radii mfg. option.

**AV**



**P.C. MOUNTING**

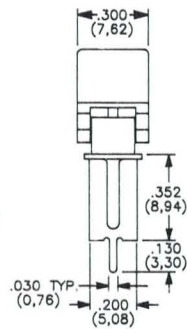
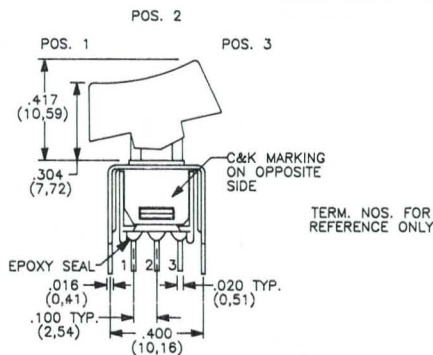


**DPDT**

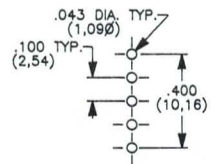
'B' Contact Material Std.

Term. bend radii mfg. option.

**V3**



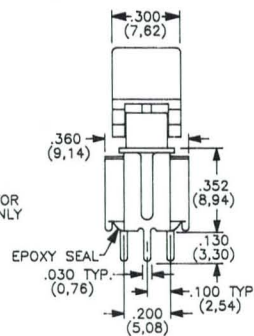
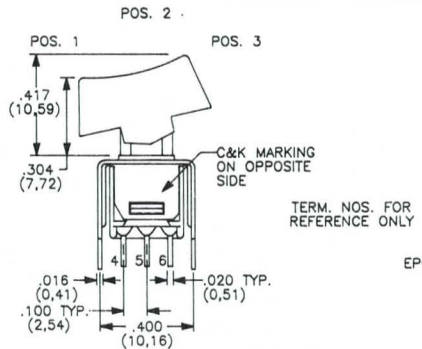
**P.C. MOUNTING**



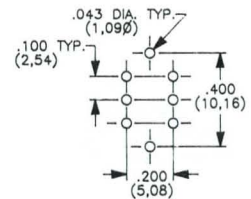
**SPDT**

'B' Contact Material Std.

**V3**



**P.C. MOUNTING**



**DPDT**

'B' Contact Material Std.





## CONTACT MATERIALS

- B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Std. with all termination options exc. Z, C)
- Q** END CONTACTS: Coin silver, silver plated.  
CENTER CONTACT & ALL TERMINALS: Brass, silver plated.  
RATING: 3 AMPS @ 120 V AC or 28 V DC on all models ending in -01 (ON-NONE-ON). All other models, 2 AMPS @ 120 V AC or 28 V DC.  
(Std. with termination options Z, C)
- G** END CONTACTS: Coin Silver, with gold plate over nickel plate.  
CENTER CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 3 AMPS @ 120 V AC or 28 V DC on all models ending in -01 (ON-NONE-ON). All other models, 2 AMPS @ 120 V AC or 28 V DC.

### NOTE:

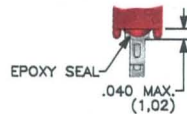
'G' contact material is equivalent to both 'B' and 'Q' contact materials and can be used where either dry circuit\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. This option should be specified where UL listing is required on a switch used in a dry circuit application.

\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.



## SEALING

**E (std.)**



**HARDWARE:** Two mounting screws, two nuts, two standoffs for 1/8 in. thk. panel and two lockwashers are supplied standard on panel mounted switches with Z, C or W terminations. Hardware for optional panel thicknesses available. See chart below to determine correct standoff length and part no. Write part description and part no. in word form after order number. If nothing is specified, standard hardware will be supplied. Hardware is also available separately, see **HARDWARE** section below.

## HOW TO ORDER

Complete the order number below by selecting the desired model no., actuator, termination, contact material and terminal sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Write actuator color in word form after order number.

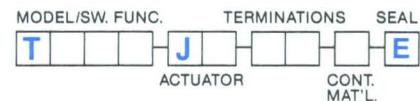
(Example: T20B-J6-A-G-E with green actuator). If no color is specified, black will be supplied.

Z terminations, Q contact material and E epoxy terminal seal are supplied if no options are specified. J1 actuator (black) standard on all models except SPDT A termination option: J6 actuator (black) standard.

T101, T103, T105, T107, T108, T201, T203, T211 models UL listed with all options when ordered with G or Q contact material.

Note: Custom actuator markings and legends available, see inside front cover and consult factory.

ACTUATOR COLORS	
1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray



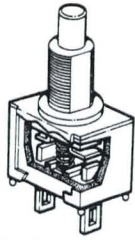
## AVAILABLE HARDWARE

The following mounting hardware is available separately. To order, see chart, right, and write part nos. and descriptions in word form. Mounting hardware consists of two screws, two nuts, two standoffs and two lockwashers per switch.

MOUNTING HARDWARE		
HARDWARE P/N	PANEL THK.	STANDOFF LENGTH
7611-01	1/16 in. (1,59)	.295 (7,49)
7611-02	3/32 in. (2,38)	.264 (6,71)
7611-03 (Std.)	1/8 in. (3,18)	.233 (5,92)

### MATERIALS:

SCREWS, NUTS, LOCKWASHERS- Stainless Steel.  
STANDOFFS- Aluminum or nylon.



### SPECIFICATIONS:

CONTACT RATING: 1 AMP @ 120 V AC or 28 V DC.  
 ELECTRICAL LIFE: 60,000 make-and-break cycles at full load on all models ending in -11 (SPST) or -21 (DPST). 30,000 cycles on all models ending in -12 (SPDT).  
 CONTACT RESISTANCE: Below 20 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.  
 INSULATION RESISTANCE: 10<sup>9</sup> ohms min.  
 DIELECTRIC STRENGTH: 1,000 V RMS min. @ sea level.  
 OPERATING TEMPERATURE: -30°C to 85°C.

### MATERIALS

CASE: Glass filled nylon or diallyl phthalate (DAP).  
 PLUNGER: Thermoplastic polyester (UL 94V-0), black.  
 BUSHING: Brass, nickel plated.  
 HOUSING: Stainless steel.  
 SWITCH SUPPORT: Brass, electrotin plated.  
 CONTACTS: Coin silver, silver plated (Q cont. mat'l.).  
 TERMINALS: Brass, silver plated (Q cont. mat'l.).  
 TERMINAL SEAL: Epoxy.  
 HARDWARE: Nut—Brass, nickel plated.  
 Locking ring—Brass, bright nickel plated.  
 Lockwasher—Steel, bright nickel plated.

### NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

### INTRODUCTION

Available options for TP SERIES TINY PUSHBUTTON SWITCHES are shown on pages G-22 thru G-27. Make selections from the following option sections: Model/Switching Function, Actuator or Bushing, Terminations, Contact Material and Epoxy Terminal Seal. Each section begins with the ordering format, with the appropriate

boxes enlarged. Complete HOW TO ORDER information is on page G-27. Available hardware and accessories shown on page G-28.

UL listed with all options when ordered with G or Q contact material. See HOW TO ORDER, page G-27.

G

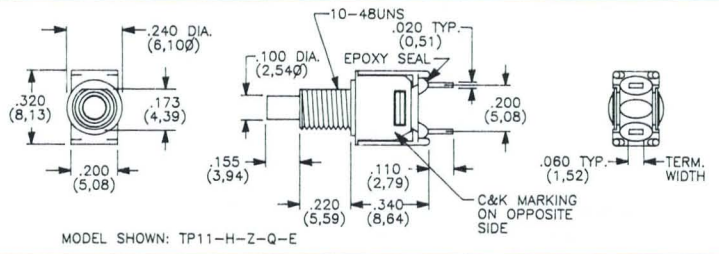
### MODEL/SW. FUNC.



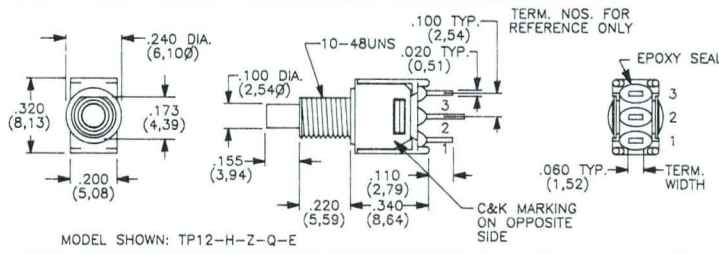
### MODELS / SWITCHING FUNCTION

MODEL NO.	SWITCHING FUNC.	
	POS 1	POS 2
TP11	OFF	MOM.
SCHEMATIC		
MOM. = MOMENTARY POSITION		
TP12	ON	MOM.
CONNECTED TERMINALS	2-1	2-3
SCHEMATIC		
MOM. = MOMENTARY POSITION		
TP21	OFF	MOM.
SCHEMATIC		
MOM. = MOMENTARY POSITION		

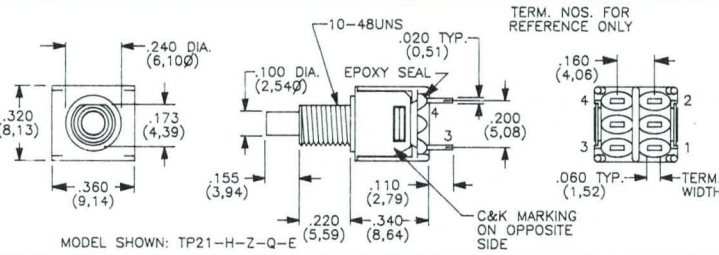
**SPST**



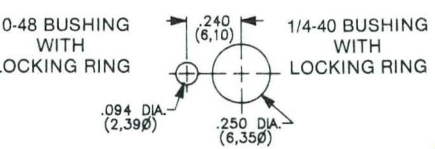
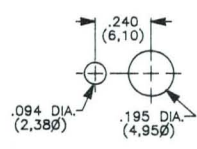
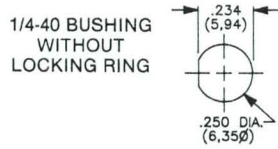
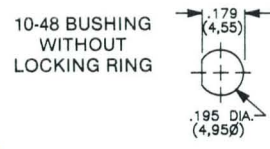
**SPDT**



**DPST**



### PANEL MOUNTING





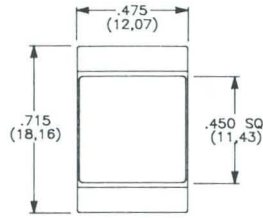
ACTUATOR OR BUSHING



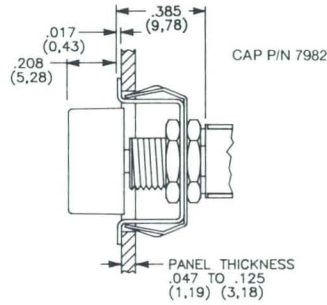
**ACTUATOR OPTIONS FOR SNAP-IN FRONT MOUNTING**

Available with Z, C, or W terminations.

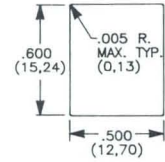
**J80**



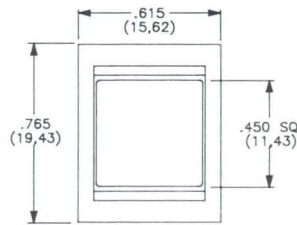
Cap finish: matte; available colors, see page G-27.



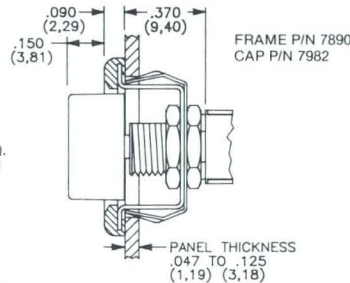
**PANEL MOUNTING**



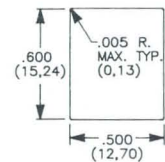
**J81**



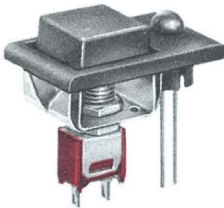
Cap and frame finish: matte; available colors, see page G-27.



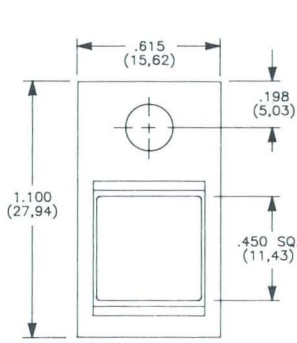
**PANEL MOUNTING**



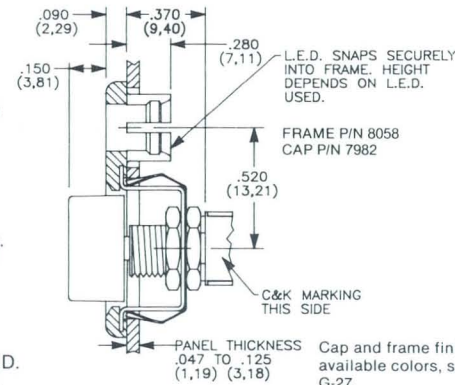
**J82**



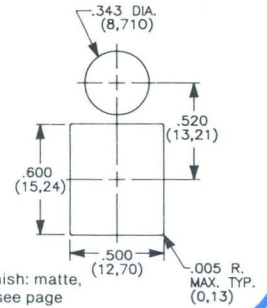
U.S. PAT. NO. 4,004,120



L.E.D. NOT INCLUDED. FOR L.E.D. INFORMATION, SEE PAGE A-25.



**PANEL MOUNTING**

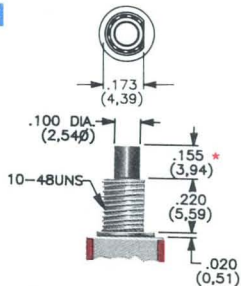


ACTUATOR OR BUSHING



**BUSHINGS**

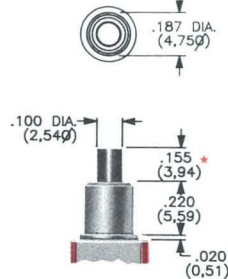
**H9 UNTHREADED**  
**H**



H std. with Z, C or W terminations.

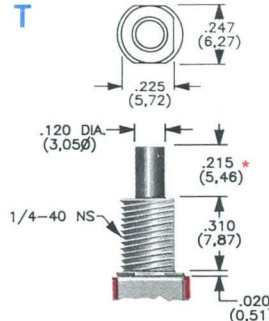
H9 std. with A, AV or V3 terminations.

**H8 UNTHREADED**

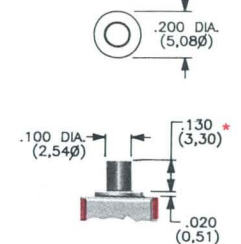


\* Subtract .016 (0.41) for models with A, AV or V3 terminations.

**T9 UNTHREADED**  
**T**

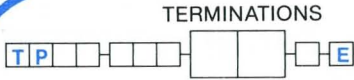


**S9**



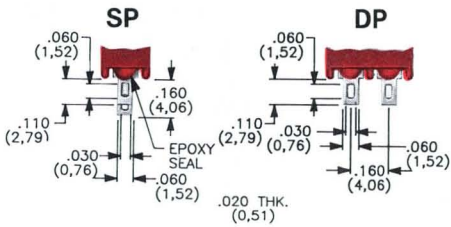
Not available with Z terminations.

Plunger length insufficient for use with caps, consult factory.



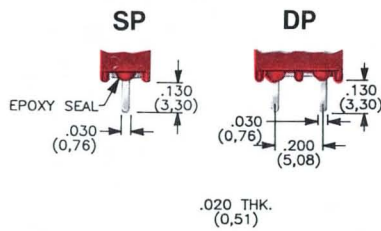
## TERMINATIONS

### Z (Std.)



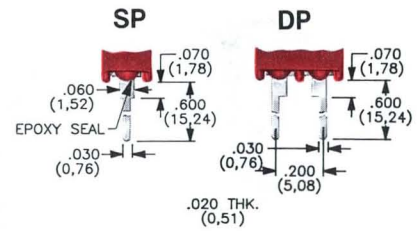
'Q' Contact Material Std.

### C



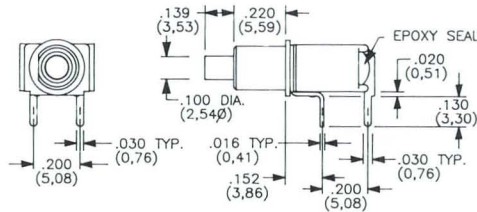
'Q' Contact Material Std.

### W



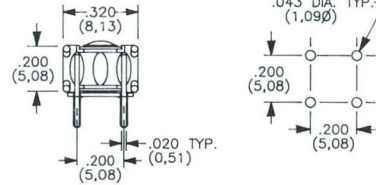
'B' Contact Material Std.

### A



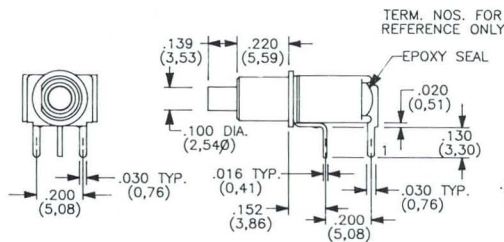
'B' Contact Material Std.

### P.C. MOUNTING



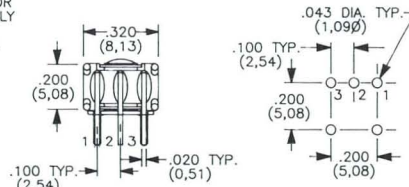
**SPST  
TP11 MODEL ONLY**

### A



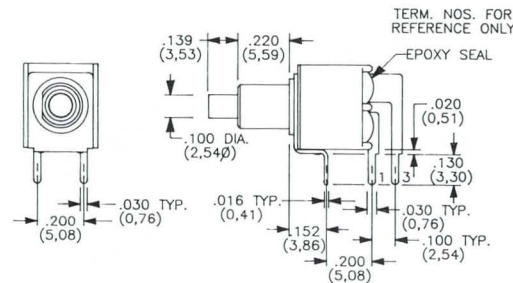
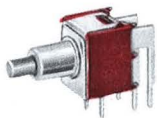
'B' Contact Material Std.

### P.C. MOUNTING



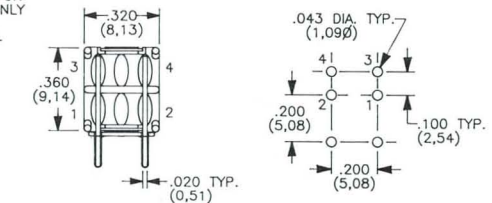
**SPDT  
TP12 MODEL ONLY**

### A



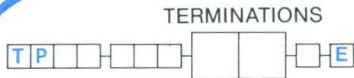
'B' Contact Material Std.

### P.C. MOUNTING



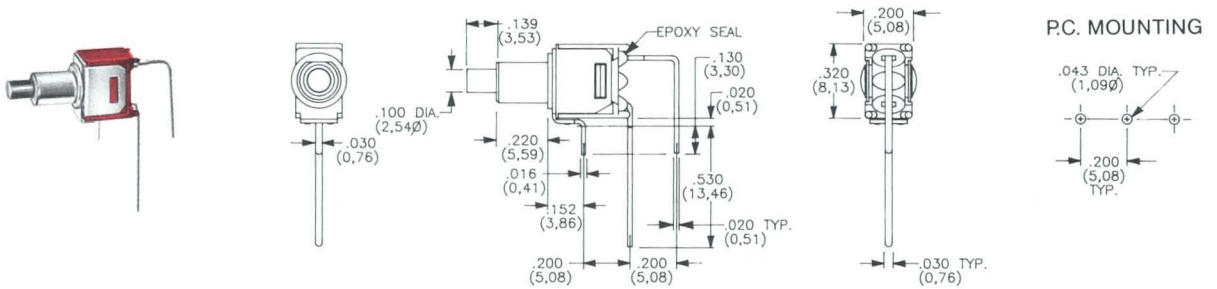
**DPST  
TP21 MODEL ONLY**





**TERMINATIONS (cont'd.)**

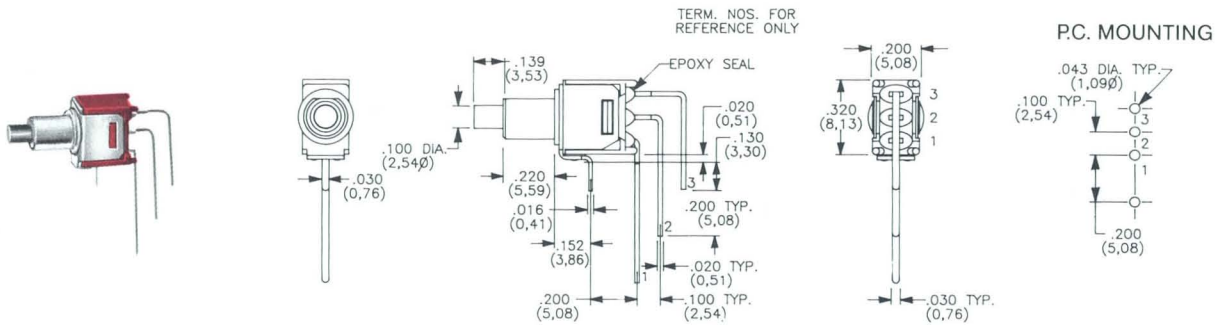
**AV**



**SPST  
TP11 MODEL ONLY**

'B' Contact Material Std. Term. bend radii mfg. option.

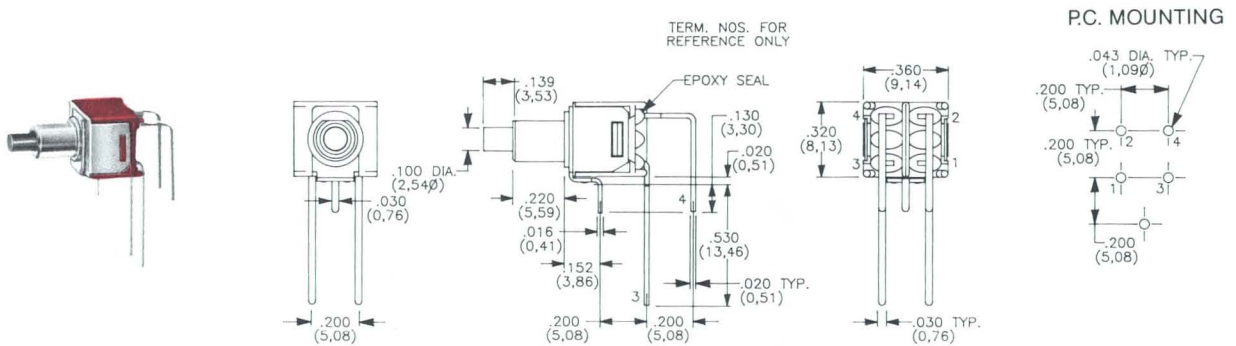
**AV**



**SPDT  
TP12 MODEL ONLY**

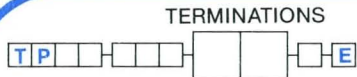
'B' Contact Material Std. Term. bend radii mfg. option.

**AV**



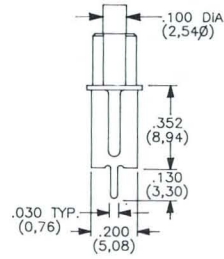
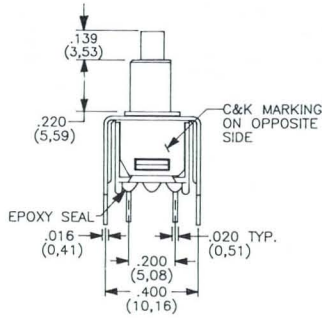
**DPST  
TP21 MODEL ONLY**

'B' Contact Material Std. Term. bend radii mfg. option.

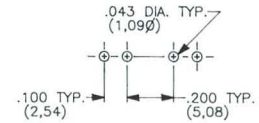


**TERMINATIONS (cont'd.)**

**V3**



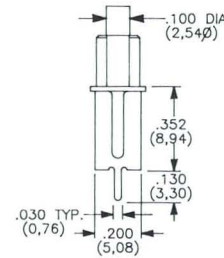
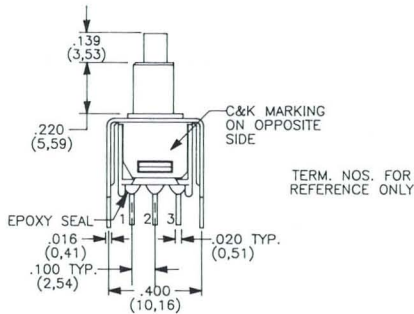
**P.C. MOUNTING**



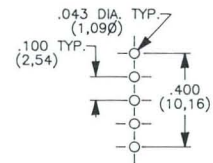
**SPST  
TP11 MODEL ONLY**

'B' Contact Material Std.

**V3**



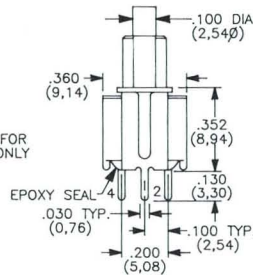
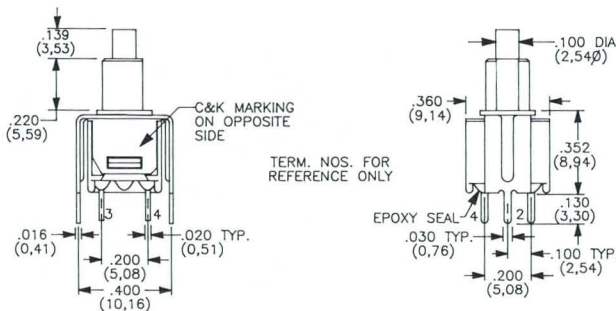
**P.C. MOUNTING**



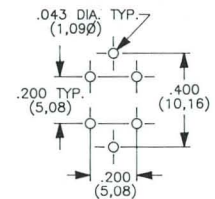
**SPDT  
TP12 MODEL ONLY**

'B' Contact Material Std.

**V3**



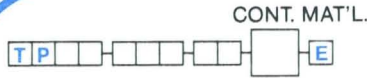
**P.C. MOUNTING**



**DPST  
TP21 MODEL ONLY**

'B' Contact Material Std.



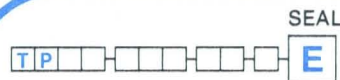


**CONTACT MATERIALS**

- B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. (Std. with all termination options exc. Z, C)
- Q** CONTACTS: Coin silver, silver plated.  
TERMINALS: Brass, silver plated.  
RATING: 1 AMP @ 120 V AC or 28 V DC. (Std. with termination options Z, C)
- G** CONTACTS: Coin Silver, with gold plate over nickel plate.  
TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 1 AMP @ 120 V AC or 28 V DC.

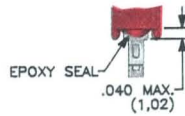
**Note:** 'G' contact material is equivalent to both 'B' and 'Q' contact materials and can be used where either dry circuit\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. This option should be specified where UL listing is required on a switch used in a dry circuit application.

\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.



**SEALING**

**E (std.)**



**HARDWARE:** One mounting nut, locking ring and lockwasher supplied standard, where applicable (except 1/4-40 bushings: two mounting nuts supplied standard). Optional mounting nut styles, locking rings and caps available. Write part descriptions and part nos. in word form after order number. If nothing is specified, standard hardware will be supplied. Hardware is also available separately, see **HARDWARE** section, page G-28.

**HOW TO ORDER**

Complete the order number below by selecting the desired model no., actuator or bushing, termination, contact material and terminal sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Where applicable, write cap and frame colors in word form after order number.

(Example: TP111-J81-C1-G-E with white cap and brown frame).

If no color is specified, black will be supplied.

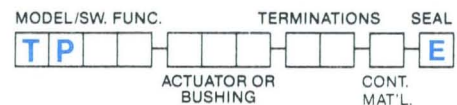
L.E.D.'s not furnished with J82 actuator option.

Plunger lengths vary with bushing and termination options selected, see **BUSHING** and **TERMINATION** option sections.

H bushing, Z terminations, Q contact material and E epoxy terminal seal are supplied if no options are specified.

UL listed with all options when ordered with G or Q contact material.

CAP AND FRAME COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		

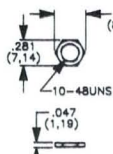


## AVAILABLE HARDWARE

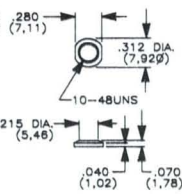
The following hardware is available separately. To order, write part nos., descriptions and colors where applicable.

### NUTS

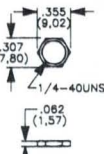
**4649**  
(Std.)



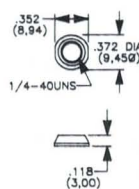
**4657**  
DRESS NUT



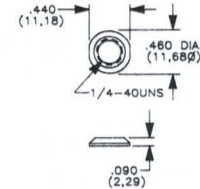
**7002**



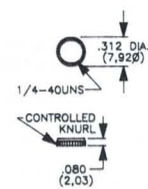
**7099**  
DRESS NUT  
(BLIND THD.)



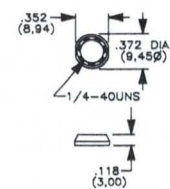
**7760**  
DRESS NUT



**7780**  
KNURLED NUT  
(BLIND THD.)

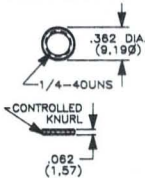


**7807**  
DRESS NUT

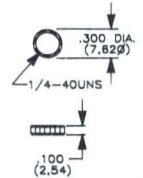


### NUTS

**7969\***  
KNURLED NUT



**7786**  
KNURLED NUT



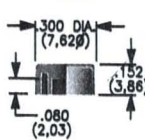
\* Controlled knurl pattern fits 'Gulmite' #12 socket.

### CAPS

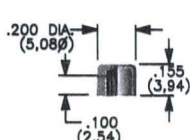
All caps: finish, gloss, except where noted; material, nylon. See color chart below.

FITS .100 (2.54 Ø) DIA. PLUNGERS

**4658**

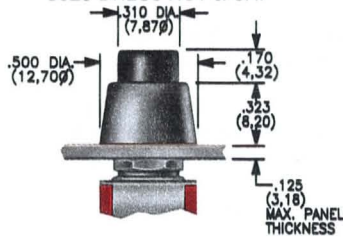


**5081\*\***



FITS T BUSHING OPTION ONLY

**8025** DRESS NUT & CAP

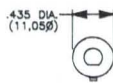


To order dress nut only, specify P/N 7025.

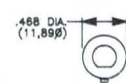
### LOCKING RINGS

FITS 10-48 BUSHING

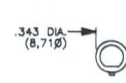
**4650**



**7572**



**7573**

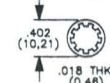


### LOCKWASHERS

**4652** FITS 10-48  
(Std.) BUSHINGS



**7003-3** FITS 1/4 IN.  
BUSHINGS

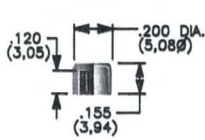


### MATERIALS

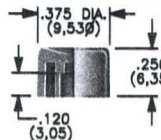
NUTS, LOCKING RINGS - Brass, nickel plated.  
LOCKWASHERS - Steel, bright nickel plated.

FITS .120 (3.05 Ø) DIA. PLUNGERS

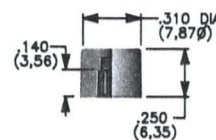
**7089**



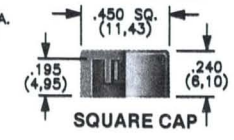
**7527**



**8018**



**7982** MATTE  
**4846** GLOSS



### FRAMES

Frames for the following actuator options are available separately. Chart shows available colors. For illustrations and dimensions of parts not shown, see pages noted. Frame finish: matte; material, nylon.

FRAME P/N	FITS ACTUATOR OPTION	SEE PAGE NO.
7890	J81	G-23
8058	J82	G-23

CAP AND FRAME COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		

### WRENCHES

Switches are normally mounted to panel using two mounting nuts: one front of panel, one back of panel. To avoid damaging front of panel, always tighten back of panel nut. When ordering, specify 4 digit part no.

P/N 7785 or  
P/N 4653

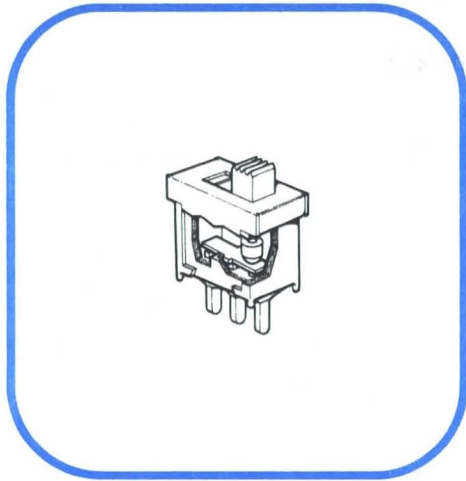


P/N 4815 or  
P/N 8942

WRENCH P/N	FITS NUTS P/N
4653	4649, 4657
7785	7002, 7099, 7807
8942	7969
4815	7780

\*\* Models with S9 bushing option or A, AV or V3 terminations have plunger length insufficient for use with cap P/N 5081. Order cap P/N 5387 with .080 (2.03) plunger engagement. Consult factory for alternate plunger lengths.





### SPECIFICATIONS

**CONTACT RATING:** 3 AMPS @ 120 V AC or 28 V DC on all models ending in -01 (ON-NONE-ON). All other models, 1 AMP @ 120 V AC or 28 V DC.

**ELECTRICAL LIFE:** 60,000 make-and-break cycles at full load on all models ending in -01 (ON-NONE-ON). All other models, 30,000 cycles.

**CONTACT RESISTANCE:** Below 20 milliohms typ. Initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.

**INSULATION RESISTANCE:** 10<sup>9</sup> ohms min.

**DIELECTRIC STRENGTH:** 1,000 V RMS min. @ sea level.

**OPERATING TEMPERATURE:** -30°C to 85°C.

### MATERIALS

**CASE:** Glass filled nylon or diallyl phthalate (DAP).

**ACTUATOR:** Nylon, black.

**HOUSING:** Stainless steel. Models with A Termination Option: stainless steel, nickel plated.

**END CONTACTS:** Coin silver, silver plated (Q cont. mat'l.).

**CENTER CONTACT & ALL TERMINALS:** Brass, silver plated (Q cont. mat'l.).

**TERMINAL SEAL:** Epoxy.

### NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

### INTRODUCTION

Available options for TS SERIES TINY SLIDE SWITCHES are shown below and on page G-30. Make selections from the following option sections: Model/Switching Function, Terminations, Contact Material

and Epoxy Terminal Seal. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page G-30.

All models UL listed with all options when ordered with G or Q contact material. See HOW TO ORDER, page G-30.

G

#### MODEL/SW. FUNC.

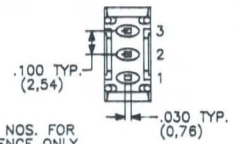
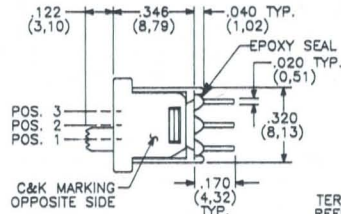
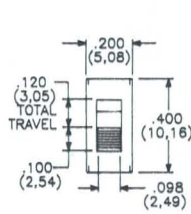
T S [ ] [ ] [ ] [ ] [ ]

### MODELS / SWITCHING FUNCTION

MODEL NO.	SWITCHING FUNC.		
	POS. 1	POS. 2	POS. 3
TS01	ON	NONE	ON
TS03	ON	OFF	ON
CONNECTED TERMINALS	1-2	OPEN	2-3

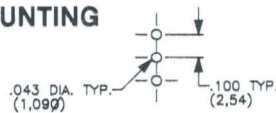


SPDT



MODEL SHOWN: TS01-C-B-E

### P.C. MOUNTING

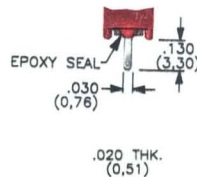


#### TERMINATIONS

T S [ ] [ ] [ ] [ ] [ ]

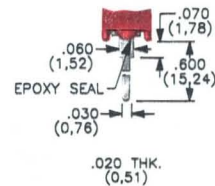
### TERMINATIONS

#### C (Std.)



'Q' Contact Material Std.

#### W

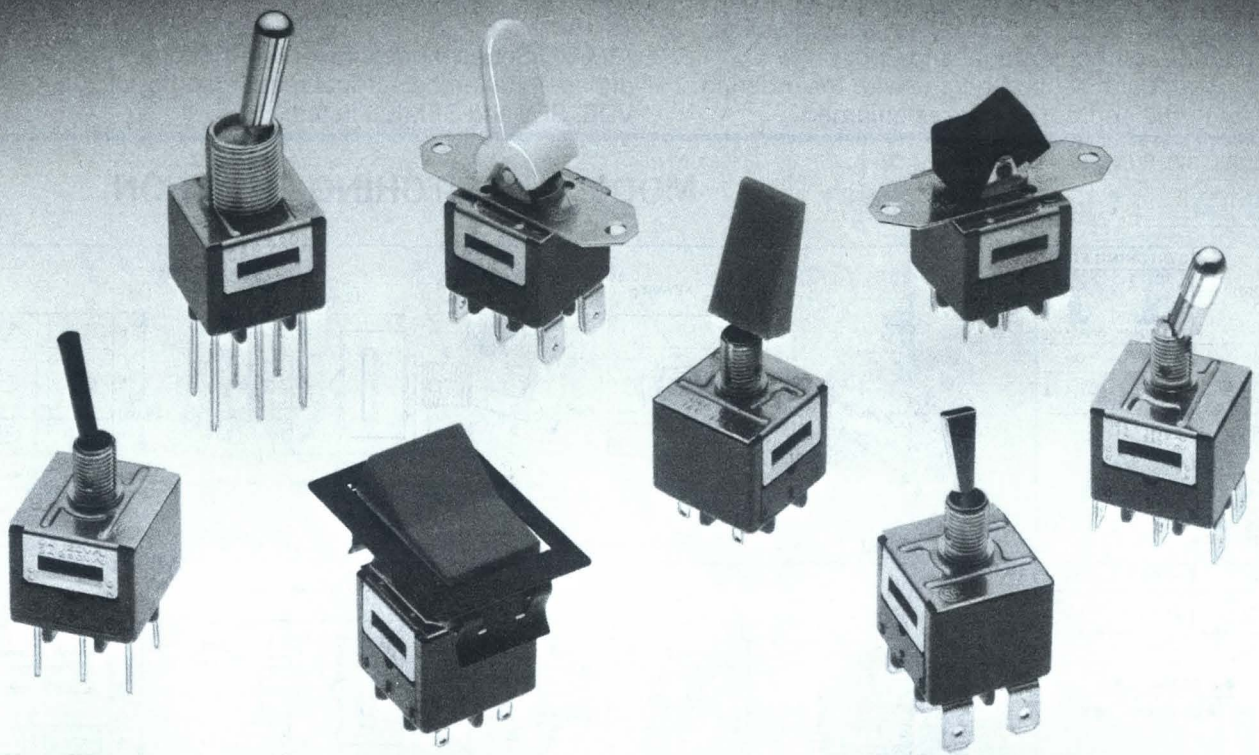


'B' Contact Material Std.





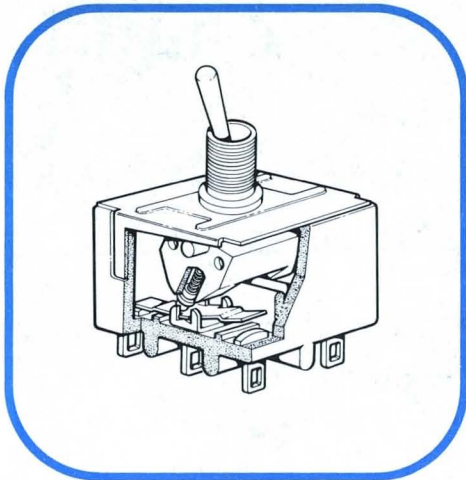
# 9000 SERIES POWER TOGGLE, ROCKER & LEVER HANDLE SWITCHES



## SECTION H INDEX

Power Toggle Switches .....	H-2 thru H-7
Power Rocker & Lever Handle Switches .....	H-8 thru H-12





## SPECIFICATIONS

**CONTACT RATING:**  
 9201 models: 6 AMPS @ 120 V AC.  
 or 28 V DC; 3 AMPS @ 250 V AC.  
 9221 models: 10 AMPS @ 125 V AC  
 or 28 V DC; 5 AMPS @ 250 V AC.

**ELECTRICAL LIFE:** 25,000  
 make-and-break cycles at full load.

**CONTACT RESISTANCE:** Below 10  
 milliohms typ. initial @ 2-4 V DC,  
 100 mA.

**INSULATION RESISTANCE:** 10<sup>9</sup> ohms  
 min.

**DIELECTRIC STRENGTH:** 2,500 V RMS  
 min. @ sea level.

**OPERATING TEMPERATURE:** -30°C to  
 85°C.

## MATERIALS

**CASE:** Diallyl phthalate (DAP).  
**ACTUATOR:** Brass, chrome plated.  
**BUSHING:** Brass, nickel plated.  
**HOUSING:** Stainless steel.  
**END CONTACTS:** Coin silver, silver  
 plated (Q cont. mat'l.).  
**CENTER CONTACTS:** Brass, silver plated  
 (Q cont. mat'l.).  
**ALL TERMINALS:** 9201 models: Brass,  
 silver plated.  
 9221 models: Brass, electrotin  
 plated.  
**TERMINAL SEAL:** Epoxy.  
**HARDWARE:** Nut- Brass, nickel plated.  
 Locking ring- Brass, bright nickel  
 plated.  
 Lockwasher- Steel, bright nickel  
 plated.

## NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

## INTRODUCTION

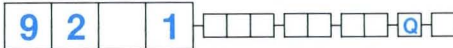
Available options for 9000 SERIES POWER TOGGLE SWITCHES are shown on pages H-2 thru H-5. Make selections from the following option sections: Model/Switching Function, Actuator, Bushing, Terminations, Contact Material and Epoxy Terminal Seal. Each section begins with the ordering format, with the appropriate boxes enlarged.

Complete HOW TO ORDER information is on page H-6. Available hardware and accessories shown on page H-7.

All 9000 Series models meet International dimensional and electrical requirements; UL, CSA, VDE, SEV and SEMKO listed.

H

MODEL/SW. FUNC.

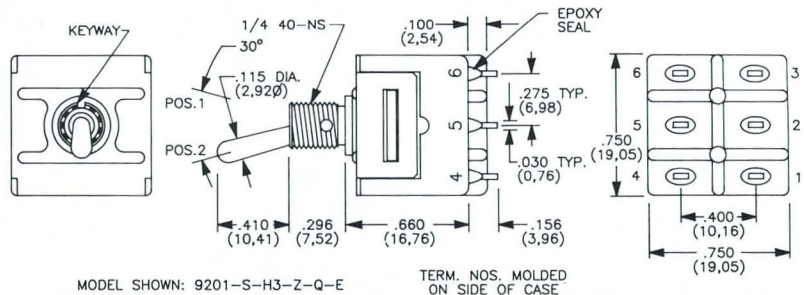


## MODELS / SWITCHING FUNCTION

MODEL NO.	SWITCHING FUNC.	
	POS 1	POS 2
9201	ON	ON
CONNECTED TERMINALS	2-3,5-6	2-1,5-4
SCHEMATIC		
CONTACTS MAKE SAME SIDE ACTUATOR THROWN.		



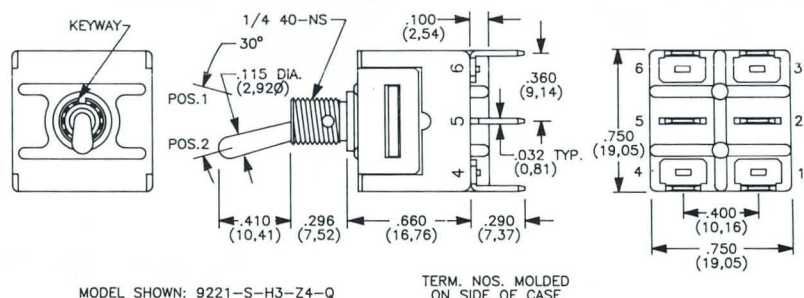
**DPDT  
6 AMP MODEL**



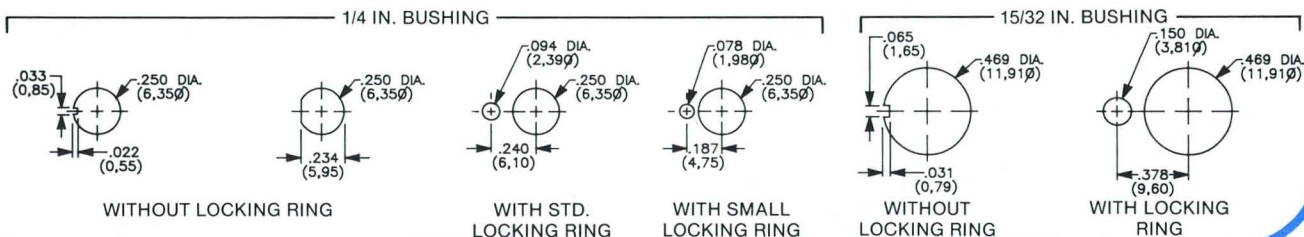
MODEL NO.	SWITCHING FUNC.	
	POS 1	POS 2
9221	ON	ON
CONNECTED TERMINALS	2-3,5-6	2-1,5-4
SCHEMATIC		
CONTACTS MAKE SAME SIDE ACTUATOR THROWN.		



**DPDT  
10 AMP MODEL**



## PANEL MOUNTING

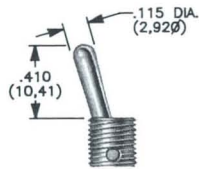




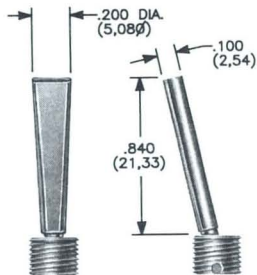


## ACTUATORS

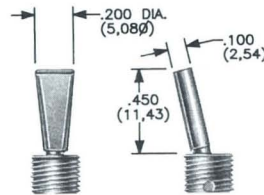
### S WITH ANTIROTATION



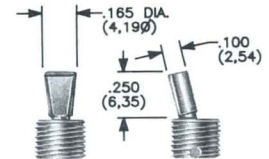
### P1 WITH ANTIROTATION



### P3 WITH ANTIROTATION

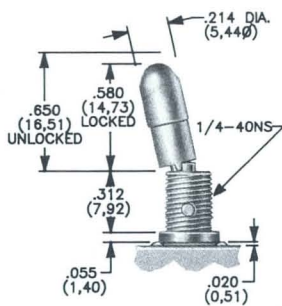


### P4 WITH ANTIROTATION

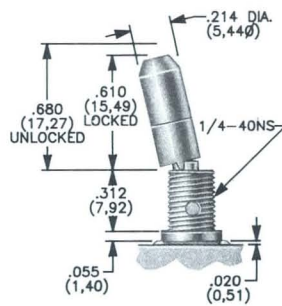


Hardware on P1, P3, P4 actuators: P/N 7099 dress nut supplied standard.

### K LOCKING LEVER



### K1 LOCKING LEVER



Bushing option code not required.

K & K1 options

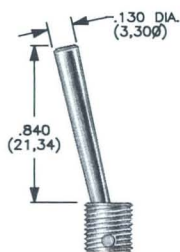


CAP COLORS	
Natural AL.	(Std.)
Black Anodized AL.	
Red Anodized AL.	
Blue Anodized AL.	

To prevent accidental actuation, toggles must be lifted before being actuated. When released, toggles again lock in place.

Add cap color in word form after order number. If no color is specified, natural aluminum will be supplied.

### L WITH ANTIROTATION



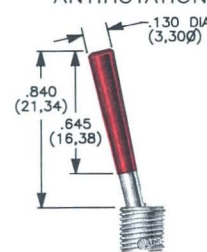
### L1 WITH ANTIROTATION



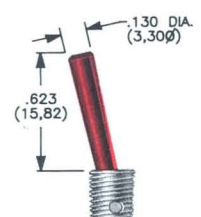
### L2 WITH ANTIROTATION



### L3 PLASTIC WITH ANTIROTATION



### L4 PLASTIC WITH ANTIROTATION



Bushing option code not required with these actuators: K, K1, T, T1; CW bushing may be specified with T or T1 actuators.

**Antirotation:** is standard on all actuators, provides anti-'push-in' feature and reduces risk of internal switch damage from impact forces on the actuator.

All actuators (except K, K1, L3, L4, L40- L43) are available with satin chrome or black finish. Write 'SATIN CHROME ACTUATOR' or 'BLACK ACTUATOR' in word form after order number. If nothing is specified, chrome plated actuators will be supplied.

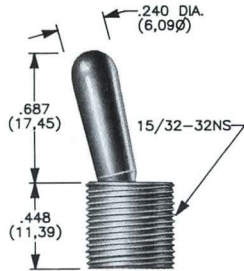
1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

Add actuator color in word form after order number. If no color is specified, black will be supplied. Finish: gloss.

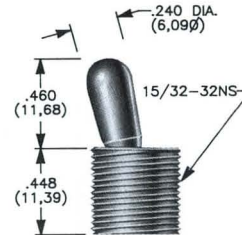


**ACTUATORS (cont'd.)**

**T**



**T1**

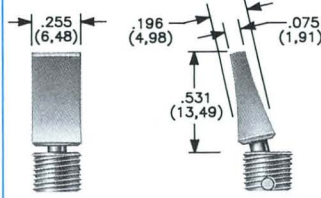


Bushing option code not required unless CW splashproof bushing option desired.

**L40**

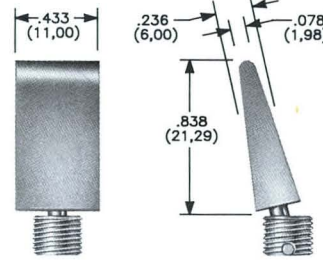


**L41 LEVER HANDLE**



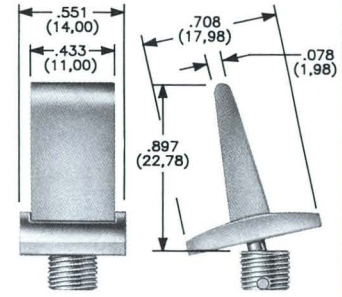
LEVER HANDLE P/N: 4810

**L42 LEVER HANDLE**



LEVER HANDLE P/N: 4811

**L43 LEVER HANDLE**



LEVER HANDLE P/N: 4812

Add lever handle color in word form after order number. If no color is specified, black will be supplied. Lever handles can be ordered separately, specify part no. and color. For interchangeability, order L40 actuator option and order lever handles separately. Finish: matte.

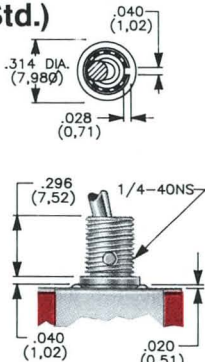
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		

**BUSHING**



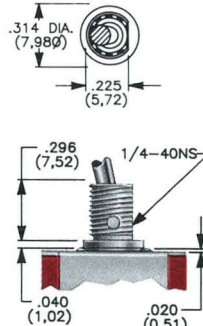
**BUSHINGS**

**H3 (Std.)**



Will withstand 12 in.-lbs. of torque with no distortion.

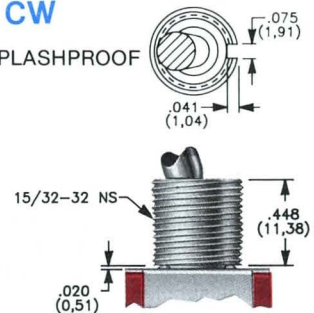
**H**



Will withstand 12 in.-lbs. of torque with no distortion.

**CW**

**SPLASHPROOF**



Available with T, T1 actuators only.  
Internal actuator seal std. Bushing sealing washer available from: Multi-Flex Seals, Inc. Hackensack, New Jersey Part No. MFS-60064





**HOW TO ORDER**

Complete the order number below by selecting the desired model no., actuator, bushing (where required), termination and terminal sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Where applicable, write actuator color in word form after order number.

(Example: 9201-L3-H-C-Q-E with red actuator). If no color is specified, black will be supplied.

S actuator, H3 bushing, Z terminations on 9201 models or Z4 terminations on 9221 models and Q contact material are supplied if no options are specified. E epoxy terminal seal standard with Z, C, Z3 and W-W4 terminations on 9201 models, not available with Z4 terminations on 9221 models.

All models UL/CSA/VDE/SEV/SEMKO listed with all options.

**ADDITIONAL ORDERING INFORMATION**

ACTUATORS: Satin chrome or black finish available on all actuators except K, K1, L3, L4, L40-L43. Write 'SATIN CHROME ACTUATOR' or 'BLACK ACTUATOR' in word form after order number. If nothing is specified, chrome plated actuators will be supplied.

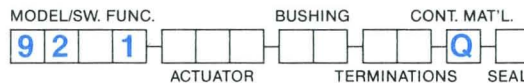
K, K1 ACTUATORS: Write actuator cap color in word form after order number. If nothing is specified, natural aluminum caps will be supplied. Bushing option code not required.

T, T1 ACTUATORS: Bushing option code not required unless CW splashproof bushing option is desired.

HARDWARE: Two mounting nuts, locking ring and lockwasher are supplied standard (except P1, P3, P4 actuators: one P/N 7099 dress nut, one hex nut, locking ring and lockwasher supplied standard). Optional mounting nut styles, locking rings and caps available. Write part descriptions and part nos. in word form after order number. If nothing is specified, standard hardware will be supplied. Hardware is also available separately, see HARDWARE section, page H-7.

**UNAVAILABLE OPTION COMBINATIONS:**

<u>Model or Option</u>	<u>Options Not Available</u>
9221	Z, C, Z3, W-W4, E
Z4	E



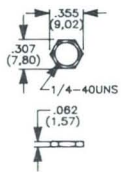


## AVAILABLE HARDWARE

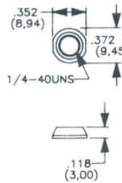
The following hardware is available separately. To order, write part nos., descriptions and colors where applicable.

### NUTS

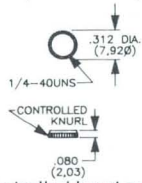
**7002**  
(Std.)



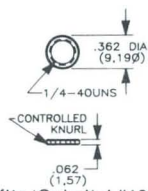
**7099**  
DRESS NUT  
(BLIND THD.)



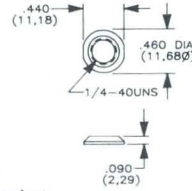
**7780**  
DRESS NUT  
(BLIND THD.)



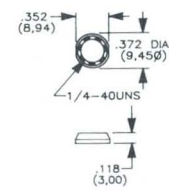
**7969\***  
KNURLED NUT



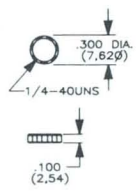
**7760**  
DRESS NUT



**7807**  
DRESS NUT



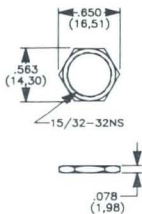
**7786**  
KNURLED NUT



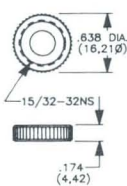
\* Controlled knurl pattern fits 'Gulmite' #12 socket.

### NUTS

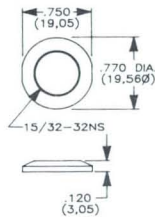
**7071**



**4713**  
KNURLED NUT  
(BLIND THD.)

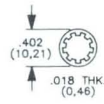


**8951**  
DRESS NUT

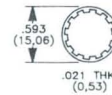


### LOCKWASHERS

**7003-3**  
(Std.)  
FITS 1/4 IN.  
BUSHINGS



**7003-2**  
FITS 15/32 IN.  
BUSHINGS



### MATERIALS

**NUTS, LOCKING RINGS -** Brass, nickel plated.  
**LOCKWASHERS -** Steel, bright nickel plated.

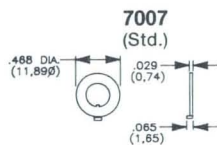
Black finish hardware is available, and is supplied when black bushings are specified. To order, write 'BLACK HARDWARE' in word form with descriptions and part nos.

### LOCKING RINGS

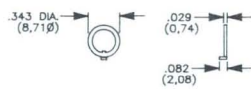
FITS BUSHINGS WITH KEYWAY

FITS BUSHINGS WITH FLAT

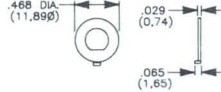
FITS 15/32 IN. BUSHINGS



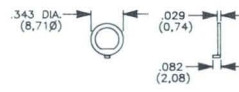
**7537**



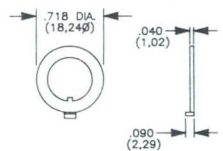
**7572**



**7573**



**7072**



### WRENCHES

Switches are normally mounted to panel using two mounting nuts: one front of panel, one back of panel. To avoid damaging front of panel, always tighten back of panel nut. When ordering, specify 4 digit part no.



P/N 4815 or P/N 8942

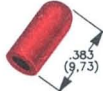
P/N 7785

WRENCH P/N	FITS NUTS P/N
7785	7002, 7099, 7807, 7916
8942	7969
4815	7780

### TOGGLE CAPS



**7062**  
Fits S actuator option; material: vinyl.



**8968**  
Fits S actuator option; material: polyethylene.



**7637**  
Fits L actuator option; material: vinyl.

Plastic caps, available in 9 colors, fit either S or L actuator options. When ordering, specify cap part no. and color in word form.

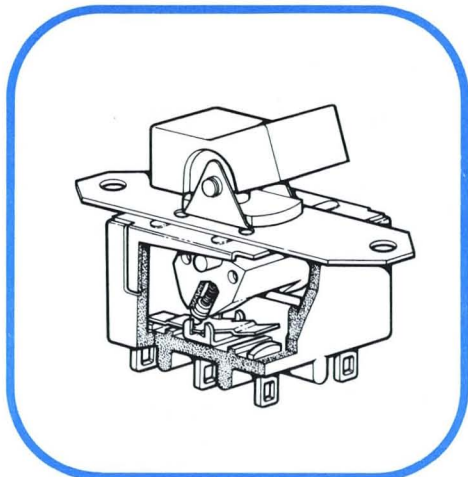
CAP COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		

### LEVER HANDLES FOR L40 ACTUATOR OPTION

Lever handles available in 3 styles and 9 colors, fit L40 actuator option. For illustrations and dimensions, see page H-4. Lever handles snap-fit and may be installed or replaced by user. When ordering, specify part no. and color in word form. Finish: matte.

LEVER HANDLE P/N	MAKES ACTUATOR OPTION
4810	L41
4811	L42
4812	L43

LEVER HANDLE COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		



### SPECIFICATIONS

**CONTACT RATING:**  
 9201 models: 6 AMPS @ 120 V AC.  
 or 28 V DC; 3 AMPS @ 250 V AC.  
 9221 models: 10 AMPS @ 125 V AC  
 or 28 V DC; 5 AMPS @ 250 V AC.  
**ELECTRICAL LIFE:** 25,000  
 make-and-break cycles at full load.  
**CONTACT RESISTANCE:** Below 10  
 milliohms typ. initial @ 2-4 V DC,  
 100 mA.  
**INSULATION RESISTANCE:** 10<sup>9</sup> ohms  
 min.  
**DIELECTRIC STRENGTH:** 2,500 V RMS  
 min. @ sea level.  
**OPERATING TEMPERATURE:** -30°C to  
 85°C.

### NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

### MATERIALS

**CASE:** Diallyl phthalate (DAP).  
**ACTUATOR:** Nylon, black, std.  
**BUSHING:** Brass, nickel plated.  
**HOUSING:** Stainless steel.  
**MOUNTING BRACKET:** Stainless steel.  
**END CONTACTS:** Coin silver, silver  
 plated (Q cont. mat'l.).  
**CENTER CONTACTS:** Brass, silver plated  
 (Q cont. mat'l.).  
**ALL TERMINALS:** 9201 models: Brass,  
 silver plated.  
 9221 models: Brass, electrotin plated.  
**TERMINAL SEAL:** Epoxy.  
**HARDWARE:** Nut- Stainless steel.  
 Screw- Stainless steel.  
 Lockwasher- Stainless steel.  
 Standoff- Aluminum or nylon.

### INTRODUCTION

Available options for 9000 SERIES POWER ROCKER AND LEVER HANDLE SWITCHES are shown on pages H-8 thru H-11. Make selections from the following option sections: Model/Switching Function, Actuator, Terminations, Contact Material and Epoxy Terminal Seal. Each section begins with the

ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page H-11. Available hardware and accessories shown on page H-12.

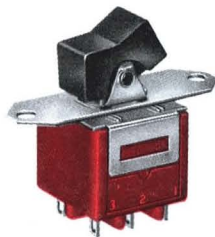
All 9000 Series models meet international dimensional and electrical requirements; UL, CSA, VDE, SEV and SEMKO listed.

### MODEL/SW. FUNC.

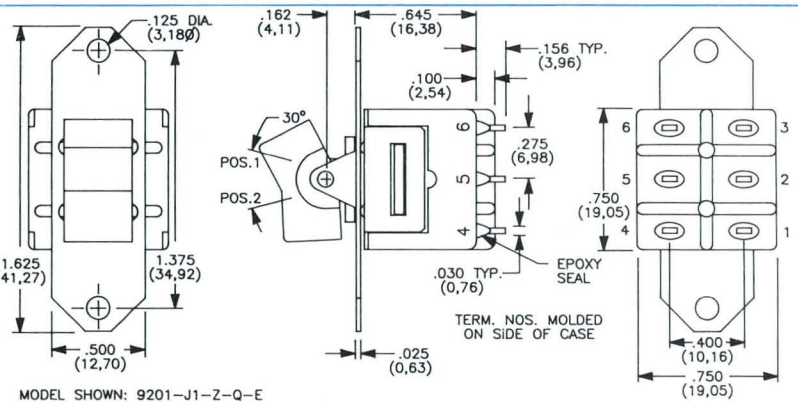


### MODELS / SWITCHING FUNCTION

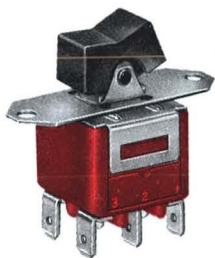
MODEL NO.	SWITCHING FUNC.	
	POS 1	POS 2
9201	ON	ON
CONNECTED TERMINALS	2-3,5-6	2-1,5-4
SCHEMATIC		
CONTACTS MAKE SAME SIDE ACTUATOR THROWN.		



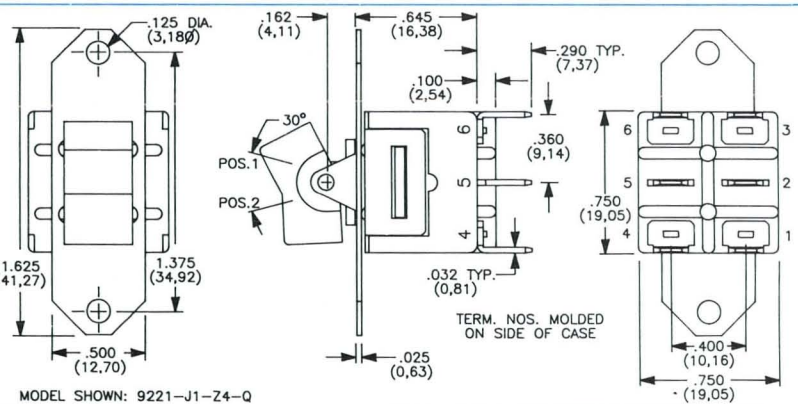
**DPDT**  
6 AMP MODEL



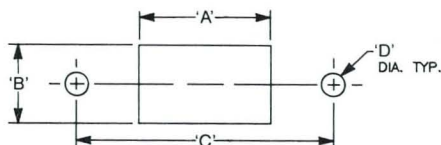
9221	ON	ON
CONNECTED TERMINALS	2-3,5-6	2-1,5-4
SCHEMATIC		
CONTACTS MAKE SAME SIDE ACTUATOR THROWN.		



**DPDT**  
10 AMP MODEL



### PANEL MOUNTING



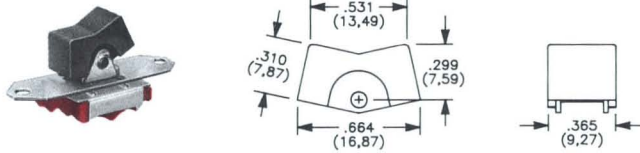
ACTUATOR OPTION	'A' DIM.	'B' DIM.	'C' DIM.	'D' DIM.
J1, J2	.707 (17,96)	.418 (10,62)	1.375 (34,93)	.125 (3,18)
J3, J4, J5	1.095 (27,81)	.648 (16,46)	1.375 (34,93)	.125 (3,18)
J10	1.375 (34,93)	.648 (16,46)	1.625 (41,28)	.140 (3,56)
J50, J60, J90	.503 (12,78)	.493 (12,52)	1.375 (34,93)	.125 (3,18)





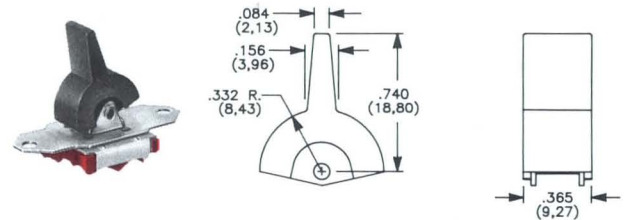
ACTUATOR OPTIONS FOR PANEL MOUNTING

**J1**



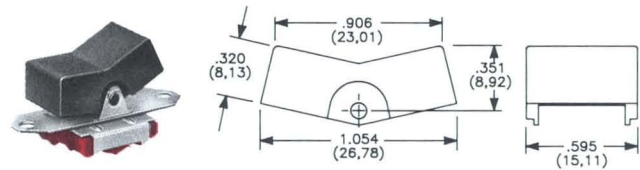
ACTUATOR P/N 7602

**J2**



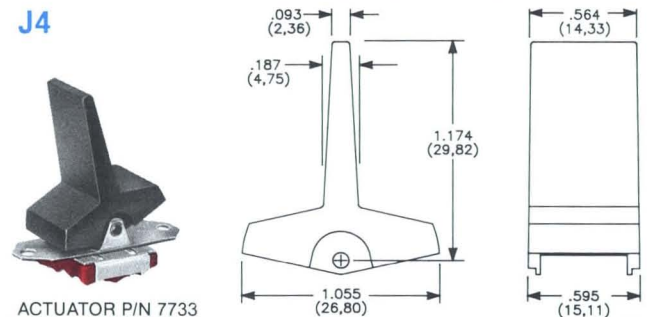
ACTUATOR P/N 7605

**J3**



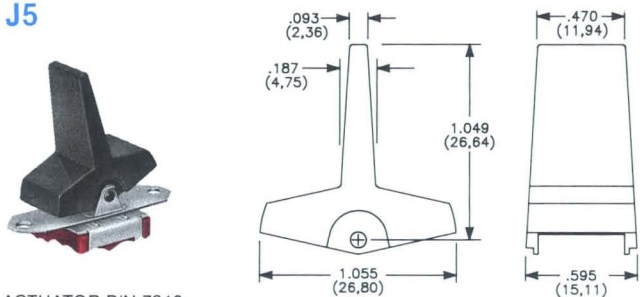
ACTUATOR P/N 7666

**J4**



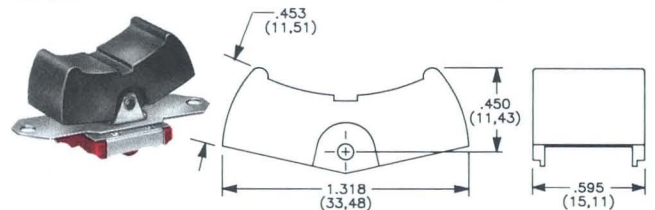
ACTUATOR P/N 7733

**J5**



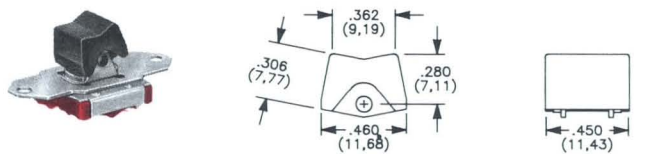
ACTUATOR P/N 7912

**J10**



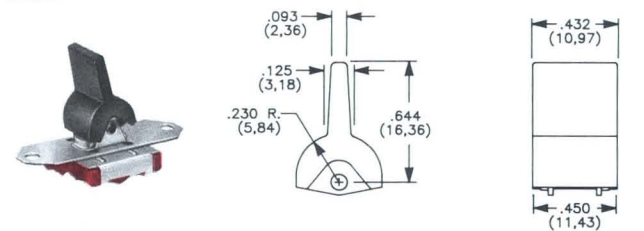
ACTUATOR P/N 7695

**J50**



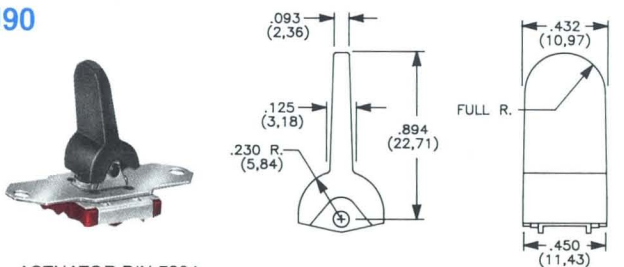
ACTUATOR P/N 7870

**J60**



ACTUATOR P/N 7868

**J90**



ACTUATOR P/N 7904

1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

Add actuator color in word form after order number. If no color is specified black will be supplied. Finish: matte.



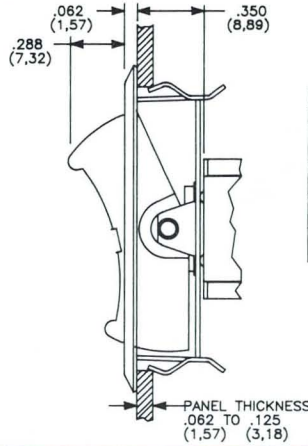
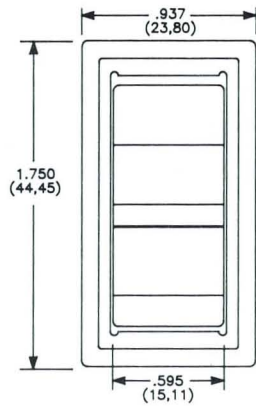
ACTUATOR



ACTUATOR OPTIONS FOR REAR MOUNTING

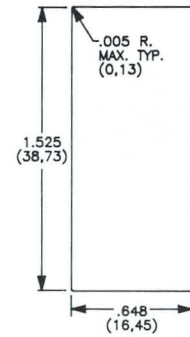
Available actuator colors, see page H-9. Select frame colors below.

J19

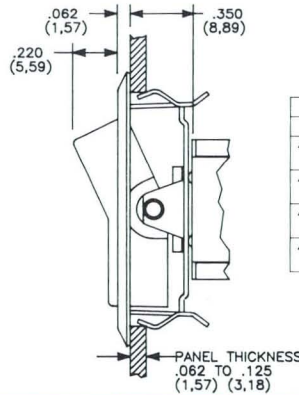
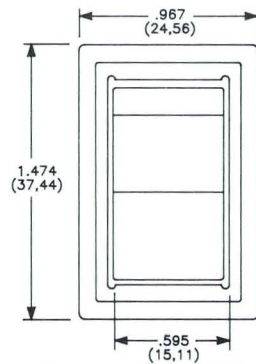


FRAME COLORS	
P/N	FINISH
7810-1	BRIGHT CHROME
7810-2	BLACK (Std.)
7810-3	SATIN CHROME
7810-4	WHITE ENAMEL

PANEL MOUNTING

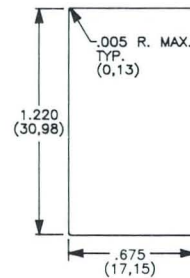


J37

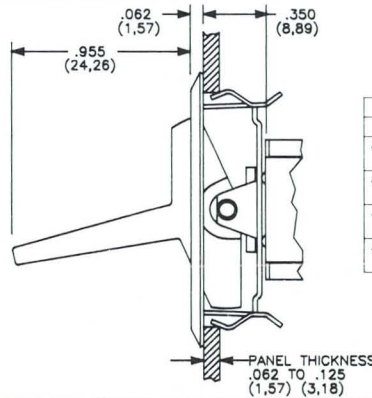
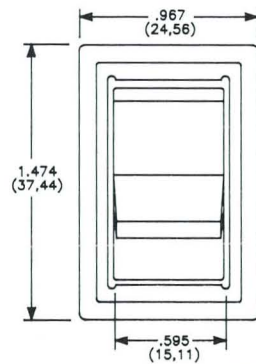


FRAME COLORS	
P/N	FINISH
4454-1	BRIGHT CHROME
4454-2	BLACK (Std.)
4454-3	SATIN CHROME
4454-4	WHITE ENAMEL

PANEL MOUNTING

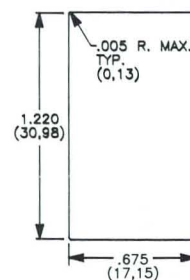


J47

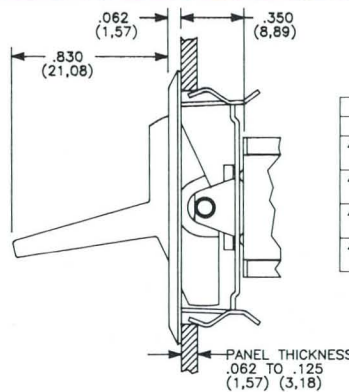
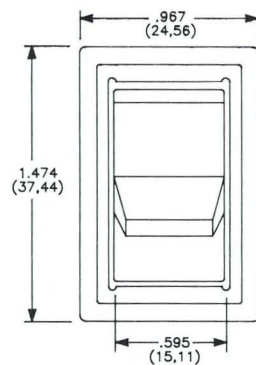


FRAME COLORS	
P/N	FINISH
4454-1	BRIGHT CHROME
4454-2	BLACK (Std.)
4454-3	SATIN CHROME
4454-4	WHITE ENAMEL

PANEL MOUNTING

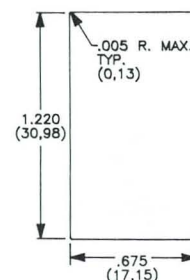


J57



FRAME COLORS	
P/N	FINISH
4454-1	BRIGHT CHROME
4454-2	BLACK (Std.)
4454-3	SATIN CHROME
4454-4	WHITE ENAMEL

PANEL MOUNTING





### TERMINATIONS

**Z**

Std. with 9201 models.

**C**

**Z3 QUICK CONNECT**

Mating quick connector available; order part no. 5301.

**Z4 QUICK CONNECT**

Only term. avail. with 9221 models.  
'E' epoxy seal not available.  
Mating quick connector available from:  
Hollingsworth Solderless Terminals, Phoenixville, PA., 19460  
AMP Special Industries, Harrisburg, PA., 17105

**W-W4 WIRE-WRAP**

OPTION CODE	DIM. 'A'
W	.750 (19,05)
W1	.964 (24,48)
W3	.425 (10,80)
W4	1.062 (26,97)

Wire-Wrap is a registered trademark of the Gardner-Denver Company.

### CONT. MAT'L. CONTACT MATERIAL

**Q** 9201 MODELS:  
END CONTACTS: Coin silver, silver plated.  
CENTER CONTACT & ALL TERMINALS: Brass, silver plated.  
RATING: 6 AMPS @ 120 V AC or 28 V DC; 3 AMPS @ 250 V AC.

9221 MODELS:  
END CONTACTS: Coin Silver, silver plated.  
CENTER CONTACT: Brass, silver plated.  
ALL TERMINALS: Brass, electrotin plated.  
RATING: 10 AMPS @ 125 V AC or 28 V DC; 5 AMPS @ 250 V AC (Avail. with Z4 terminations only).

**Q**

### SEAL SEALING

**(None)**

No seal

Std. with Z4 terminations.

Not avail. with Z, C, Z3, W-W4 terminations.

**E**

Std. with Z, C, Z3, W-W4 terminations.

Not available with Z4 terminations or all 9221 models.

## HOW TO ORDER

Complete the order number below by selecting the desired model no., actuator, termination and terminal sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Write actuator color and, where applicable, frame color in word form after order number.  
(Example: **9201-J47-W-Q-E** with yellow actuator and white frame). If no color is specified, black will be supplied.  
Z terminations on 9201 models or Z4 terminations on 9221 models and Q contact material are supplied if no options are specified. E epoxy terminal seal standard with Z, C, Z3 and W-W4 terminations on 9201 models, not available with Z4 terminations on 9221 models.  
All models UL/CSA/VDE/SEV/SEMKO listed with all options.

Note: Custom actuator markings and legends available, see inside front cover and consult factory.

HARDWARE: Two mounting screws, two nuts, two standoffs for 1/8 in. thk. panel and two lockwashers are supplied standard on panel mounted switches. Hardware for optional panel thicknesses available. See chart on page H-12 to determine correct standoff length and part no. Write part description and part no. in word form after order number. If nothing is specified, standard hardware will be supplied. Hardware is also available separately, see HARDWARE section, page H-12.

### UNAVAILABLE OPTION COMBINATIONS:

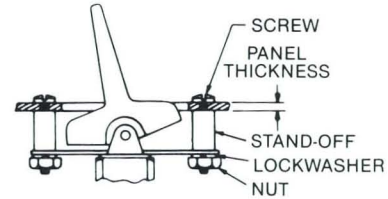
Model or Option	Options Not Available
9221	Z, C, Z3, W-W4, E
Z4	E



**AVAILABLE HARDWARE**

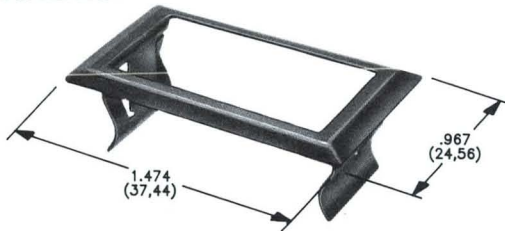
The following hardware is available separately. To order, write part nos., descriptions and colors in word form. Mounting hardware consists of two screws, two nuts, two standoffs and two lockwashers per switch. See chart.

HARDWARE P/N	MOUNTING HARDWARE		ACTUATOR OPTION
	PANEL THK.	STANDOFF LENGTH	
7706-01	1/16 in. (1,59)	.295 (7,49)	J1, J2, J3, J50, J60, J90
7706-02	3/32 in. (2,38)	.264 (6,71)	
7706-03 (Std.)	1/8 in. (3,18)	.233 (5,92)	
7750-01	1/16 in. (1,59)	.375 (9,53)	J4, J5
7750-02	3/32 in. (2,38)	.344 (8,74)	
7750-03 (Std.)	1/8 in. (3,18)	.312 (7,92)	
7707-01	1/16 in. (1,59)	.295 (7,49)	J10
7707-02	3/32 in. (2,38)	.264 (6,71)	
7707-03 (Std.)	1/8 in. (3,18)	.233 (5,92)	



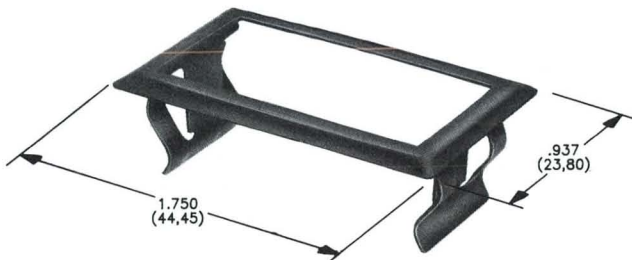
MATERIALS: SCREWS, NUTS, LOCKWASHERS- Stainless Steel. STANDOFFS- Aluminum or nylon.

**FRAMES**



FOR J37, J47, J57 ACTUATORS

FRAME COLORS	
P/N	FINISH
4454-1	BRIGHT CHROME
4454-2	BLACK (Std.)
4454-3	SATIN CHROME
4454-4	WHITE ENAMEL



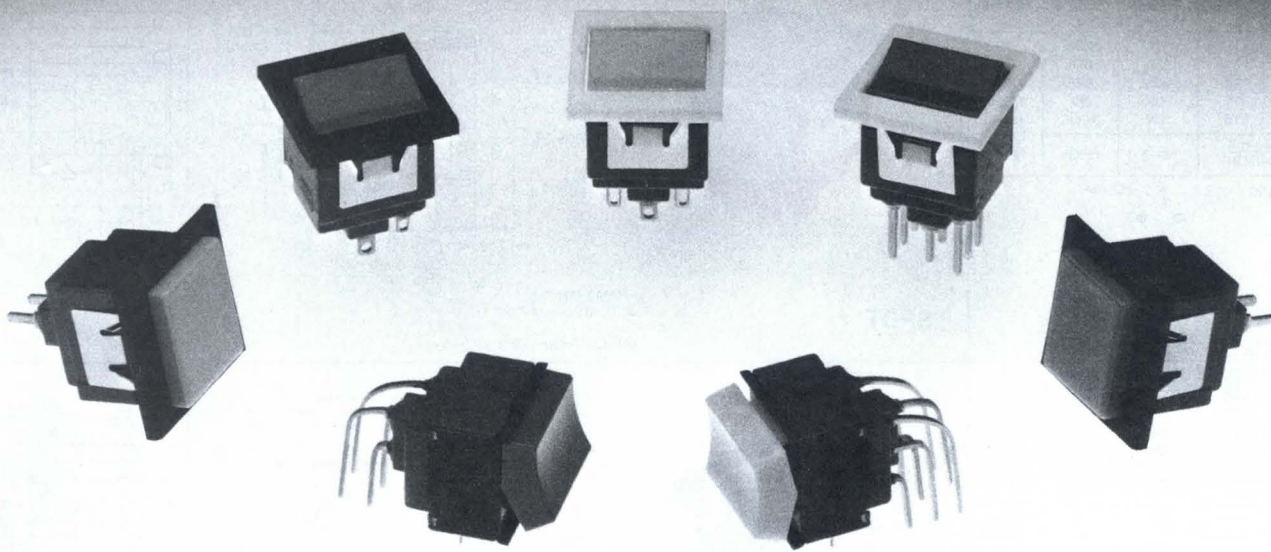
FOR J19 ACTUATOR

FRAME COLORS	
P/N	FINISH
7810-1	BRIGHT CHROME
7810-2	BLACK (Std.)
7810-3	SATIN CHROME
7810-4	WHITE ENAMEL

Frame snaps-in from front of panel, switch snaps to frame from rear. See page H-10 for panel opening dimensions. Material: spring steel.

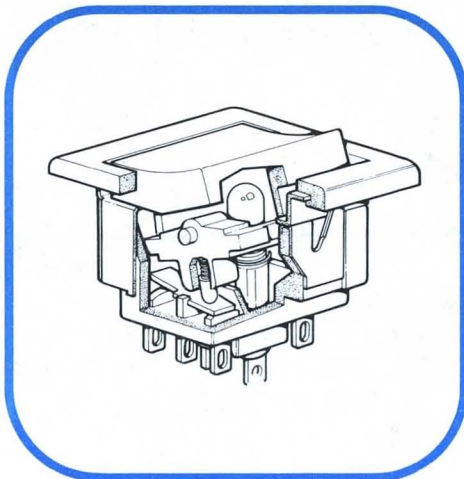


# 5000 SERIES ILLUMINATED ROCKER SWITCHES



SECTION J

J



### SPECIFICATIONS

CONTACT RATING: 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC.  
 ELECTRICAL LIFE: 100,000 make-and-break cycles at full load on all models ending in -01 (ON-NONE-ON). All other models, 40,000 cycles.  
 CONTACT RESISTANCE: Below 10 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.  
 INSULATION RESISTANCE: 10<sup>9</sup> ohms min.  
 DIELECTRIC STRENGTH: 1,000 V RMS min. @ sea level.  
 OPERATING TEMPERATURE: -30°C to 85°C.

### MATERIALS

CASE: Diallyl phthalate (DAP).  
 ACTUATOR: Polycarbonate, white, std.  
 FRAME: Nylon, black, std.  
 HOUSING: Stainless steel, black passivate.  
 MOUNTING SPRING: Spring steel, nickel plated.  
 END CONTACTS: Coin silver, silver plated (Q cont. mat'l.).  
 CENTER CONTACT & ALL TERMINALS: Brass, silver plated (Q cont. mat'l.).  
 LAMP SOCKET TERMINALS: Brass, electrotin plated.  
 TERMINAL SEAL: Epoxy.

### NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

### INTRODUCTION

Available options for 5000 SERIES ILLUMINATED ROCKER SWITCHES are shown on pages J-2 thru J-4. Make selections from the following option sections: Model/Switching Function, Terminations, Contact Material and Epoxy Terminal Seal. Each

section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page J-4. Available Indicator Light shown on page J-4. UL, CSA listings available. See HOW TO ORDER, page J-4.

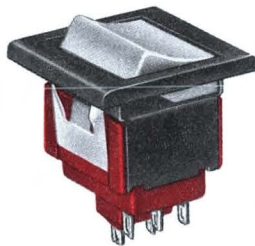
### MODEL/SW. FUNC.



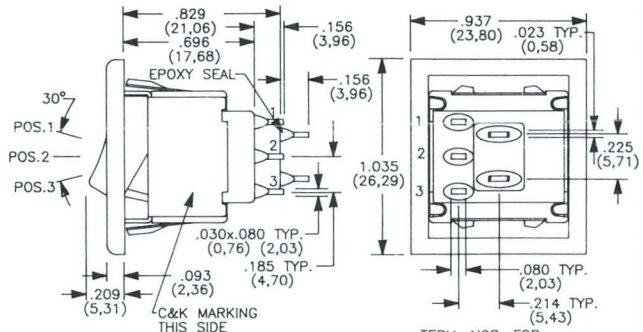
### MODELS / SWITCHING FUNCTION

MODEL NO.	UL MODEL NO.	SWITCHING FUNCTION		
		POS 1	POS 2	POS 3
5101	L11	ON	NONE	ON
5103	L13	ON	OFF	ON
5105	L15	MOM.	OFF	MOM.
5107	L17	ON	OFF	MOM.
5108	L18	ON	NONE	MOM.

CONNECTED TERMINALS: 2-3 OPEN 2-1



SPDT



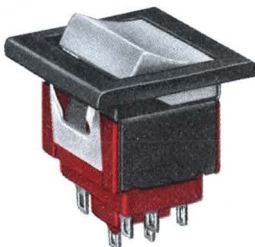
MOM. = MOMENTARY POSITION

5201	L21	ON	NONE	ON
5203	L23	ON	OFF	ON
5205	L25	MOM.	OFF	MOM.
5207	L27	ON	OFF	MOM.
5208	L28	ON	NONE	MOM.

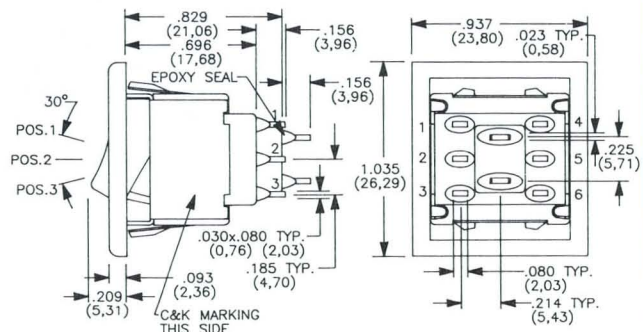
CONNECTED TERMINALS: 2-3,5-6 OPEN 2-1,5-4

5211*	5211	ON	ON	ON
5213*	5213	ON	ON	MOM.
5215*	5215	MOM.	ON	MOM.

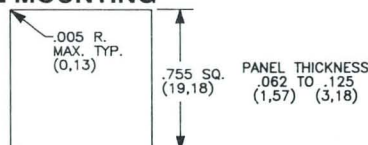
CONNECTED TERMINALS: 2-3,5-6 2-3,5-4 2-1,5-4



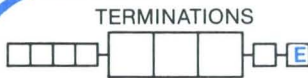
DPDT



### PANEL MOUNTING

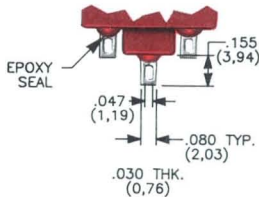






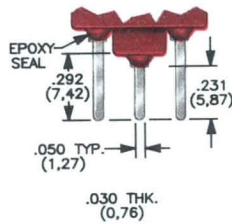
## TERMINATIONS

### Z (Std.)



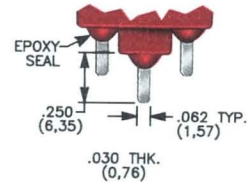
'Q' Contact Material Std.

### C1



'Q' Contact Material Std.

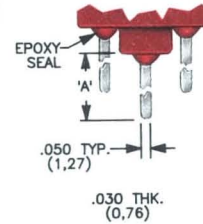
### Z3 QUICK CONNECT



Mating quick connector available; order part no. 5301.

'Q' Contact Material Std.

### W-W5 WIRE-WRAP

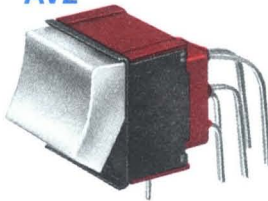


'B' Contact Material Std.

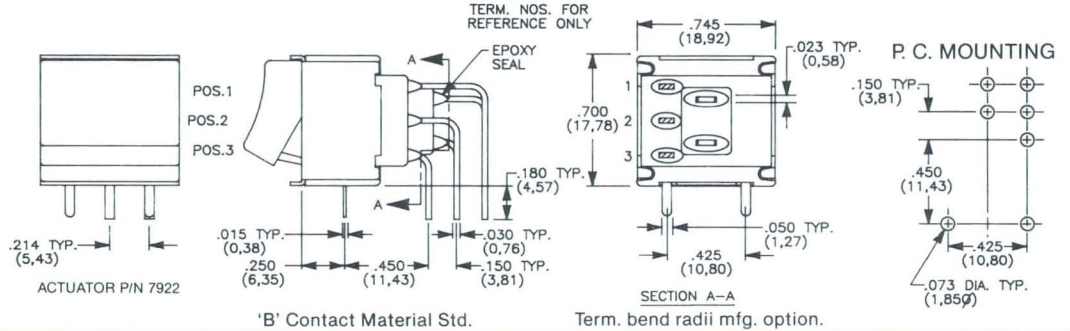
OPTION CODE	DIM. 'A'
W	.750(19,05)
W1	.964(24,48)
W3	.425(10,80)
W4	1.062(26,97)
W5	1.305(33,15)

Wire-Wrap is a registered trademark of the Gardner-Denver Company.

### AV2



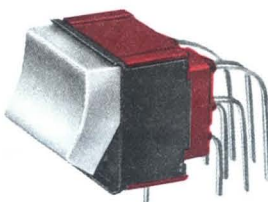
SPDT



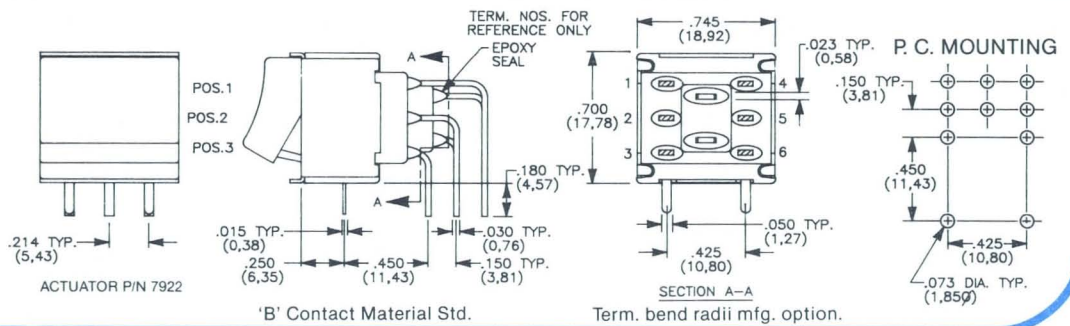
'B' Contact Material Std.

Term. bend radii mfg. option.

### AV2

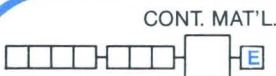


DPDT



'B' Contact Material Std.

Term. bend radii mfg. option.



## CONTACT MATERIALS

**B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max.  
(Std. with all termination options exc. Z, C1, Z3)

**Q** END CONTACTS: Coin silver, silver plated.  
CENTER CONTACT & ALL TERMINALS: Brass, silver plated.  
RATING: 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC.  
(Std. with termination options Z, C1, Z3)

**G** END CONTACTS: Coin silver, with gold plate over nickel plate.  
CENTER CONTACT & ALL TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or 5 AMPS @ 120 V AC or 28 V DC; 2 AMPS @ 250 V AC.

**Note:** 'G' contact material is equivalent to both 'B' and 'Q' contact materials and can be used where either dry circuit\* or power conditions are encountered. However, when the dry circuit\* rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. This option should be specified where UL or CSA listing is required on a switch used in a dry circuit application.

\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.

SEAL

## SEALING

---

**E (Std.)**

### LAMP INFORMATION

- 1.) Lamps are replaceable from front on both switches and indicators. No special tools are required.
- 2.) Bulbs are not supplied with either the switch or indicator.
- 3.) Midget Screw Base bulbs sizes T 1½ and T 1¾ fit both the switch and indicator. Suggested spherical candlepower range is .34 M.S.C.P. to .75 M.S.C.P. Instrument grade bulbs are recommended for dimensional consistency with a maximum overall length of: .635" (M.O.L.) by .200" max. O.D.

### HOW TO ORDER

Complete the order number below by selecting the desired model no., termination, contact material and terminal sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. Write actuator color and, where applicable, frame color in word form after order number. (Example: L21-Z-G-E with yellow actuator and blue frame). If no colors are specified, a white actuator and black frame will be supplied. No frame on models with AV2 terminations. Actuators and frames supplied not installed.

Z terminations and Q contact material are supplied if no options are specified. E epoxy terminal seal standard with all terminations and all bulb socket terminals.

UL listed with all options when ordered with model nos. L11 thru L28 or 5211 thru 5215, and G or Q contact material. CSA listing available on all UL listed switches, specify 'with CSA listing' in word form after order number.

Note: Bulbs are not furnished. See LAMP INFORMATION above.

Note: Custom markings and legends available, see inside front cover and consult factory.

#### UNAVAILABLE OPTION COMBINATIONS:

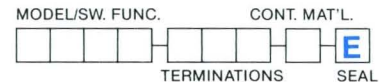
#### Model or Option

L11 thru L28

#### Options Not Available

B\*

\*UL listed switches must be ordered with G or Q contact material because UL considers for listing only those components suitable for power applications.



COLOR NO.	FRAME COLORS
1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

COLOR NO.	ACTUATOR/ LENS COLORS
1	White (Std.)
3	Red
4	Orange (Amber)
5	Yellow
6	Green

#### HARDWARE

Actuator, P/N 7922 and frame, P/N 7888 available separately. To order, write desired part no., description and color. See color charts above.

MODEL NO.

5

6

0

0

## 5600 INDICATOR LIGHT

FRAME P/N 7888  
LENS P/N 7952

EPOXY SEAL

PANEL MOUNTING

PANEL THICKNESS  
.062 TO .125 (1,57) (3,18)

MODEL SHOWN: 5600-C

### INDICATOR LIGHT: HOW TO ORDER

Specify model no. 5600 and desired termination option. Indicator light available with Z, C, Z3 or W-W4 terminations. Write lens color and frame color in word form after order number. (Example: 5600-C with orange lens and blue frame).

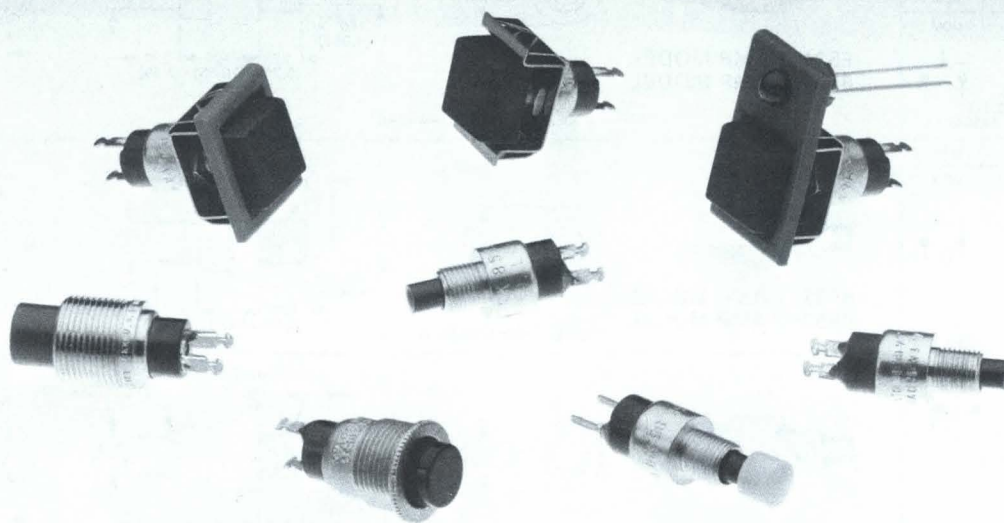
If no color is specified, a white lens and black frame will be supplied. Z terminations and epoxy terminal seal supplied std.

Note: Bulbs not furnished. See LAMP INFORMATION above. Lens, P/N 7952 and frame, P/N 7888 available separately. To order, write desired part no., description and color. See color charts above. Lenses and frames supplied not installed.



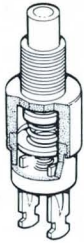


# 8500 SERIES SUBMINIATURE PUSHBUTTON SWITCHES



SECTION K

K



### SPECIFICATIONS

**CONTACT RATING:** 853X Models: 1 AMP @ 120 V AC or 28 V DC.  
855X Models: 3 AMPS @ 120 V AC or 28 V DC.

**ELECTRICAL LIFE:** 853X Models: 250,000 actuations at full load.  
855X Models: 10,000 actuations at full load.

**CONTACT RESISTANCE:** Below 30 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.

**INSULATION RESISTANCE:** 10<sup>9</sup> ohms min.

**DIELECTRIC STRENGTH:** 1,000 V RMS min. @ sea level.

**OPERATING TEMPERATURE:** -30°C to 65°C.

### MATERIALS

**CASE:** Glass filled phenolic or diallyl phthalate (DAP).

**PLUNGER:** Phenolic or glass filled polyester, black, std.

**BUSHING:** Brass, nickel plated.

**CONTACTS:** Coin silver, silver plated (Q cont. mat'l.).

**TERMINALS:** Brass, silver plated (Q cont. mat'l.).

**HARDWARE:** Nut- Brass, nickel plated.  
Lockwasher- Steel, bright nickel plated.

### NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

### INTRODUCTION

Available options for 8500 SERIES SUBMINIATURE PUSHBUTTON SWITCHES are shown on pages K-2 thru K-4. Make selections from the following option sections: Model/ Switching Function, Actuator or Plunger, Terminations, Contact Material and (if desired) Epoxy Terminal Seal. Each section

begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page K-4. Available hardware and accessories shown on page K-4. UL listed with all options when ordered with G or Q contact material. See HOW TO ORDER, page K-4.

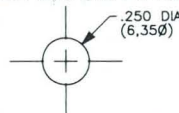
### MODEL/SW. FUNC.

8	5						
---	---	--	--	--	--	--	--

### MODELS / SWITCHING FUNCTION

MODEL NO.	SWITCHING FUNC.		SCHEMATIC	MODEL SHOWN	DIMENSIONS	TERMINALS
	POS 1	POS 2				
8531	OFF	MOM.		8531: 1 AMP MODEL 8551: 3 AMP MODEL		
8532	OFF	MOM.		8532: 1 AMP MODEL 8552: 3 AMP MODEL		
8533	ON	MOM.		8533: 1 AMP MODEL		
8534	ON	MOM.		8534: 1 AMP MODEL		

### PANEL MOUNTING





## ACTUATORS / PLUNGERS

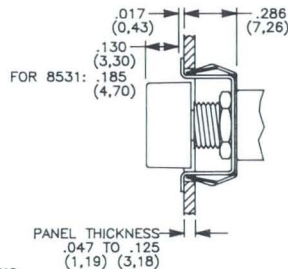
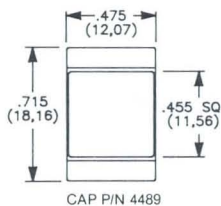
Select desired option from available actuators below OR plungers, next page. Available cap and frame colors shown right, black std. Plungers available in black and red only, black std. Add plunger or cap and frame colors in word form after order number. If no color is specified, black will be supplied.

CAP AND FRAME COLORS			
1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		

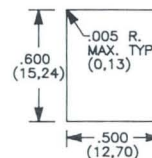


## ACTUATORS

**J80**

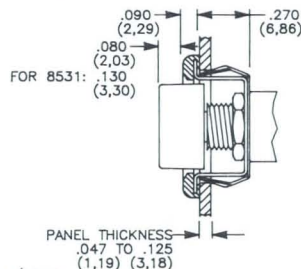
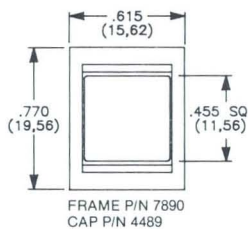


### PANEL MOUNTING

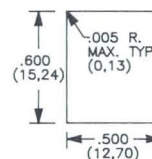


Cap finish: matte; available colors, see above.

**J81**

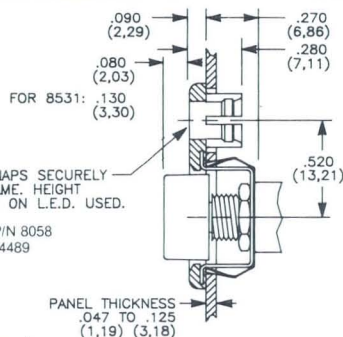
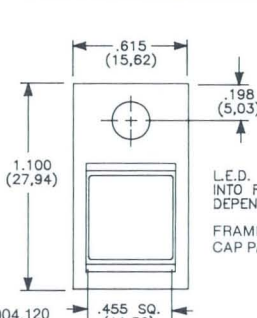
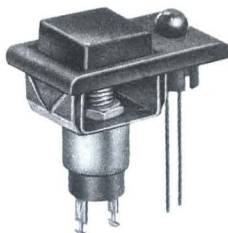


### PANEL MOUNTING

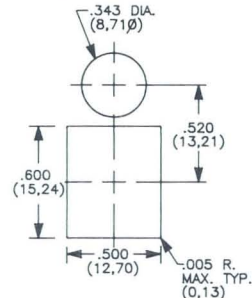


Cap and frame finish: matte; available colors, see above.

**J82**



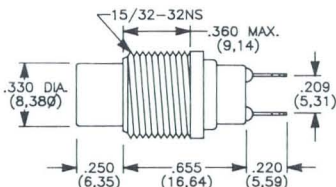
### PANEL MOUNTING



L.E.D. NOT INCLUDED. FOR L.E.D. INFORMATION, SEE PAGE A-25.

Cap and frame finish: matte; available colors, see above.

**T**

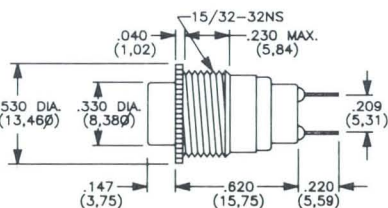


### PANEL MOUNTING

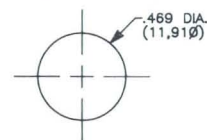


Cap finish: gloss; available colors, see above.

**T1**



### PANEL MOUNTING



**8532, 8534 MODELS ONLY**

Cap finish: gloss; available colors, see above.

**ACTUATOR OR PLUNGER**

**PLUNGERS**

**M (Std.)**

**S**

Black plunger std., red available. Add plunger color in word form after order number. If no color is specified, black will be supplied.

**TERMINATIONS**

**TERMINATIONS**

**Z (Std.)**

**C**

'Q' Contact Material Std.

**CONT. MAT'L.**

**CONTACT MATERIALS**

**B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate. RATING: 0.4 VA max. @ 20 V AC or DC max.

**Q** CONTACTS: Coin silver, silver plated. TERMINALS: Brass, silver plated. RATING: 853X Models: 1 AMP @ 120 V AC or 28 V DC. 855X Models: 3 AMPS @ 120 V AC or 28 V DC. (Std. with all term. options)

**G** CONTACTS: Coin Silver, with gold plate over nickel plate. TERMINALS: Brass, with gold plate over nickel plate. RATING: 853X Models: 0.4 VA max. @ 20 V AC or DC max. or 1 AMP @ 120 V AC or 28 V DC. 855X Models: 0.4 VA max. @ 20 V AC or DC max. or 3 AMPS @ 120 V AC or 28 V DC.

**Note:** 'G' contact material is equivalent to both 'B' and 'Q' contact materials and can be used where either dry circuit\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. This option should be specified where UL listing is required on a switch used in a dry circuit application.

\* Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.

**SEAL**

**SEALING**

**(None)**

No seal

Std. with 8531, 8532, 8551, 8552 models. Not avail. with 8533, 8534 models.

**E**

EPOXY SEAL

Std. on 8533, 8534 models.

**HOW TO ORDER**

Complete the order number below by selecting the desired model no., actuator or plunger, termination and contact material options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. (Example: 8531-S-C-B-□).

For epoxy terminal seal on 8531, 8532, 8551, 8552 models, specify 'E' in SEAL box, for no seal, leave box empty. Epoxy seal standard on 8533, 8534 models.

M plunger (black), Z terminations and Q contact material are supplied if no options are specified. One mounting nut and lockwasher are supplied standard, where applicable (except T actuator option: two mounting nuts and lockwasher supplied standard). Where applicable, add plunger, cap and frame colors in word form after order number. (Example: 8531-T-Z-Q-E with red cap). If no color is specified, black will be supplied.

UL listed when ordered with G or Q contact material.

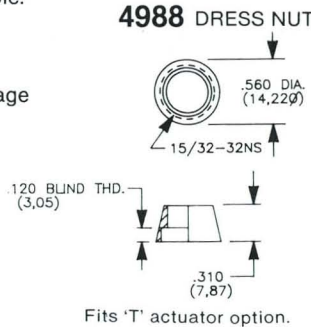
**UNAVAILABLE OPTION COMBINATIONS**

Model or Option	Options Not Available
8531, 8533, 8551	T1

**AVAILABLE HARDWARE**

The following hardware is available separately. For illustrations and dimensions of parts not shown, see pages noted. To order, write part nos., descriptions and colors where applicable.

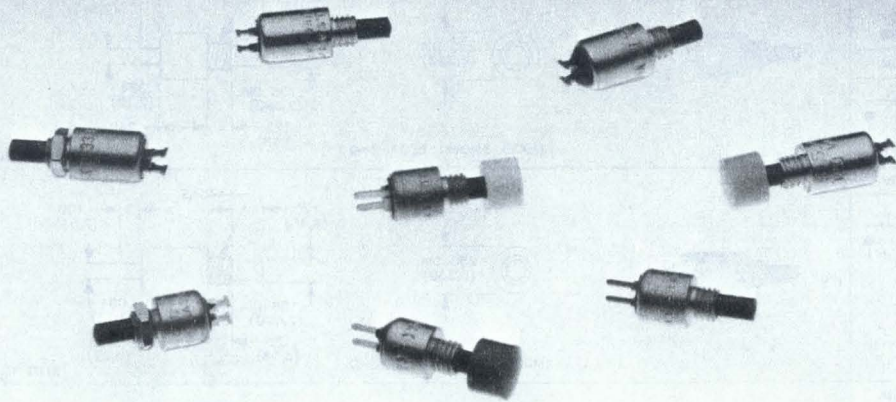
- NUTS: 7002, 7071 (see page A-13)
- LOCKWASHERS: 7003-2, 7003-3 (see page A-13)
- WRENCH: 7785 (see page A-13)
- FRAMES: 7890, 8058 (see page K-3)



CAP AND FRAME COLORS	
1	White
2	Black/(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

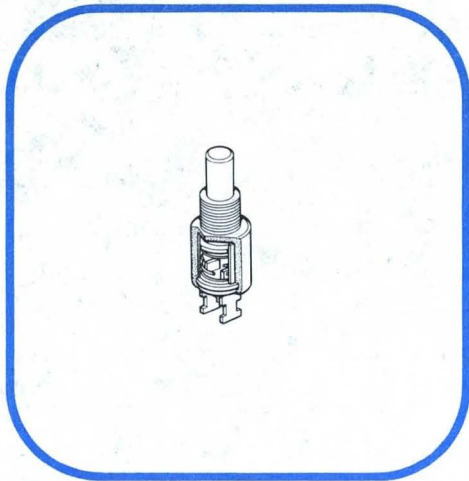


# 8600 SERIES MICROMINIATURE PUSHBUTTON SWITCHES



SECTION L





### SPECIFICATIONS

**CONTACT RATING:**  
 8631, 8632 models: 500 mA @ 120 V AC or 28 V DC; 250 mA @ 250 V AC.  
 8633 model: 250 mA @ 120 V AC or 28 V DC; 125 mA @ 250 V AC.

**ELECTRICAL LIFE:**  
 8631, 8633 models: 250,000 actuations at full load.  
 8632 model: 100,000 actuations at full load.

**CONTACT RESISTANCE:** Below 30 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.

**INSULATION RESISTANCE:** 10<sup>9</sup> ohms min.

**DIELECTRIC STRENGTH:** 500 V RMS min. @ sea level.

**OPERATING TEMPERATURE:** -30°C to 65°C.

### MATERIALS

**CASE:** Glass filled phenolic or diallyl phthalate (DAP).

**PLUNGER:** Glass filled nylon or glass filled polyester, black, std.

**BUSHING:** Brass, nickel plated.

**CONTACTS:** Coin silver, silver plated (Q cont. mat'l.).

**TERMINALS:** Brass, silver plated (8633 models: coin silver). 8631, 8632 models: terminals insert molded.

**HARDWARE:** Nut- Brass, nickel plated.

### NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

### INTRODUCTION

Available options for 8600 SERIES MICROMINIATURE PUSHBUTTON SWITCHES are shown on pages L-2 and L-3. Make selections from the following option sections: Model/Switching Function, Terminations, Contact Material and

(if desired) Epoxy Terminal Seal. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page L-3. Available hardware and accessories shown on page L-3.

8631, 8632 models UL listed when ordered with G or Q contact material. See HOW TO ORDER, page L-3.

MODEL/SW. FUNC.		MODELS / SWITCHING FUNCTION			
MODEL NO.	SWITCHING FUNC.	PHYSICAL VIEW	TERMINAL VIEW	TERMINAL VIEW	TERMINAL VIEW
8631	OFF MOM.				
N.O. TOT. TRAVEL: .050 (1,27) ACTUATION FORCE: 5 OZ. (140g)					Terminals Insert Molded
8632	OFF MOM.				
N.O. WITH OVERTRAVEL TOT. TRAVEL: .080 (2,03) OVERTRAVEL: .015 MIN. (0,38) ACTUATION FORCE: 5 OZ. (140g)					Terminals Insert Molded
8633	ON MOM.				
N.C. TOT. TRAVEL: .040 (1,02) ACTUATION FORCE: 5 OZ. (140g)					
MOM. = MOMENTARY POSITION					

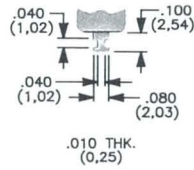
**PANEL MOUNTING**



### TERMINATIONS



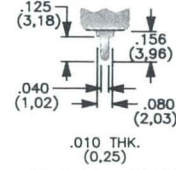
**Z (Std.)**



'Q' Contact Material Std.

### TERMINATIONS

**C**



'Q' Contact Material Std. Available with 8631, 8632 models only.

### CONT. MAT'L.



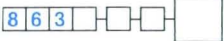
### CONTACT MATERIALS

- B** CONTACTS & TERMINALS: Brass, with gold plate over nickel plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max.
- Q** CONTACTS: Coin silver, silver plated.  
TERMINALS: Brass, silver plated (exc. 8633: coin silver).  
RATING: 8631, 8632 models: 500 mA @ 120 V AC or 28 V DC; 250 mA @ 250 V AC.  
8633 models: 250 mA @ 120 V AC or 28 V DC; 125 mA @ 250 V AC (Std. with all termination options)
- G** CONTACTS: Coin Silver, with gold plate over nickel plate.  
TERMINALS: Brass, with gold plate over nickel plate (exc. 8633: coin silver, with gold plate over nickel plate).  
RATING: 0.4 VA max. @ 20 V AC or DC max. or  
8631, 8632 models: 500 mA @ 120 V AC or 28 V DC; 250 mA @ 250 V AC.  
8633 models: 250 mA @ 120 V AC or 28 V DC; 125 mA @ 250 V AC

**Note:** 'G' contact material is equivalent to both 'B' and 'Q' contact materials and can be used where either dry circuit\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits. This option should be specified where UL listing is required on a switch used in a dry circuit application.

\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.

### SEAL



### SEALING

**(None)**

No seal — std.

**E**



Available on 8633 models only.

### HOW TO ORDER

Complete order number below by selecting the desired model no., termination and contact material options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Write plunger color (black or red) in word form after order number. (Example: 8633-2-B with red plunger). If no color is specified, black will be supplied.

E epoxy terminal seal option avail. on 8633 model only, specify 'E' in SEAL box, for no seal, leave box empty. Terminals insert molded on 8631, 8632 models, and E epoxy terminal seal not required. Black plunger and Q contact material are supplied if no options are specified. One mounting nut is supplied standard. C printed circuit termination option avail. on 8631, 8632 models only.

8631, 8632 models UL listed when ordered with G or Q contact material.

### UNAVAILABLE OPTION COMBINATIONS

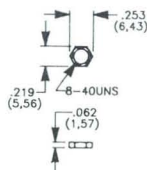
Model or Option	Options Not Available
8631, 8632 8633	E (not req'd., terms. insert molded) C



### AVAILABLE HARDWARE

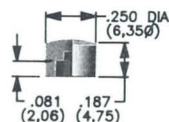
The following hardware is available separately. To order, write part nos., descriptions and colors where applicable.

#### 7752 NUT



Material: brass, nickel plated.

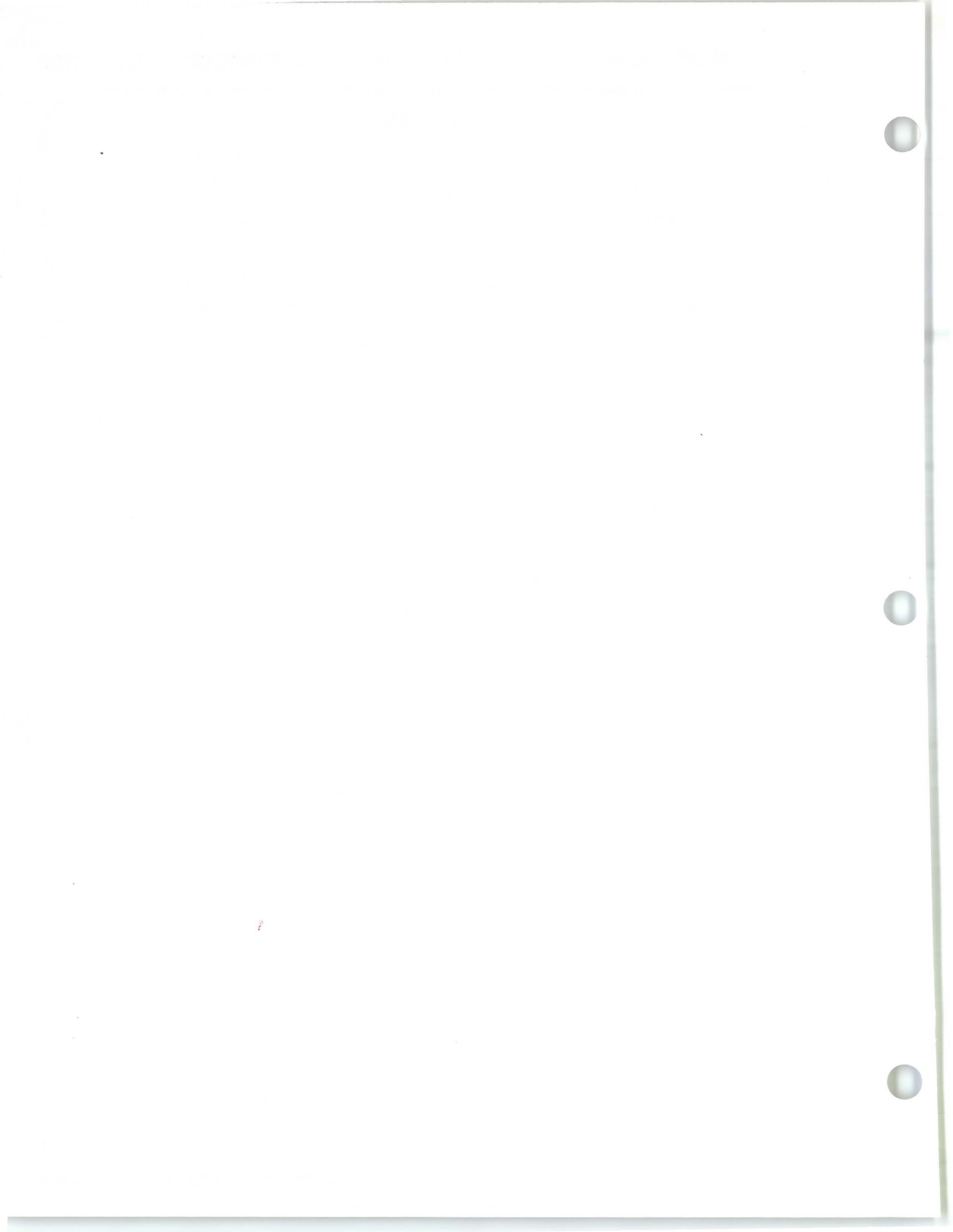
#### 7851 CAP



Cap finish; gloss; material, nylon.

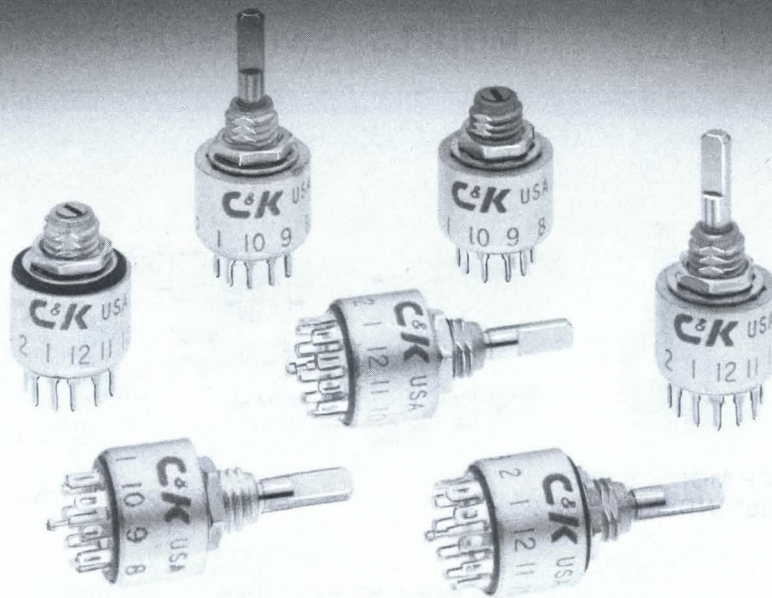
#### CAP COLORS

1	White	6	Green
2	Black(Std.)	7	Blue
3	Red	8	Brown
4	Orange	9	Gray
5	Yellow		





# M SERIES HALF-INCH ROTARY SWITCHES



## SECTION M





MODEL/SW. FUNC.



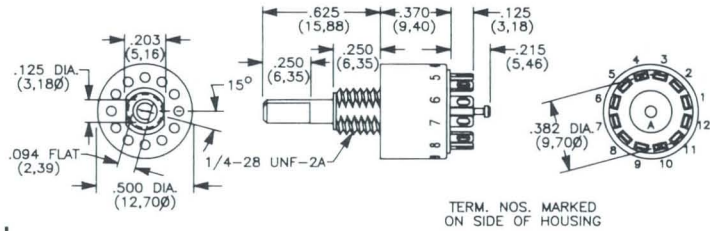
## MODELS / SWITCHING FUNCTION (cont'd.)

MODEL NO.	SW. FUNCTION
MC00	SP 12 POS. No Stops
MC02	SP 2 POS.
MC03	SP 3 POS.
MC04	SP 4 POS.
MC05	SP 5 POS.
MC06	SP 6 POS.
MC07	SP 7 POS.
MC08	SP 8 POS.
MC09	SP 9 POS.
MC10	SP 10 POS.
MC11	SP 11 POS.
MC12	SP 12 POS.

All above models 30° indexing. Number of positions or stops preset at factory (Note: MC00 models have full 360° rotation with no stops. Stop pins supplied for user-selectable stops). All terminals present regardless of number of switch positions.



### SP MODELS WITH 30° INDEXING



Actuator shown in POS.1, fully CCW.

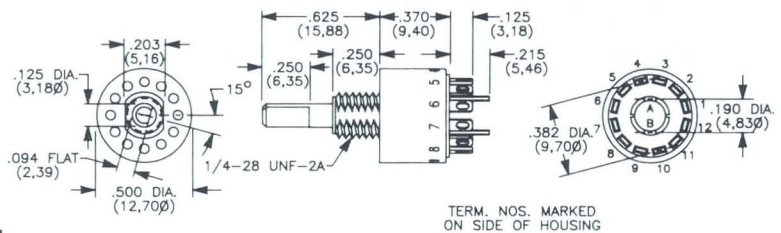
MODEL SHOWN: MC00-L1-N-Z-Q

MODEL NO.	SW. FUNCTION
MD00	DP 6 POS. No Stops
MD02	DP 2 POS.
MD03	DP 3 POS.
MD04	DP 4 POS.
MD05	DP 5 POS.
MD06	DP 6 POS.

All above models 30° indexing. Number of positions or stops preset at factory (Note: MD00 models have full 360° rotation with no stops. Stop pins supplied for user-selectable stops). All terminals present regardless of number of switch positions.



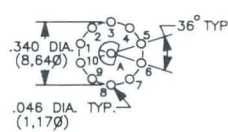
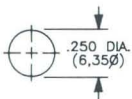
### DP MODELS WITH 30° INDEXING



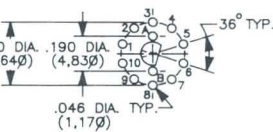
Actuator shown in POS.1, fully CCW.

MODEL SHOWN: MD00-L1-N-Z-Q

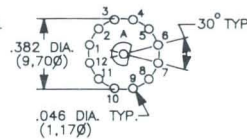
### PANEL MOUNTING



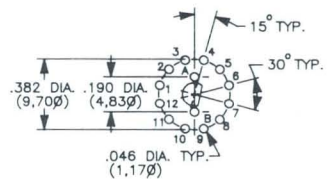
SP MODELS WITH 36° INDEXING



DP MODELS WITH 36° INDEXING

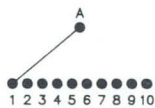


SP MODELS WITH 30° INDEXING

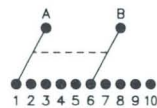


DP MODELS WITH 30° INDEXING

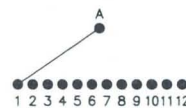
### SCHEMATICS



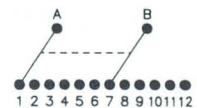
SP MODELS WITH 36° INDEXING



DP MODELS WITH 36° INDEXING



SP MODELS WITH 30° INDEXING



DP MODELS WITH 30° INDEXING

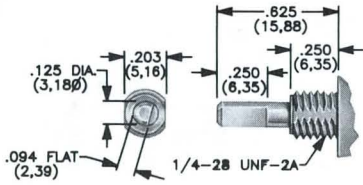
Terminal nos. marked on side of housing. Actuators and schematics shown in pos. 1. All terminals present regardless of number of switch positions.

ACTUATOR

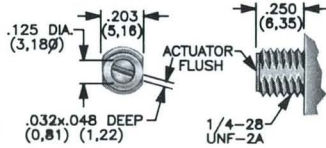


ACTUATORS

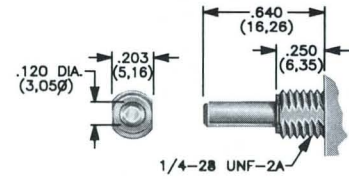
L1 (Std.)



L2



L3



All actuators shown in pos. 1.

SHORTING/  
NON-SHORTING



SHORTING / NON-SHORTING CONTACTS

**N (Std.)** Non-shorting contacts — break before make.

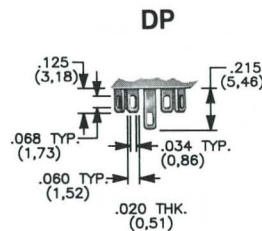
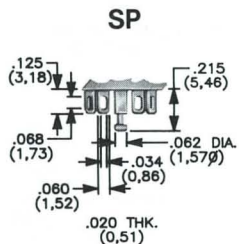
**S** Shorting contacts — make before break.

TERMINATIONS

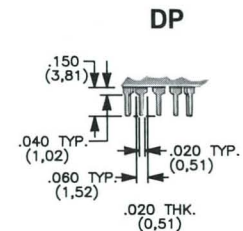
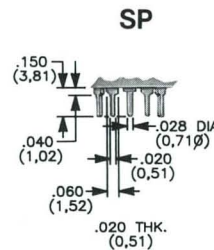


TERMINATIONS

Z (Std.)

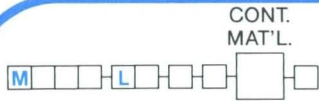


C



Terminals insert molded. All terminals present regardless of number of switch positions.



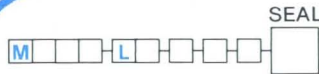


**CONTACT MATERIALS**

- Q** MOVABLE CONTACT: Non-shorting—Brass, silver plated.  
Shorting—Zinc alloy, silver plated.  
STATIONARY CONTACTS & TERMINALS: Brass, silver plated.  
RATING: Switch—250 mA @ 125 V AC or 28 V DC.  
Carry—6 AMPS continuous. (Std. with all termination options)
- G** MOVABLE CONTACT: Non-shorting—Brass, with gold plate over nickel plate over silver plate.  
Shorting—Zinc alloy, with gold plate over nickel plate over silver plate.  
STATIONARY CONTACTS & TERMINALS: Brass, with gold plate over nickel plate over silver plate.  
RATING: 0.4 VA max. @ 20 V AC or DC max. or  
Switch—250 mA @ 125 V AC or 28 V DC.  
Carry—6 AMPS continuous.

**Note:** 'G' contact material is equivalent to both 'B' and 'Q' contact materials and can be used where either dry circuit\* or power conditions are encountered. However, when the dry circuit rating is exceeded, the gold plating is removed from the contact interface and the switch cannot then be used in dry circuits.

\*Dry circuit = conditions where no arcing occurs during switching, i.e., 0.4 VA max. @ 20 V AC or DC max.

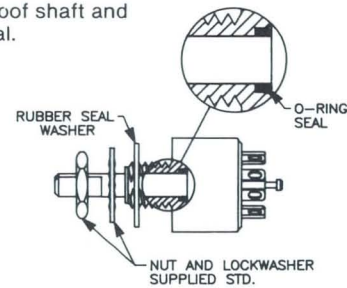


**SEALING**

**(None)**

No seal — Std.

**F** Splashproof shaft and panel seal.

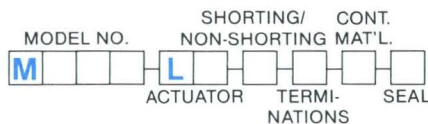


**HOW TO ORDER**

Complete the order number below by selecting the desired model no., actuator, shorting or non-shortng contacts, termination, contact material and (if desired) sealing options. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. (Example: MA05-L2-S-C-G-□).

For sealing option, specify **F** in SEAL box, for no seal, leave box empty. **L1** actuator, **N** non-shortng contacts, **Z** terminations, **Q** contact material and no seal are supplied if no options are specified. One hex mounting nut and lockwasher are supplied standard, not installed.

Note: Number of positions or stops are pre-set at factory. **MA00**, **MB00**, **MC00** and **MD00** models have full 360° rotation with no stops. Stop pins are supplied for user-selectable stops. See SETTING STOPS, page M-6, for installation instructions.



**SETTING STOPS****MA00, MB00, MC00, MD00 MODELS ONLY:**

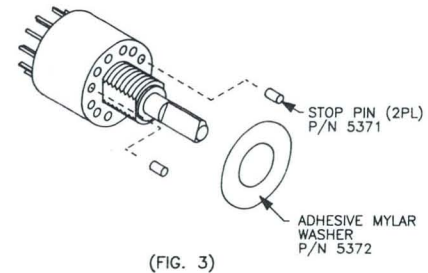
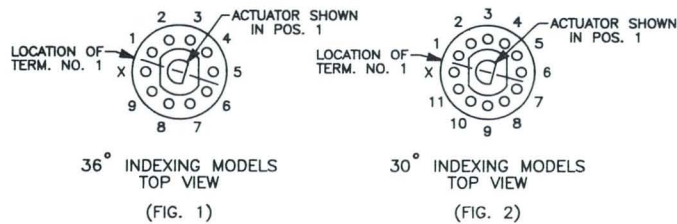
The number of switch positions or stops is adjustable by means of stop pins provided with each switch. Switches are normally shipped with stop pins and hardware in bulk, not installed. Without stop pins, switches have full 360° rotation and no stops. Note that all two pole models begin to repeat when actuated 180° or more.

To set stops, refer to figs. 1 & 2. Orient switch so that terminal no. 1 is as shown. Turn actuator to pos. 1, using flats on bushing and terminal no. 1 as reference. Install CCW stop pin in hole designated 'X'. Install second stop pin in hole number corresponding to the number of positions desired. Note that two pole models will begin to repeat when actuated 180° or more.

To retain stop pins, use adhesive mylar washer included; see fig. 3.

**ALL OTHER MODELS:**

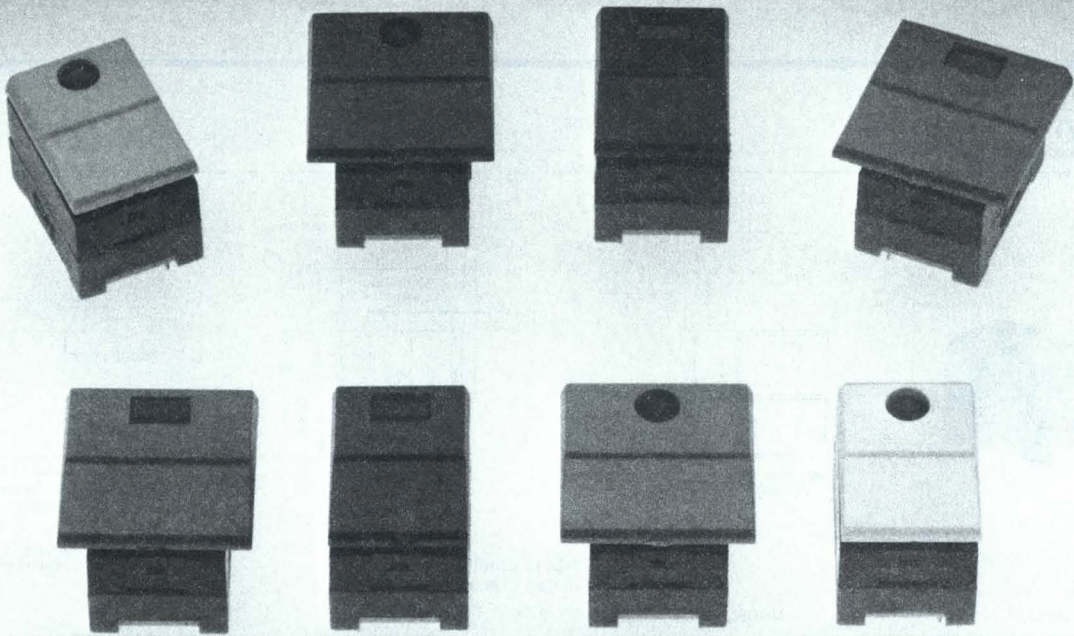
All models except MA00, MB00, MC00, MD00 have number of switch positions or stops pre-set at factory and are not adjustable.



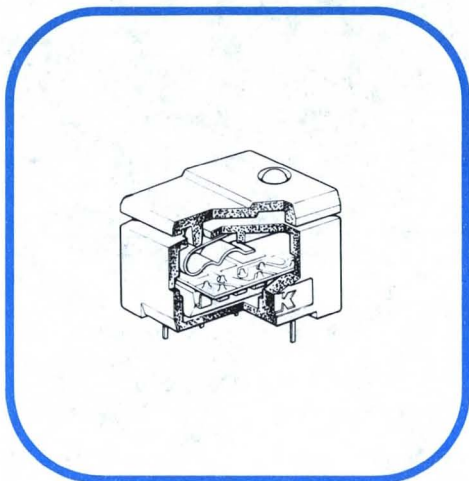


# SS SERIES

## SOLID STATE PUSHBUTTON SWITCHES



SECTION N



### SPECIFICATIONS

**SWITCHING FUNCTION:** SPDT,  
Momentary or alternate action, user  
choice with jumper in external  
circuit.  
**OPERATING TEMPERATURE:** 0°C to  
70°C.  
**OPERATING FORCE:** 150 grams typ.  
See complete SPECIFICATIONS and  
RATINGS, PAGE N-4.

- Self Contained Electronics
- Logic Compatible Circuit
- User Selectable Operation —  
Momentary or Maintained
- Bounce-Free Outputs

### MATERIALS

**CASE:** Glass filled nylon.  
**CAP:** Polycarbonate - ABS blend  
(UL 94V-0), matte finish, 8 colors  
available, black std.  
**TERMINALS:** Solder clad, insert molded.

- Wide Supply Voltage Range
- DIP Pattern Compatible
- Built-In Internally Connected L.E.D.  
for Status Indication

### INTRODUCTION

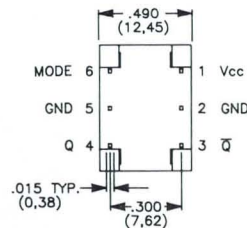
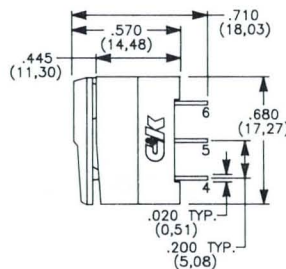
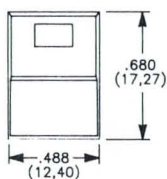
Available options for SS SERIES SOLID STATE PUSHBUTTON SWITCHES are shown on pages N-2 thru N-4. Make selections from the following option sections: Model/Switching Function, Cap Style, Cap Color and L.E.D. Color. Each section begins with the

ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page N-4. Available caps, which may be user-installed, shown on page N-3.

MODEL NO.

S S 0 1 □ □ □ □

### MODEL



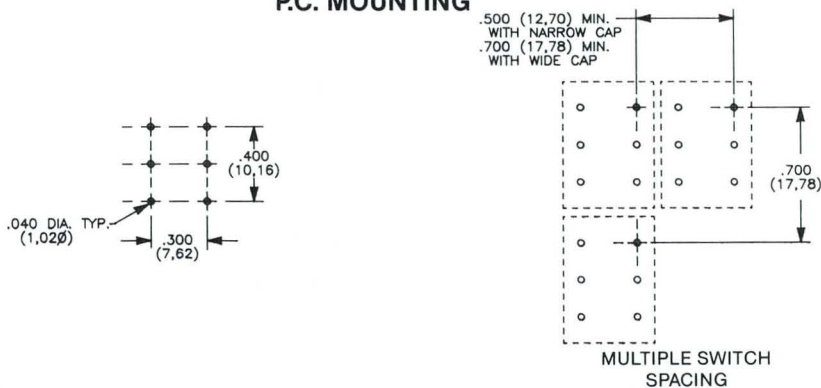
Terminals 2, 5 (GND) internally connected.  
All terminals insulated from case.

TERM. NOS. FOR  
REFERENCE ONLY

U.S. PAT. NO. 4,379,973

MODEL SHOWN: SS01-R2-2-1

### P.C. MOUNTING



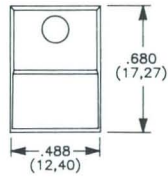
N





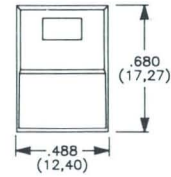
## CAP STYLES

R1



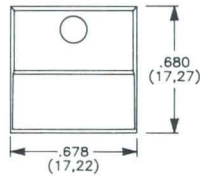
(P/N 4779)

R2



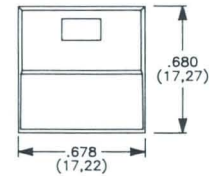
(P/N 4780)

S1



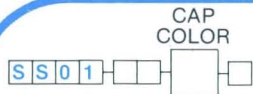
(P/N 4781)

S2



(P/N 4782)

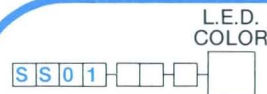
The above cap styles are available in 8 colors, black std. (see chart). Caps snap in place and may be factory installed, installed by user or replaced in the field without special tools. Caps can be ordered separately by specifying the 4 digit P/N and color. Switches are also available without caps. See HOW TO ORDER, page N-4. Cap finish: matte.



## CAP COLORS

Select desired cap color from chart and place the option code in the appropriate box of the ordering format. If no color is specified, black will be supplied. Caps can be ordered separately by specifying the 4 digit P/N and color. Cap finish: matte.

OPTION CODE	CAP COLORS
1	White
2	Black(STD)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
9	Gray



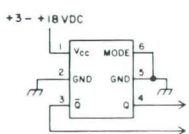
## L.E.D. COLORS

L.E.D.s are available in 2 styles and 3 colors, red std. (see chart). Select desired color and place option code in the appropriate box of the ordering format. If no color is specified, red will be supplied. Round or rectangular style is determined by cap selection. L.E.D.s are internally connected to I.C., and no external circuitry is required.

OPTION CODE	L.E.D. COLOR
3	Red (Std.)
5	Yellow
6	Green

## TYPICAL APPLICATIONS

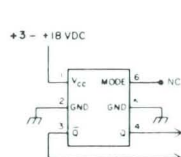
### MOMENTARY



Truth Table - Momentary (mode pin ground)

Power	Q	Q̄
0	0	1
0	0	1
D	1	0
0	0	1

### ALTERNATE ACTION



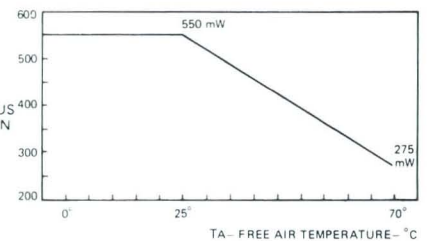
Truth Table - Alternate Action (mode pin open)

Power	Q	Q̄
0	0	1
0	0	1
D	1	0
0	1	0
0	0	1

Note: I = High 0 = Low/Open D = Depressed

States Q, Q̄ are for identification of outputs. "POWER" indicates status of switch at turn-on without depression of the Switch Cap.

## DISSIPATION DERATING CURVE



(See specifications, page N-4)

**FUNCTIONAL DESCRIPTION**

The custom integrated circuit provides all of the "cleaning" functions necessary to interface the switch directly to user logic. The mechanical switching assembly, a single pole double throw contact spring, is connected to the input of a conventional R-S flip-flop to provide positive debounce. The low input current requirement and large voltage compliance of the flip-flop allow a low-force long life switch design.

Depending upon the status of the mode pin, the signal out of the debounce circuitry is directed to a divide-by-two flip-flop (for alternate action operation) or directly to the output drivers (for momentary operation). Positive output of the circuit is provided by the use of current-mirror circuitry, achieving the closest possible tracking of the supply over a large output range and minimum standby current requirements. Sufficient current sink capability is maintained via large area devices to drive a minimum of 10 TTL

style loads. The I.C. also supplies regulated current to an integral L.E.D. display.

Power up circuitry insures that the status of the switch is determined at the time of system turn-on. The 'Q' output is in the 'OFF' (low level) state. The opposite logic condition exists at the 'Q̄' output, due to internal inversion and duplication of the power output stage. The two outputs are loaded independently, and are capable of driving full loads simultaneously. Short circuits to either the supply or ground are permitted for indefinite periods at the outputs without interference to normal operation since the output pins are totally buffered from the switching input section. In fact, operation at normal logic levels is possible from one output even when the other output is shorted. A linked short at the ground terminals reduces the complication of board layout for mounting of multiple switch units.

**SPECIFICATIONS**

**ABSOLUTE MAXIMUM RATINGS-FREE AIR OPERATION (unless noted)\***

Supply Voltage	18v
Output Voltage	$V_{cc} - .8$
Output Sink Current	25 mA
Continuous Total Dissipation (at 25°C free air temp.)**	550 mW
Operating Free Air Temperature	0° to 70°C
Storage Temperature	-55° to 125°C
Lead Temperature 1/16 in. from case 10 sec.	300°C
Lead Temperature 1/16 in. from case 60 sec.	250°C

**RECOMMENDED OPERATING CONDITIONS**

	MIN.	NOM.	MAX.	UNIT
Supply Voltage, $V_{cc}$	3.0	5 - 16	18	V
High Level Output Current $I_{oH}$	-5.0	-9.0	—	mA
Low Level Output Current, $I_{oL}$	20	25	—	mA
Operating Free Air Temperature	0°	25°	70°	°C

**ELECTRICAL CHARACTERISTICS @ 25°C**

PARAMETER	MIN.	TYP.	MAX.	UNIT
$V_{oH}$ (high level output at 3,4)	$V_{cc} - 1$	$V_{cc} - .5$	—	V
$V_{oL}$ (low level output at 3,4)	—	0.5	0.8	V
$I_{cco}$ (standby current L.E.D. off)	—	8	12	mA
$I_{ccd}$ (circuit current L.E.D. on)	20	25	30	mA
$I_m$ (mode pin current)	—	1.5	2.5	mA
$V_m$ (voltage at mode pin for momentary function)	—	.8	1.1	V
$I_{osH}$ (output short circuit high)	-5	-9	—	mA
$I_{osL}$ (output short circuit low)	25	32	—	mA
Short Circuit Duration†	Either output to $V_{cc}$ or ground indefinitely			
Operating Force	100	150	300	grams

\* All values with respect to ground (terminals 2,5).  
 \*\* For operation above 25°C, see derating curve, Page N-3.  
 † Not more than one output should be shorted at a time.

NOTE: Negative values indicate current out of a terminal, positive, current in.

**HOW TO ORDER**

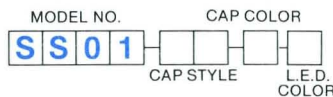
Complete the order number below by selecting the desired cap style, cap color no. and L.E.D. color no. from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Note that L.E.D. style is determined by cap selection.

(Example: **SS01-R2-4-5**). If no colors are specified, a black cap and red L.E.D. will be supplied. **R1** cap (black) and round red L.E.D. are supplied if no options are specified.

SWITCH WITHOUT CAP: Switches are also available without caps. Place **01** in CAP STYLE ordering boxes for switch with round L.E.D.; **02** for switch with rectangular L.E.D. Indicate L.E.D. color code as above. (Example: **SS01-02-□-□-3**).

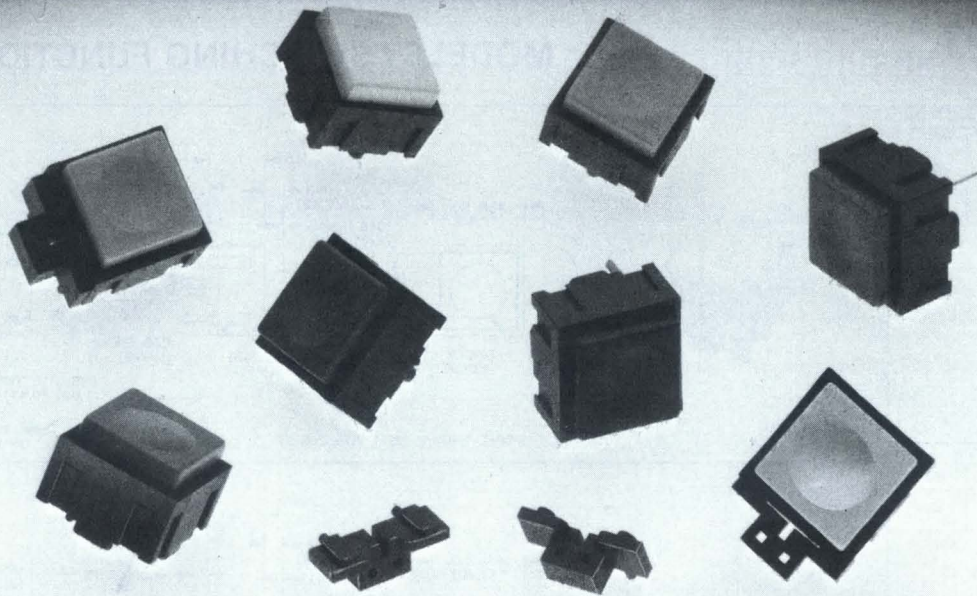
Custom cap markings are available, see inside front cover and consult factory.

CAPS: Caps are also available separately and may be user-installed. Select desired cap color from chart, page N-3. When ordering, write cap part no. and color in word form.

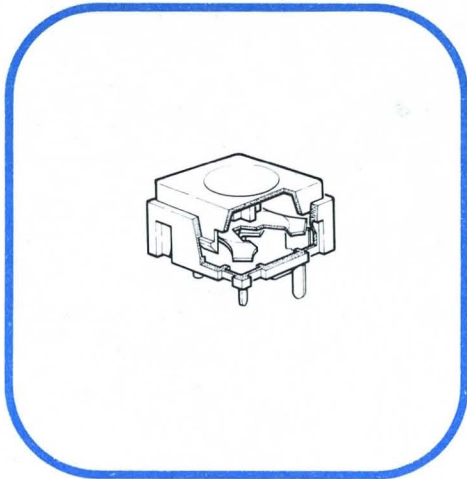




# KS SERIES PUSHBUTTON KEY SWITCHES



SECTION O



### SPECIFICATIONS

CONTACT RATING: 25 mA max. @ 50 V AC or DC max.  
 MECHANICAL LIFE: 100,000 actuations.  
 CONTACT RESISTANCE: Below 20 milliohms typ. initial @ 2-4 V DC, 100 mA.  
 INSULATION RESISTANCE:  $10^9$  ohms min.  
 DIELECTRIC STRENGTH: 1,000 V RMS min. @ sea level.  
 OPERATING TEMPERATURE:  $-30^{\circ}\text{C}$  to  $65^{\circ}\text{C}$ .

### MATERIALS

CASE: Glass filled nylon (UL 94 V-0).  
 ACTUATOR: ABS or polycarbonate — ABS blend, matte finish, 9 colors available, black std.  
 MOVABLE CONTACT: Stainless steel, silver clad or beryllium copper, silver plated.  
 STATIONARY CONTACTS & TERMINALS: Brass, silver plated.

### NOTE

Specifications and Materials listed above are general specifications for switches with standard options. See option sections for additional information. Specifications available for specific models, consult factory.

## INTRODUCTION

Available options for KS SERIES PUSHBUTTON KEY SWITCHES are shown on pages O-2 and O-3. Make selections from the following option sections: Model/Switching Function, Cap Style, Cap Color, L.E.D. Support (if desired), Terminations

and Contact Material. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page O-4.

MODEL/SW. FUNC.  
K S R2 C Q

## MODELS / SWITCHING FUNCTION

MODEL NO.	SWITCHING FUNC.	
	POS 1	POS 2
KS11	OFF	MOM.

SCHEMATIC

**SPST**

MODEL SHOWN: KS11-R2-2-C-Q

TERM. NOS. MOLDED ON HOUSING

MOM. = MOMENTARY POSITION		
MODEL NO.	ON	MOM.
KS12	ON	MOM.

CONNECTED TERMINALS

1-4      1-3

SCHEMATIC

**SPDT**

MODEL SHOWN: KS12-R2-2-C-Q

TERM. NOS. MOLDED ON HOUSING

### P.C. MOUNTING

KS11

KS12

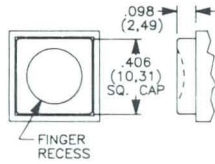
MULTIPLE SWITCH SPACING



CAP STYLE **CAP STYLE**



**R2 (Std.)**



CAP COLOR **CAP COLOR**



Select desired cap color from chart and place the option code in the appropriate box of the ordering format. If no color is specified, black will be supplied. Cap finish: matte. Custom marking available, consult factory.

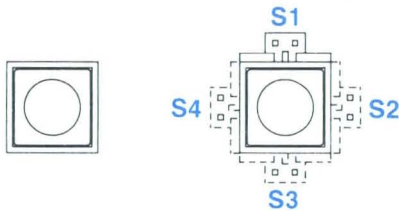
OPTION CODE	CAP COLORS
1	White
2	Black(Std.)
3	Red
4	Orange
5	Yellow
6	Green
7	Blue
8	Brown
9	Gray

L.E.D. SUPPORT **L.E.D. SUPPORT**



**(None)**

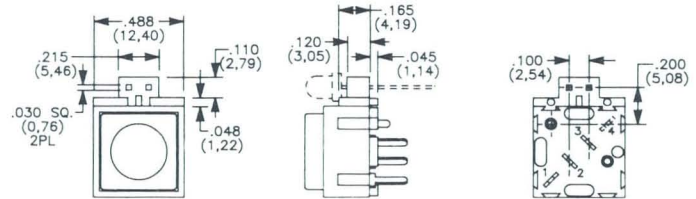
**S1-S4**



No L.E.D. support — Std.

Position of factory installed L.E.D. support.

TYPICAL INSTALLATION:



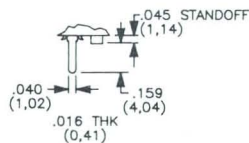
L.E.D. support shown in position S1.

L.E.D. not supplied. L.E.D. support also available separately, consult factory.

TERMINATIONS **TERMINATIONS**



**C (Std.)**



CONT. MAT'L. **CONTACT MATERIAL**



**Q (Std.)** MOVABLE CONTACTS: Stainless steel, silver clad or beryllium copper, silver plated.  
STATIONARY CONTACTS & TERMINALS: Brass, silver plated.  
RATING: 25 mA max. @ 50 V AC or DC max.

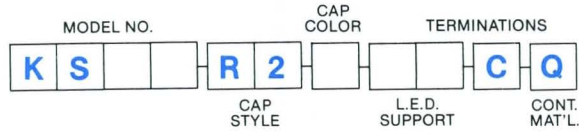
**HOW TO ORDER**

Complete the order number below by selecting the desired model no., cap style, cap color, L.E.D. support (if desired), termination and contact material options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled.

(Examples: **K****S****1****2**-**R****2**-**3**-□-□-**C**-**Q** or **K****S****1****2**-**R****2**-**5**-**S****1**-**C**-**Q**). If no cap color is specified, black will be supplied.

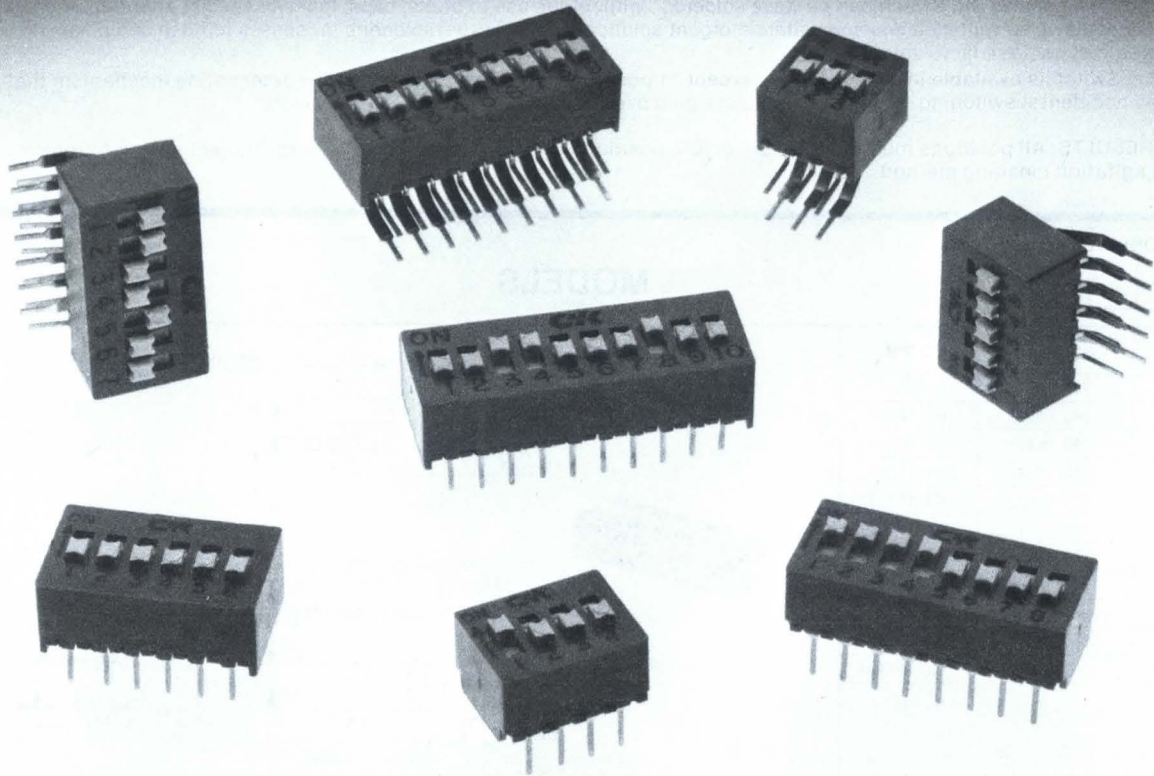
No L.E.D. support supplied unless specified. **R2** cap style, **C** terminations and **Q** contact material supplied std.

Custom cap marking available, consult factory.



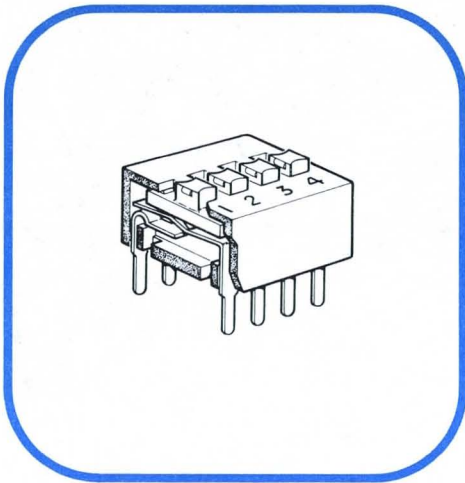


# BD SERIES DIP SWITCHES



## SECTION P INDEX

BD Series DIP Switches .....	P-2 thru P-3
LD Series Low Profile Machine Insertable DIP Switches .....	P-4



### SPECIFICATIONS

SWITCHING FUNCTION: SPST, 1 thru 12 pos. avail. (except 11 pos.).  
 CONTACT RATING: Carry- 100 mA max. @ 50 V DC.  
 Switch- 100 mA max. @ 5 V DC or 25 mA max. @ 25 V DC.  
 ELECTRICAL LIFE: 10,000 make-and-break cycles, each circuit.  
 MECHANICAL LIFE: 10,000 make-and-break cycles, each circuit.  
 CONTACT RESISTANCE: Below 100 milliohms typ. initial @ 2-4 V DC, 100 mA.  
 INSULATION RESISTANCE: 10<sup>9</sup> ohms min. between adjacent terminals.  
 DIELECTRIC STRENGTH: 500 V RMS min. @ sea level between adjacent terminals.  
 CAPACITANCE: 5 pF max. between adjacent terminals.

STORAGE AND OPERATING TEMPERATURE: - 40°C to 85°C.  
 SHOCK: withstands 20 g 11 ms sawtooth waveform with no contact opening greater than 10 microseconds.  
 VIBRATION: no contact opening greater than 10 microseconds and no contact closure when exposed to vibration .06 in. DA or 5 g, whichever is less, from 10 to 55 Hz, and 10 g from 55 to 500 Hz.

### MATERIALS

CASE & COVER: Glass filled polyester, red (UL94V-0).  
 ACTUATOR: Glass filled nylon, white.  
 CONTACTS: Gold over nickel over phosphor bronze.  
 TERMINALS: Solder clad over phosphor bronze.

## INTRODUCTION

C&K's reliable, inexpensive DIP Switch can be wave soldered\* without the use of boots, caps, tapes or special attention. A unique open base design allows solvent cleaners and water/detergent solutions used in wave soldering processes to flush and clean the electrical contacts of contaminants and fluxes.

The C&K Dip Switch is available in 1 thru 12 pos. (except 11 pos.) configurations with a positive detent slide mechanism that all but eliminates accidental switching. Wiping contacts are gold over nickel, with solder clad terminals.

\*FOR BEST RESULTS: All positions must be in 'open' or 'off' position during soldering and cleaning. Subject switch to forced rinse or high agitation cleaning method.

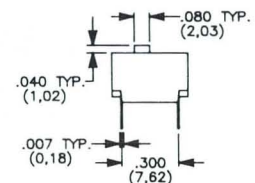
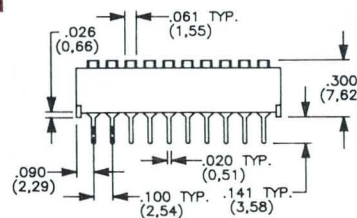
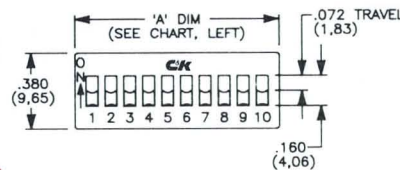
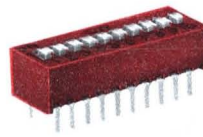
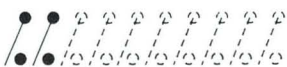
MODEL NO.

B	D		
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## MODELS

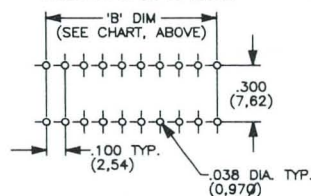
MODEL NO.	NO. POS.	'A' DIM.	'B' DIM.
BD01	1	.180 (4,57)	N/A
BD02	2	.280 (7,11)	.100 (2,54)
BD03	3	.380 (9,65)	.200 (5,08)
BD04	4	.480 (12,19)	.300 (7,62)
BD05	5	.580 (14,73)	.400 (10,16)
BD06	6	.680 (17,27)	.500 (12,70)
BD07	7	.780 (19,81)	.600 (15,24)
BD08	8	.880 (22,35)	.700 (17,78)
BD09	9	.980 (24,89)	.800 (20,32)
BD10	10	1.080 (27,43)	.900 (22,86)
BD12	12	1.280 (32,51)	1.100 (27,94)

SCHEMATIC (TYP.)



MODEL SHOWN: BD10

### P.C. MOUNTING



P



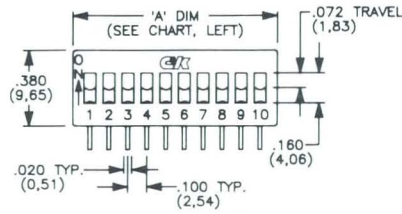
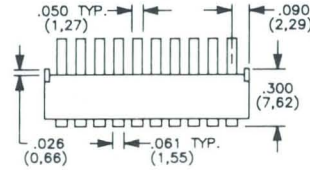
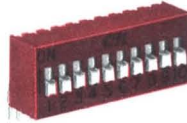
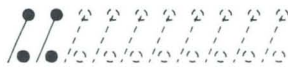
MODEL NO.

**B** **D**

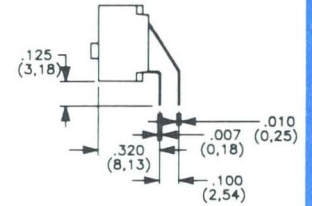
## MODELS (cont'd.)

MODEL NO.	NO. POS.	'A' DIM.	'B' DIM.
BD02-AV	2	.280 (7,11)	.100 (2,54)
BD03-AV	3	.380 (9,65)	.200 (5,08)
BD04-AV	4	.480 (12,19)	.300 (7,62)
BD05-AV	5	.580 (14,73)	.400 (10,16)
BD06-AV	6	.680 (17,27)	.500 (12,70)
BD07-AV	7	.780 (19,81)	.600 (15,24)
BD08-AV	8	.880 (22,35)	.700 (17,78)
BD09-AV	9	.980 (24,89)	.800 (20,32)
BD10-AV	10	1.080 (27,43)	.900 (22,86)
BD12-AV	12	1.280 (32,51)	1.100 (27,94)

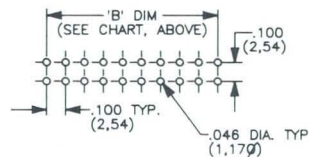
SCHEMATIC (TYP.)



MODEL SHOWN: BD10-AV  
 Term. bend radii mfg. option.



## P.C. MOUNTING



## HOW TO ORDER

Complete the order number below by selecting the desired model no. from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. Some boxes may be unfilled. (Example: **B****D****0****8**--).

MODEL NO.

**B** **D**

## INSTALLATION, SOLDERING & CLEANING INSTRUCTIONS

C&K's reliable, inexpensive DIP Switch can be wave soldered without the use of boots, caps, tapes or special attention. A unique open base design allows solvent cleaners and water/detergent solutions used in wave soldering processes to flush and clean the electrical contacts of contaminants and fluxes. For best results, follow these recommendations:

- 1) Wave soldering recommended at 500°F solder temp.
- 2) Hand solder using 30 watt small tip iron controlled at 500°F, 10 sec. max./terminal.
- 3) Flux clean using forced rinse, high agitation or triple bath cleaning method. Freon TMC or TF, or Methylene Chloride give excellent results. *Do not* mask or cover switch during cleaning as switch is designed for easy solvent flush out.
- 4) All switch positions must be 'off' or 'open' during cleaning.

## CROSS REFERENCE CHART

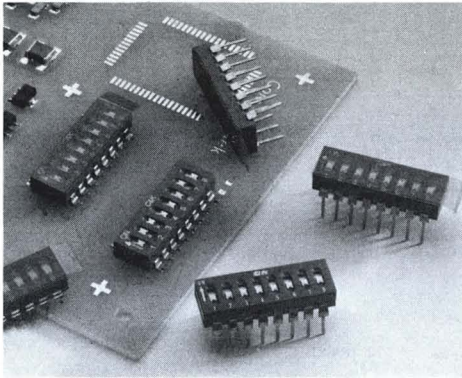
C&K P/N	AMP P/N	GRAYHILL P/N		CTS P/N	EECO P/N
		ROCKER ACT.	SLIDE ACT.		
BD02	2-435166-9	76SB02	78B02	206-2	240002G
BD03	3-435166-0	76SB03	78B03	206-3	240003G
BD04	435166-2	76SB04	78B04	206-4	240004G
BD05	435166-3	76SB05	78B05	206-5	240005G
BD06	435166-4	76SB06	78B06	206-6	240006G
BD07	435166-1	76SB07	78B07	206-7	240007G
BD08	435166-5	76SB08	78B08	206-8	240008G
BD09	435166-6	76SB09	78B09	206-9	240009G
BD10	435166-7	76SB10	78B10	206-10	2400010G
BD12	3-435166-2	76SB12	—	206-12	—



LD Series

NEW

# Low Profile & Surface Mount DIP Switches



## SPECIFICATIONS

SWITCHING FUNCTION: SPST, 8 pos. only.  
 CONTACT RATING: Carry—100 mA max. @ 50 V DC. Switch—100 mA max. @ 5 V DC or 25 mA max. @ 25 V DC.  
 MECHANICAL & ELECTRICAL LIFE: 2,000 make-and-break cycles, each circuit.  
 CONTACT RESISTANCE: Below 100 milliohms typ. initial @ 2-4 V DC, 100 mA.  
 INSULATION RESISTANCE: 10<sup>9</sup> ohms min.  
 DIELECTRIC STRENGTH: 500 V RMS min. @ sea level between adjacent terminals.  
 CAPACITANCE: 5 pF max. between adjacent terminals.  
 OPERATING TEMPERATURE: -20°C to 70°C.

STORAGE TEMPERATURE: -40°C to 85°C.  
 SOLDERABILITY: Per mil std 202F method 208D.

PACKAGING: Switches are supplied in rigid tubes for dispensing. Switch pos. 1 denotes pin no. 1. All switch actuators in "OFF" position std.

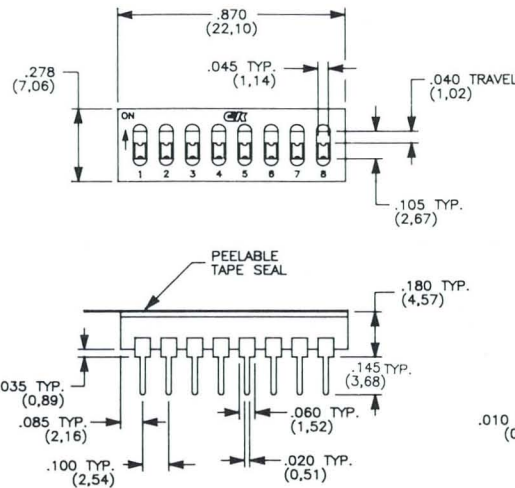
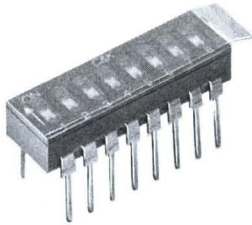
## MATERIALS

CASE & COVER: Glass filled polyester (PET) (UL 94V-0), color: red.  
 ACTUATOR: Glass filled nylon (UL 94V-0), color: white.  
 CONTACTS: Precious metal over copper alloy.  
 TERMINALS: Solder clad over copper alloy.

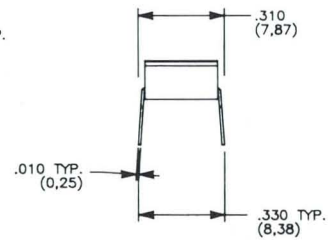
**Note:** Specifications and Materials listed above are general specifications for switches with standard options. Specifications available for specific models, consult factory.

- MACHINE INSERTABLE—LOW PROFILE
- RECESSED SLIDE ACTUATORS AND POSITIVE DETENT—PREVENT ACCIDENTAL ACTUATION
- SEALED—WAVE SOLDERABLE WITH STD. TAPE TOP SEAL
- SWITCHING FUNCTION: SPST—8 POS.
- SURFACE MOUNT OR THRU-HOLE P.C. TERMINATIONS
- ALL TERMINALS SOLDER CLAD FOR EASY SOLDERING

## P.C. THRU-HOLE MOUNTING

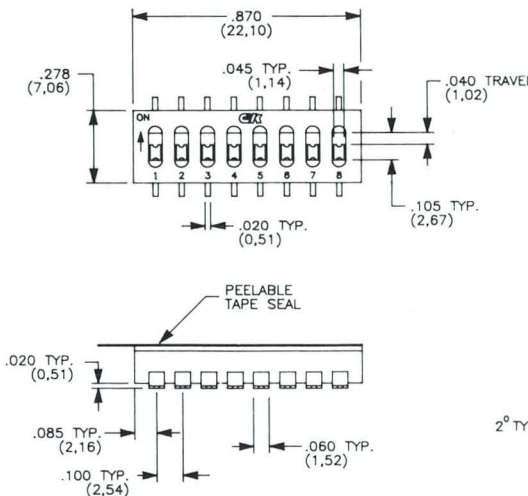
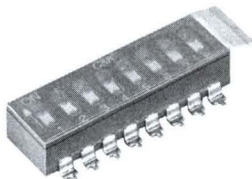


Available Soon!

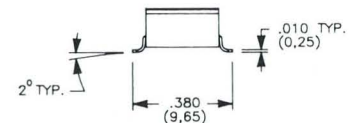


MODEL SHOWN: LD08

## P.C. SURFACE MOUNTING



Available Soon!



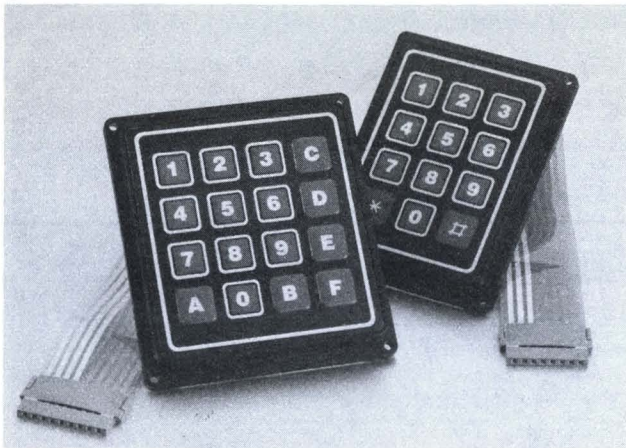
MODEL SHOWN: LD08-S



# 4000 SERIES MEMBRANE KEYPADS



SECTION Q



- **LONG LIFE—UP TO FIVE MILLION CYCLES**
- **SEALED SWITCHES—SPLASHPROOF**
- **GRAPHIC OVERLAY RESISTS CHEMICALS**
- **BUILT-IN STATIC SHIELD—STANDARD**
- **6 IN. FLEX TAIL WITH MALE & FEMALE CONNECTOR**
- **DETENT AND NON-DETENT KEYPADS AVAILABLE**

**SPECIFICATIONS**

CONTACT RATING: 100 ma max. @ 35 V DC max., 0.5 W max.  
 ELECTRICAL LIFE: 2,000,000 cycles (with detent), 5,000,000 cycles (without detent).  
 CONTACT RESISTANCE: 50 ohms typ. initial with silver contacts.  
 INSULATION RESISTANCE: 10<sup>10</sup> ohms min.  
 DIELECTRIC STRENGTH: 250 V RMS min. @ sea level.  
 CIRCUIT CAPACITANCE: 10 pf typ.  
 CONTACT BOUNCE: Below 5 msec. typ.  
 ACTUATION FORCE: 7–11 oz. typ. (with detent), 3–5 oz. typ. (without detent).  
 TRAVEL: .025–.030 typ. (with detent), .008–.010 typ. (without detent).  
 OPERATING TEMPERATURE: – 40°C to 75°C.  
 VIBRATION: .03 displacement @ 10 to 55 / 3 axis.  
 MECHANICAL SHOCK: 10 g max. 11 ms duration.

**INTRODUCTION**

Available options for 4000 SERIES MEMBRANE KEYPADS are shown on pages Q-2 thru Q-6. Make selections from the following option sections: Model, Function Code, Graphics / Overlay, Overlay Colors, Base Colors, Detent, Terminations

**MATERIALS**

OVERLAY WITH GRAPHICS: Polycarbonate/polyester, matte finish (embossed keys on models with detent).  
 BASE: Rigid polyester (UL 94V-0), black, std.  
 CONTACTS & CIRCUIT: Silver conductive circuit on heat stabilized polyester membrane.  
 CONNECTOR: Male or female connector with tin/lead plating.

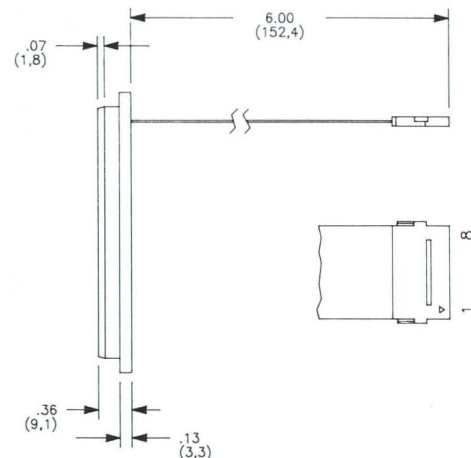
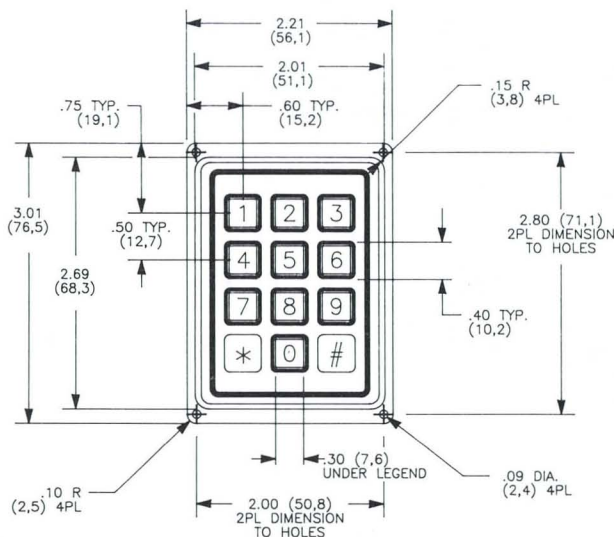
and Contact Material. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page Q-6.

MODEL



**MODELS**

**4A** 3 x 4 KEYPAD ARRAY—12 KEYS



MODEL SHOWN: 4A-01-T-32-2-P-CF-Q

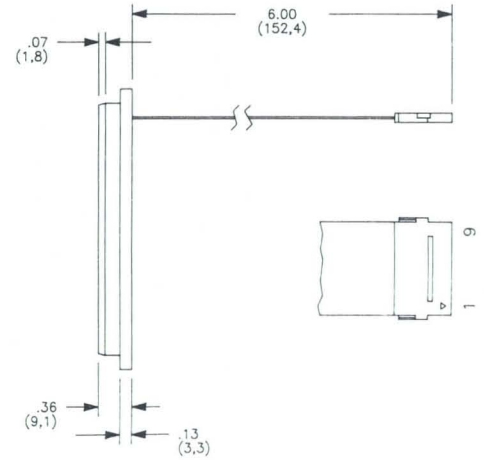
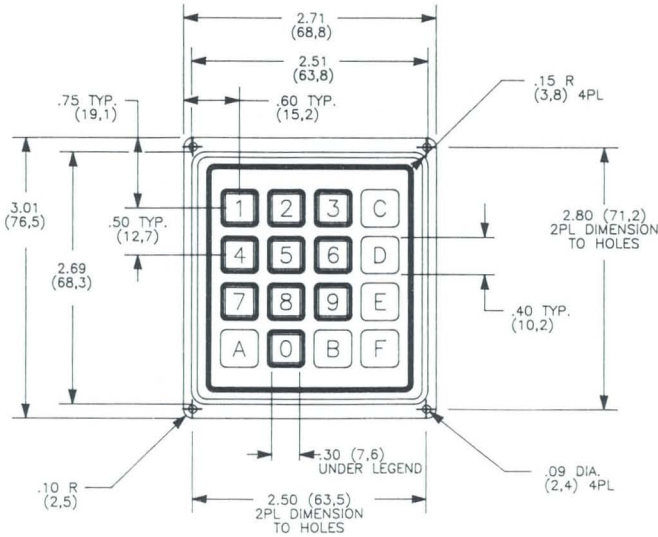


MODEL



**MODELS (cont'd.)**

**4B 4 x 4 KEYPAD ARRAY—16 KEYS**



MODEL SHOWN: 4B-01-H-32-2-P-CF-Q

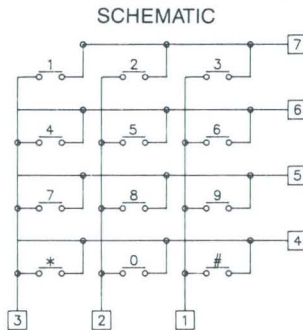
FUNC. CODE



**FUNCTION CODE**

**01**

**4A MODELS—12 KEY ARRAY ONLY**



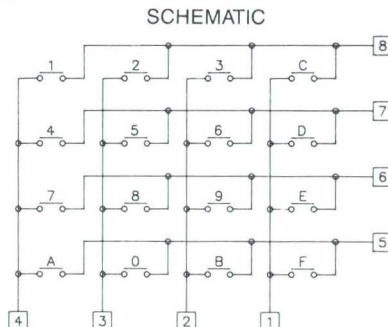
X-Y Matrix output circuit configuration with static shield. Switch function—SPST N.O. momentary.

**TRUTH TABLE**

		TERMINALS						
		1	2	3	4	5	6	7
Y ← X	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	0							
*								
#								

**NOTE:** Terminal 8 is static shield.

**4B MODELS—16 KEY ARRAY ONLY**



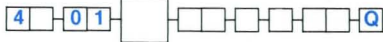
X-Y Matrix output circuit configuration with static shield. Switch function—SPST N.O. momentary.

**TRUTH TABLE**

		TERMINALS							
		1	2	3	4	5	6	7	8
Y ← X	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	0								
	A								
	B								
	C								
	D								
	E								
	F								

**NOTE:** Terminal 9 is static shield.

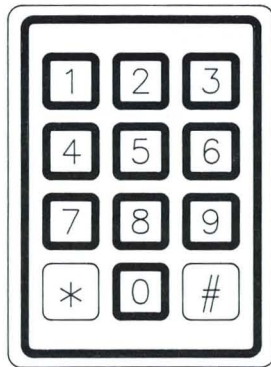
GRAPHICS/OVERLAY



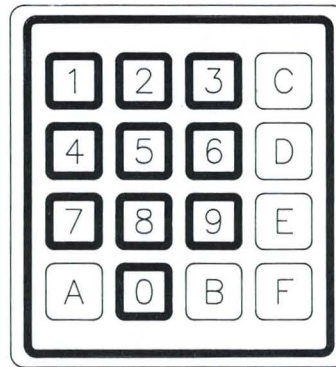
GRAPHICS / OVERLAY

**T** DECIMAL / TELEPHONE KEYPAD (12 KEYS, WITH \* AND #)

**H** HEXADECIMAL KEYPAD (16 KEYS)



Must be ordered with 4A model, 3 x 4 keypad array.



Must be ordered with 4B model, 4 x 4 keypad array.

Overlay is polyester, matte finish. Embossed key buttons provided only when P detent option is ordered. See OVERLAY COLORS section for available colors. Custom graphics, markings and colors available, consult factory.

OVERLAY COLORS



OVERLAY COLORS

- 19** White embossed keys, gray background, black key outlines and border.
- 32 (Std.)** Red embossed keys, black background, white key outlines and border.
- 72** Blue embossed keys, black background, white key outlines and border.

**NOTE:** Other colors, markings and graphics available, consult factory.

Q



BASE COLOR



**BASE COLORS**

- 1** White base.
- 2 (Std.)** Black base.

**NOTE:** Base material: polyester (UL 94V-0). Other base colors available, consult factory.

DETENT



**DETENT**

- N** No Detent—flat graphic overlay without embossed keys.
- P** PDT\* Polyester detent—graphic overlay has embossed keys.

\*Polydome Tactile.

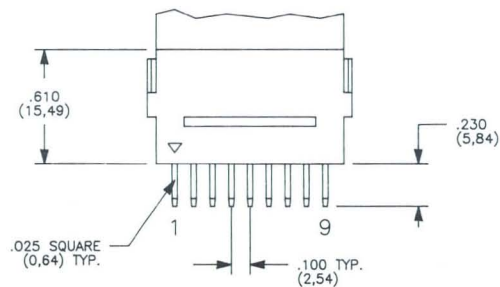
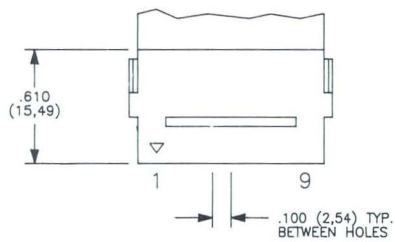
TERMINATIONS



**TERMINATIONS**

- CF (Std.)** 6 in. flex tail with female connector with tin/lead plating.

- CM** 6 in. flex tail with male connector with tin/lead plating.



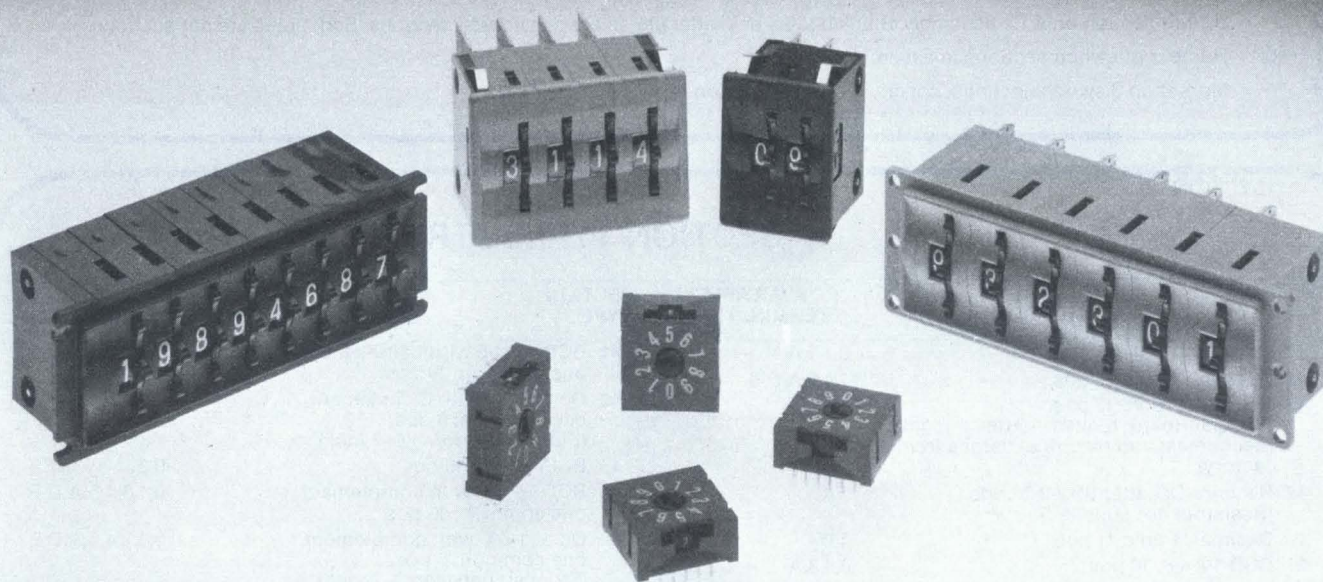
Connector for 4B models (16 key array) has 9 contacts, as shown.  
 Connector for 4A models (12 key array) has 8 contacts.

**NOTE:** Other connectors and flex tail lengths available, consult factory.





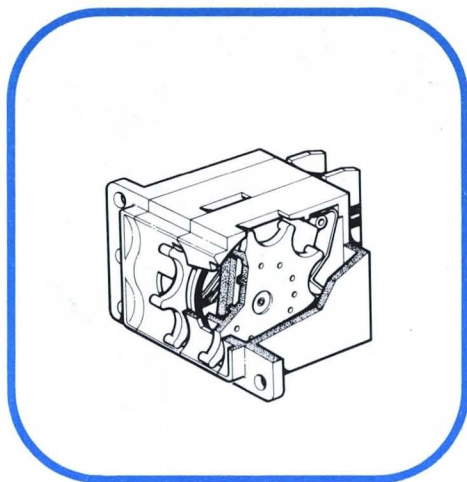
# 3 / 3M SERIES THUMBWHEEL SWITCHES



## SECTION R INDEX

3 Series Thumbwheel Switches .....	R-2 thru R-11
3M Series Minithumbwheel Switches .....	R-12 thru R-13
SF/SR/S2D Series Thumbwheel Switches .....	R-14 thru R-16





### SPECIFICATIONS

CONTACT RATING: Carry- 1 AMP continuous.  
 Switch- 100 mA max.  
 OPERATING VOLTAGE: 50 mV to 28 V DC or 120 V AC.  
 ELECTRICAL LIFE: 10<sup>5</sup> detent operations between any two adjacent positions @ 25°C.  
 CONTACT RESISTANCE: Below 100 milliohms typ. initial @ 2-4 V DC, 100 mA.  
 INSULATION RESISTANCE: 10<sup>9</sup>ohms min.  
 DIELECTRIC STRENGTH: 500 V RMS min. @ sea level between common terminal and any output.  
 OPERATING TEMPERATURE: -10°C to 65°C.

### MATERIALS

SWITCH BODY: ABS plastic.  
 THUMBWHEEL: ABS plastic.  
 ROTOR CONTACTS: Precious metal on copper alloy.  
 STATOR CONTACTS: Hard gold over nickel over 2 oz. copper on epoxy fiberglass.

### INTRODUCTION

Available configurations and options for 3 SERIES THUMBWHEEL SWITCHES are shown on pages R-2 thru R-10. Make selections from the following option sections: Number of Sections, Section Type, Mounting Style, Assembly Type, Terminations, Color/Marking/Stops and Sealing. Each section begins with the

ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page R-9. A sample CONFIGURATION FORM for special assemblies is provided on page R-11, along with instructions. Available hardware and accessories shown on pages R-8 and R-10.

#### NO. SECTIONS



### NUMBER OF SECTIONS

- 0** Switch section only, no assembly. Blank bodies or divider plates are considered sections. End plates are not sections.
- 1-8** Number of switch sections in assemble.
- 9** More than 8 switch sections, specify on "configuration form".

#### SECTION TYPE



### SECTION TYPES / TRUTH TABLES

SECTION TYPE	DESCRIPTION	AVAILABLE TERMINATIONS	SECTION TYPE	DESCRIPTION	AVAILABLE TERMINATIONS
11	Decimal; 1 pole 10 pos.	0,1,3,A	41	BCD 1-2-4-8 with complement, one common; 10 pos.	0,1,3,A
12	Decimal; 1 pole 10 pos.	1,4,5,A,D,E	42	Octal 1-2-4 with complement, one common; 8 pos. (Stopped between 0-7 incl.)	0,1,3,A
13	Decimal; 2 pole 10 pos. (Special Board; request terminal location mechanical and electrical details from factory)	M	45	BCD 1-2-4-8; 10 pos.	0,3
14	Resistor Decade; 1-2-2-2-2-code (Resistors not supplied)	1,A	51	BCD 1-2-4-8 with complement, one common; 10 pos.	0,1,3,4,5,A,D,E
16	Decimal; 1 pole 11 pos.	4,D	52	Octal 1-2-4- with complement, one common; 8 pos. (Stopped between 0-7 incl.)	0,1,3,4,5,A,D,E
21	BCD 1-2-4-8; 10 pos.	0,1,3,A	58	7 Segment Decoder with Blank and BCD Output (TTL) (Special Board; request terminal location, mechanical and electrical details from factory)	M
22	Octal 1-2-4; 8 pos. (Stopped between 0-7 incl.)	0,1,3,A	59	7 Segment Decoder	M
23	Complement of BCD 1-2-4-8; 10 pos.	0,1,3,A	61	SPDT repeating; 10 pos. Plus (+) and Minus (-) alternating	0,1,3,4,5,A,D,E
24	Complement of Octal 1-2-4; 8 pos. (Stopped between 0-7 incl.)	0,1,3,A	70	Binary Coded Hexadecimal; 16 pos. with Parity Bit	M
26	Complement of BCD 1-2-4-8; 10 pos.	6,B	71	Binary Coded Hexadecimal; 16 pos.	0,1,3,A
27	BCD 1-2-4-8; 10 pos.	6,B	72	Binary Coded Hexadecimal; 16 pos.	6,B
28	Complement of 9's Complement; 10 pos.	7C	81	BCD 1-2-4-8; 10 pos.	6,B
29	BCD 1-2-4-8; 10 pos.	6,B	83	Binary Coded Hexadecimal; 16 pos.	6,B
31	BCD 1-2-4-8; 10 pos.	0,1,3,4,5,A,D,E	91	Blank Section (inactive)	8
32	Octal 1-2-4; 8 pos. (Stopped between 0-7 incl.)	0,1,3,4,5,A,D,E	92	Blank section with ribbed center (inactive)	8
33	Complement of BCD 1-2-4-8; 10 pos.	1,4,5,A,D,E	99	Intermixed Sections Specify on "Configuration Form"	Depends on section types
34	Complement of Octal 1-2-4; 8 pos. (Stopped between 0-7 incl.)	1,4,5,A,D,E			
35	BCD 1-2-4-8 with Separate Common To Not True Bits; 10 pos.	0,1,3,A			



SECTION TYPE



## SECTION TYPES/TRUTH TABLES (Cont'd).

See Terminal Location Diagrams, Fig. 1, Fig. 2, Page R-8.

### 11 DECIMAL — 1 Pole; 10 Position

W H E E L	SIGNALS CONNECTED TO COMMON SIGNAL C										
	0	1	2	3	4	5	6	7	8	9	C
0											•
1	•										•
2		•									•
3			•								•
4				•							•
5					•						•
6						•					•
7							•				•
8								•			•
9									•		•
	2	3	4	5	6	7	8	9	10	11	12
	TERM. LOCATION										

See Fig. 1.

### 12 DECIMAL — 1 Pole; 10 Position

W H E E L	SIGNALS CONNECTED TO COMMON SIGNAL C										
	0	1	2	3	4	5	6	7	8	9	C
0	•										•
1		•									•
2			•								•
3				•							•
4					•						•
5						•					•
6							•				•
7								•			•
8									•		•
9										•	•
	2	3	4	5	6	7	8	9	10	11	12
	TERM. LOCATION										

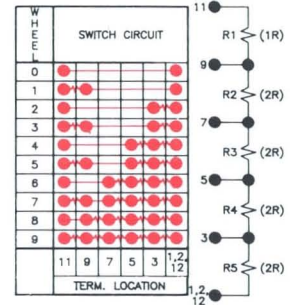
See Fig. 1.

### 13 DECIMAL — Double Pole; 10 Position

W H E E L	SIGNALS CONNECTED TO COMMON SIGNAL C	
	COMMON A CONN. TO:	COMMON B CONN. TO:
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

FOR TERM. LOC. CONSULT C&K

### 14 RESISTOR DECADE 1-2-2-2 CODE



See Fig. 1.

### 16 DECIMAL — 1 Pole; 11 Position

W H E E L	SIGNALS CONNECTED TO COMMON SIGNAL A											
	0	1	2	3	4	5	6	7	8	9	10	A
0												•
1	•											•
2		•										•
3			•									•
4				•								•
5					•							•
6						•						•
7							•					•
8								•				•
9									•			•
10										•		•
	1	2	3	4	5	7	8	9	10	11	12	8
	TERM. LOCATION											

See Fig. 1.

### 21 BCD: 1-2-4-8 22 (Type 22 Octal NO Pos. 8 & 9)

W H E E L	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	C
0					•
1	•				•
2		•			•
3			•		•
4				•	•
5					•
6					•
7					•
8					•
9					•
	3	5	7	11	9
	TERM. LOCATION				

See Fig. 1.

### 23 COMPLEMENT OF BCD: 1-2-4-8 24 (Type 24 Octal NO Pos. 8 & 9)

W H E E L	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	C
0	•	•	•	•	•
1					•
2					•
3					•
4					•
5					•
6					•
7					•
8					•
9					•
	3	9	11	5	7
	TERM. LOCATION				

See Fig. 1.

### 26 COMPLEMENT OF BCD: 1-2-4-8

W H E E L	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	C
0	•	•	•	•	•
1					•
2					•
3					•
4					•
5					•
6					•
7					•
8					•
9					•
	4	5	1	2	3
	TERM. LOCATION				

See Fig. 2.

### 27 BCD: 1-2-4-8

W H E E L	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	C
0					•
1	•				•
2		•			•
3			•		•
4				•	•
5					•
6					•
7					•
8					•
9					•
	4	5	1	2	3
	TERM. LOCATION				

See Fig. 2.

### 28 COMPLEMENT OF 9's COMPLEMENT

W H E E L	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	C
0	•	•	•	•	•
1					•
2					•
3					•
4					•
5					•
6					•
7					•
8					•
9					•
	2	1	5	4	3
	TERM. LOCATION				

See Fig. 2.

### 29 BCD: 1-2-4-8

W H E E L	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	C
0					•
1	•				•
2		•			•
3			•		•
4				•	•
5					•
6					•
7					•
8					•
9					•
	2	3	4	5	1
	TERM. LOCATION				

See Fig. 2.

### 31 BCD: 1-2-4-8 32 (Type 32 Octal NO Pos. 8 & 9)

W H E E L	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	C
0					•
1	•				•
2		•			•
3			•		•
4				•	•
5					•
6					•
7					•
8					•
9					•
	2	3	11	9	8
	TERM. LOCATION				

See Fig. 1.

### 33 COMPLEMENT OF BCD: 1-2-4-8 34 (Type 34 Octal NO Pos. 8 & 9)

W H E E L	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	C
0	•	•	•	•	•
1					•
2					•
3					•
4					•
5					•
6					•
7					•
8					•
9					•
	2	3	11	9	8
	TERM. LOCATION				

See Fig. 1.

### 35 BCD: 1-2-4-8 W/Separate Common to Not True Bits

W H E E L	SIGNALS CONN. TO COMMON SIGNALS					
	1	2	4	8	X	Y
0	•	•	•	•	•	•
1					•	•
2					•	•
3					•	•
4					•	•
5					•	•
6					•	•
7					•	•
8					•	•
9					•	•
	8	8	4	2	12	10
	TERM. LOCATION					

See Fig. 1.

### 41 BCD: 1-2-4-8; W/COMPLEMENT 42 (Type 42 Octal NO Pos. 8 & 9)

W H E E L	SIGNALS CONN. TO COMM. SIG. C								
	1	2	4	8	1	2	4	8	C
0					•	•	•	•	•
1	•				•	•	•	•	•
2		•			•	•	•	•	•
3			•		•	•	•	•	•
4				•	•	•	•	•	•
5					•	•	•	•	•
6					•	•	•	•	•
7					•	•	•	•	•
8					•	•	•	•	•
9					•	•	•	•	•
	10	9	8	7	3	4	5	6	11
	TERM. LOCATION								

See Fig. 1.

### 45 BCD: 1-2-4-8

W H E E L	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	C
0					•
1	•				•
2		•			•
3			•		•
4				•	•
5					•
6					•
7					•
8					•
9					•
	5	6	7	8	9
	TERM. LOCATION				

See Fig. 1.

SECTION TYPE



**SECTION TYPES/TRUTH TABLES (Cont'd).**

See Terminal Location Diagrams, Fig. 1, Fig. 2, Page R-8.

**51** BCD: 1-2-4-8; W/COMPLEMENT  
**52** (Type 52 Octal NO Pos. 8 & 9)

WHEEL	SIGNALS CONN. TO COMM. SIG. C								
	1	2	4	8	T	Z	7	8	C
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
	5	4	3	2	10	9	8	7	6

TERM. LOCATION

See Fig. 1.

**58** 7 Segment Decoder with Blank and BCD output (TTL)

WHEEL	SIGNALS CONNECT TO COMMON GROUND							
	a	b	c	d	e	f	g	Gnd/Vcc
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								

FOR TERMINAL LOCATIONS CONSULT CK

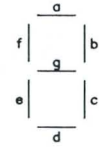
Note: Connections for RBO and RBI supplied.

**59** 7 Segment Decoder

WHEEL	COMMON (C) CONNECTED TO TERMINAL INDICATED								
	a	b	c	d	e	f	g	Gnd/Vcc	
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
	6	5	4	3	2	8	7	1	12

TERM. LOCATION

See Fig. 1.



Note: Use decoder type 7446/7.

**61** SPDT REPEATING

WHEEL	SIG. CONN. TO C		
	+	-	
+			
-			
+			
-			
+			
-			
+			
-			
+			
-			
	9	8	2

TERM. LOC.

See Fig. 1.

**70** Binary Coded Hexadecimal with Parity Bit

WHEEL	SIGNALS CONN. TO COMM. SIG. C					
	1	2	4	8	P	C
0						
1						
2						
3						
4						
5						
6						
7						
8						
9						
A						
B						
C						
D						
E						
F						
	3	5	7	11	1	9

TERM. LOCATION

See Fig. 1.

**71** Binary Coded Hexadecimal

WHEEL	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	C
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
A					
B					
C					
D					
E					
F					
	3	5	7	11	9

TERM. LOCATION

See Fig. 1.

**72** Binary Coded Hexadecimal

WHEEL	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	C
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
A					
B					
C					
D					
E					
F					
	2	3	4	5	1

TERM. LOCATION

See Fig. 2.

**81** BCD: 1-2-4-8

WHEEL	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
	1	2	3	5	4

TERM. LOCATION

See Fig. 2.

**83** Binary Coded Hexadecimal

WHEEL	SIGNALS CONN. TO COMM. SIG. C				
	1	2	4	8	C
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
A					
B					
C					
D					
E					
F					
	1	2	3	5	4

TERM. LOCATION

See Fig. 2.

Other section types and functions available, consult factory.

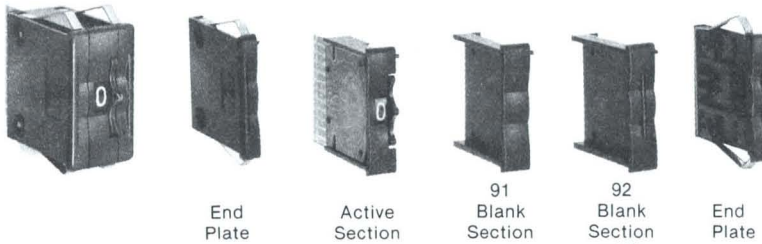


MTG. STYLE

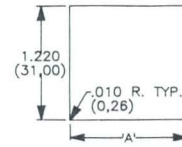


**MOUNTING STYLES**

**0**



PANEL MOUNTING

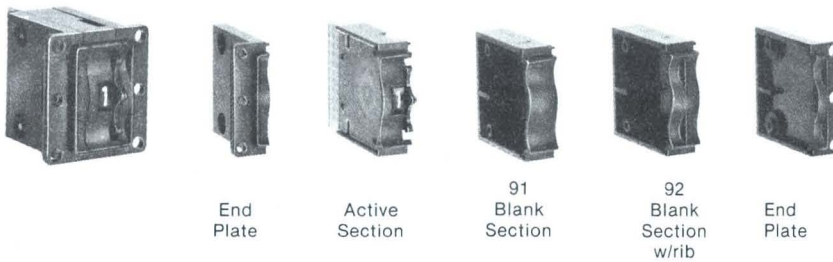


ASS'Y TYPE		A
Front Mounting	0	(.315 × N) + .326 (800 × N) + (8.28)
	3	(.394 × N) + .326 (10.0 × N) + (8.28)
	4	(.500 × N) + .326 (12.7 × N) + (8.28)

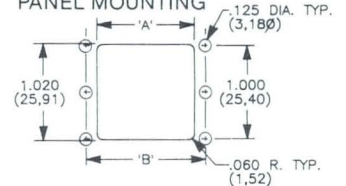
N = Number of Sections  
Recommended Panel Thickness—  
.046 - .125 (1,16 - 3, 18)

**SNAP-IN FRONT MOUNTING**

**1**



PANEL MOUNTING



ASS'Y TYPE		A	B
Rear Mounting	0	(.350 × N) + .340 (8.89 × N) + (8.64)	(.350 × N) + .560 (8.89 × N) + (14.22)
	4	(.500 × N) + .340 (12.7 × N) + (8.64)	(.500 × N) + .560 (12.7 × N) + (14.22)

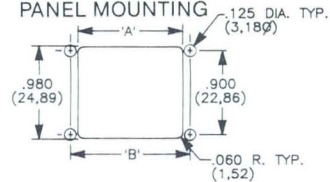
N = Number of Sections  
Recommended Panel Thickness—  
.046 - .125 (1,16 - 3, 18)

**REAR MOUNTING**

**2**



PANEL MOUNTING



ASS'Y TYPE		A	B
Rear Mounting	0	(.350 × N) + .420 (8.89 × N) + (10.67)	(.350 × N) + .580 (8.89 × N) + (14.73)
	4	(.500 × N) + .420 (12.7 × N) + (10.67)	(.500 × N) + .580 (12.7 × N) + (14.73)

N = Number of Sections  
Recommended Panel Thickness—  
.046 - .125 (1,16 - 3, 18)

**REAR MOUNTING**

ASSY. TYPE



**ASSEMBLY TYPE**

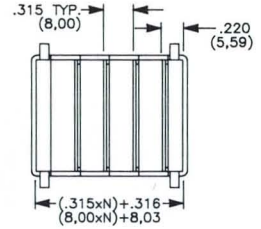
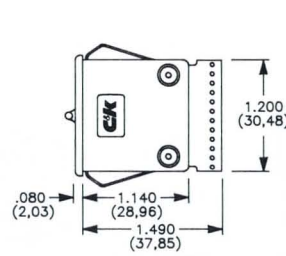
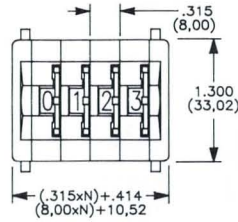
- 0** Switch assembly with end plates. .315 terminal spacing, center to center, front-mounting. .350 terminal spacing, center to center, rear mounting.
- 3** 10mm terminal spacing center to center, assembly with end plates, front-mounting only.
- 4** 0.50 terminal spacing, center to center, assembly with end plates front and rear mounting.
- 9** Switch sections unassembled without end plates, front and rear mounting.

NOTE: 10mm (type 3) and 0.50 (type 4) switch section assemblies are produced by using spacers as shown on page R-10.

## MOUNTING STYLES & ASSEMBLY TYPES ILLUSTRATED

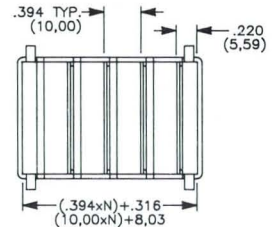
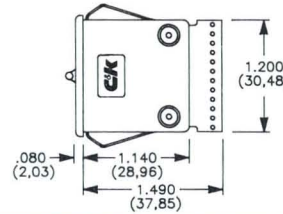
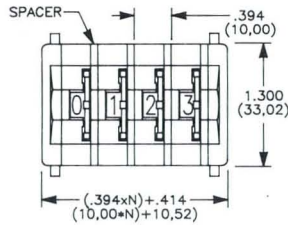
Below, and on next page, are shown the available mounting style / assembly type combinations.

**SNAP-IN FRONT MOUNTING**  
 Section Pitch: .315 (8,00)  
 Mounting Style: 0  
 Assembly Type: 0



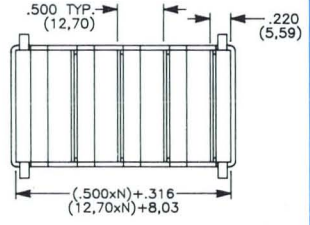
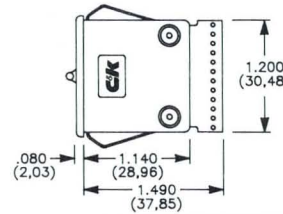
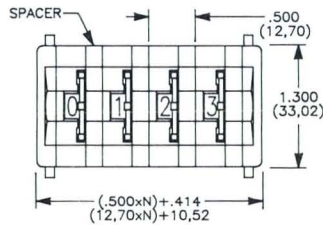
N = Number of Sections

**SNAP-IN FRONT MOUNTING**  
 Section Pitch: 10mm  
 Mounting Style: 0  
 Assembly Type: 3



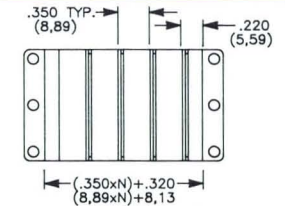
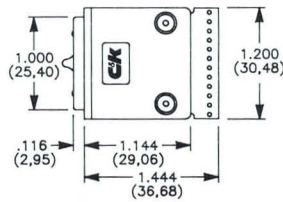
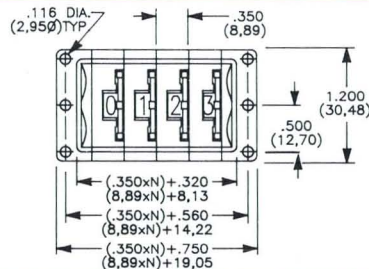
N = Number of Sections

**SNAP-IN FRONT MOUNTING**  
 Section Pitch: .500 (12,70)  
 Mounting Style: 0  
 Assembly Type: 4



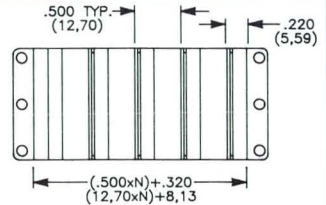
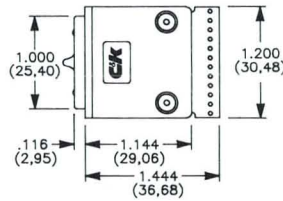
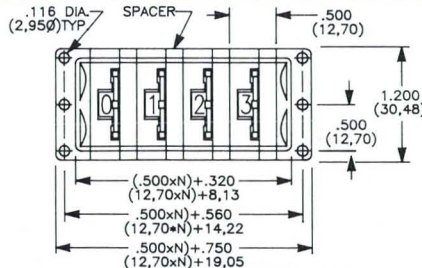
N = Number of Sections

**REAR MOUNTING**  
 Section Pitch: .350 (8,89)  
 Mounting Style: 1  
 Assembly Type: 0



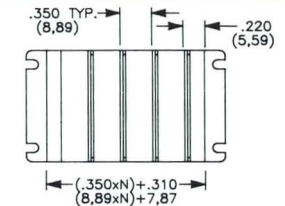
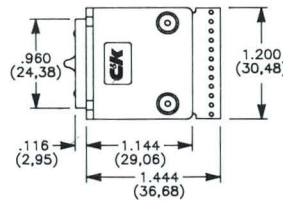
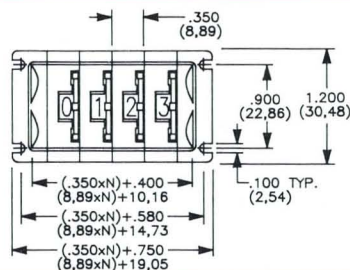
N = Number of Sections

**REAR MOUNTING**  
 Section Pitch: .500 (12,70)  
 Mounting Style: 1  
 Assembly Type: 4



N = Number of Sections

**REAR MOUNTING**  
 Section Pitch: .350 (8,89)  
 Mounting Style: 2  
 Assembly Type: 0

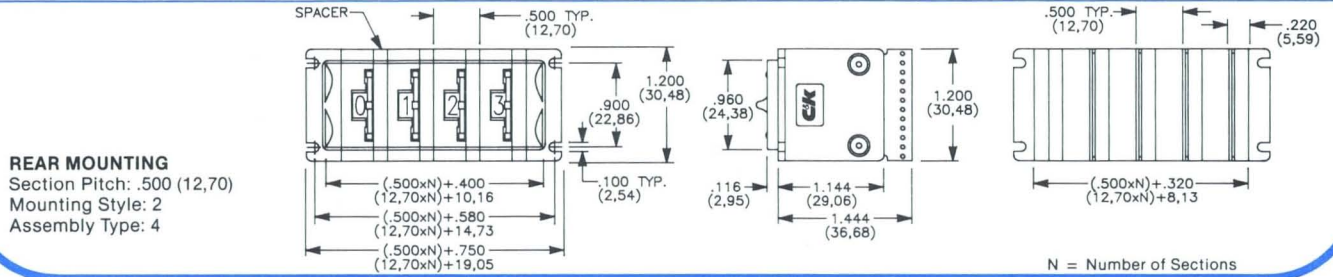


N = Number of Sections

R



**MOUNTING STYLES & ASSEMBLY TYPES ILLUSTRATED (cont'd.)**



**REAR MOUNTING**  
 Section Pitch: .500 (12,70)  
 Mounting Style: 2  
 Assembly Type: 4

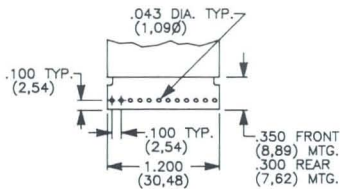
N = Number of Sections

**TERMINATIONS**



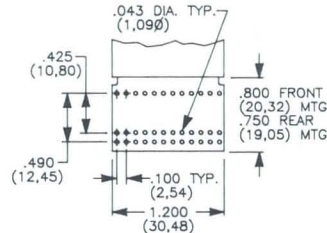
**TERMINATIONS**

**0**



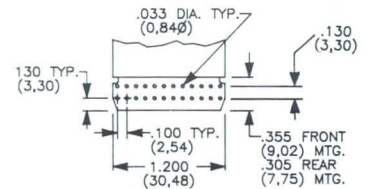
P.C. BOARD 1/32" THK. (0,79)

**1**



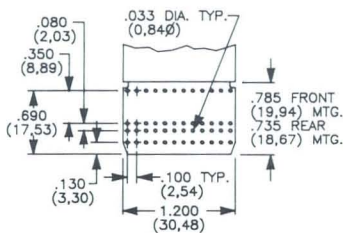
Note: Signal traces cut except for common(s).

**4**



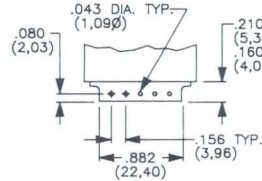
P.C. BOARD 1/32" THK. (0,79)

**5**



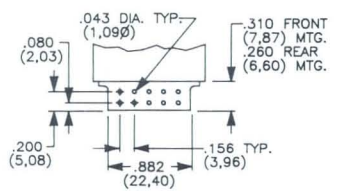
Note: Signal traces cut except for common(s).

**6**



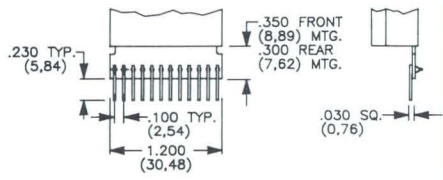
P.C. BOARD 1/32" THK. (0,79)

**7**



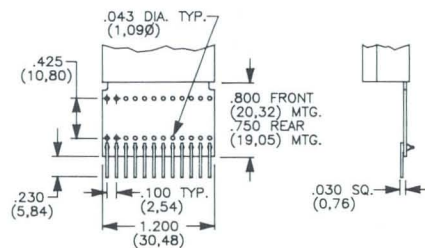
P.C. BOARD 1/32" THK. (0,79)

**3**



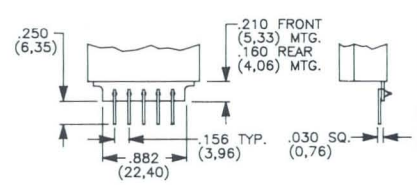
P.C. BOARD 1/32" THK. (0,79)

**A**



Note: Signal traces cut except for common(s).

**B**

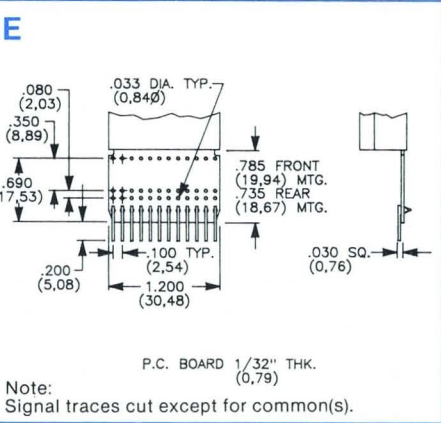
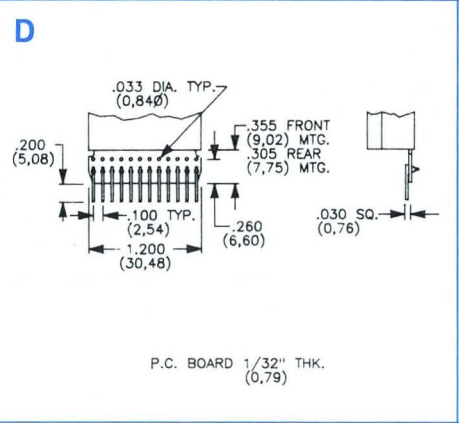
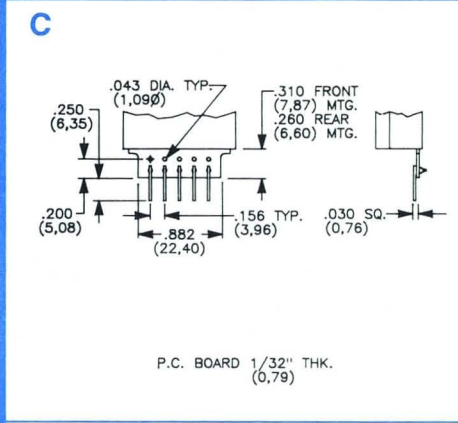


P.C. BOARD 1/32" THK. (0,79)

**R**



**TERMINATIONS (cont'd.)**



**8**

Termination N/A

**9**

Any Combination of Termination Configurations. Specify on 'Configuration Form', see page R-11.

**M**

Special Termination (consult factory)

**AVAILABLE COMBINATIONS: SECTION TYPES / TERMINATIONS**

SECTION TYPE

	11	12	13	14	16	21	22	23	24	26	27	28	29	31	32	33	34	35	41	42	45	51	52	58	59	61	70	71	72	81	83
0	•	•				•	•	•	•					•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
1	•	•		•		•	•	•	•					•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
3	•					•	•	•	•					•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
4		•			•									•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
5		•												•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
6										•	•	•	•																	•	•
7													•																		•
A	•	•		•		•	•	•	•					•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
B										•	•	•	•																	•	•
C													•																		•
D		•			•									•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
E		•												•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
M		•																													•

• INDICATES CURRENTLY AVAILABLE COMBINATION

**4046 CONNECTOR**



**TERMINATION LOCATION DIAGRAMS**



See TRUTH TABLES, Pages R-3 and R-4, for Signal Locations



COLOR/MARKING/STOPS



**COLOR / MARKING / STOPS**

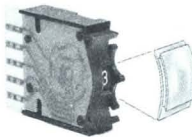
0	1	2	3	4	9
Matte black body; Glossy black wheel with white characters	Matte gray body; Glossy black wheel with white characters	Special Colors/Wheel and/or body Specify on "Configuration Form"	Special Marking on Wheel and/or body Specify on "Configuration Form"	Special Stops Specify on "Configuration Form"	Any Combination of 2, 3, or 4. Specify on "Configuration Form"

**COLORS AVAILABLE:** **Marking** — white or black  
**Body** — matte black or matte gray  
**Wheel** — white, black, red, orange, yellow, green, blue, brown or gray

SEAL



**SEALING**

0	1	2	3	8	9
Unsealed Switching Contacts	Sealed Switching Contacts Switching contact area is protected from moisture, oil, and airborne contaminants. Sealing is by means of an "O" ring rotary seal and a cured-in-place elastomer gasket.	Dust Lens The Dust Lens protects the character face of the wheel from abrasion and dirt.	 With Dust Lens and Sealed Switching Contacts (Option 1 and 2)	Sealing N/A, must be specified when ordering blank sections or divider plates.	Sealing variations, section to section within assembly must be specified on "configuration form"

**HOW TO ORDER**

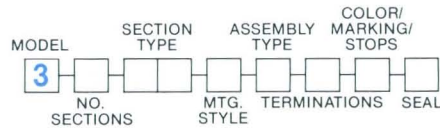
Complete the order number below by selecting the desired number of sections, section type, mounting style, assembly type, termination, color/marking/stops and sealing options from the preceding sections. Place the option codes in the appropriate boxes of the ordering format. (Example: 3-6-11-1-4-3-0-2).

**SPECIAL CONFIGURATION:**

For special configurations which cannot be expressed in the 9 digit order number, copy and fill in the CONFIGURATION FORM on page R-11. Special instructions also on page R-11.

**INACTIVE SECTIONS AND HARDWARE:**

Inactive sections, spacers, end plates and assembly hardware are available separately, see page R-10. Available terminal connector, see page R-8.

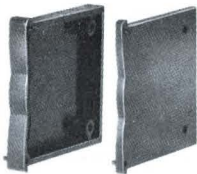


## HARDWARE

To order, specify part no., description and color in word form.

### ↑ SPACERS

#### FOR TYPE '0' FRONT MOUNT



**4106 SPACER FOR .500 (12,70) FRONT MT.**  
.185 (4,70) width  
**4108 SPACER FOR 10mm FRONT MT.** .078 (1,98) width

4106 4108 SPECIFY BLACK OR GRAY

#### FOR TYPE '1' REAR MOUNT



**4107 SPACER FOR .500 (12,70) REAR MT.** .150 (3,81) width

4107 SPECIFY BLACK OR GRAY

#### FOR TYPE '2' REAR MOUNT



**4736 SPACER FOR .500 (12,70) REAR MOUNT.** .150 (3,81) width

4736 SPECIFY BLACK OR GRAY

† To be used in combination with active and / or blank sections to obtain .500 (12,70) or 10mm spacing.

### END PLATES

#### FOR TYPE '0' FRONT MOUNT



**4134 FRONT MT. END PLATE**  
(2 pcs. required for complete assembly)

4134 SPECIFY BLACK OR GRAY

#### FOR TYPE '1' REAR MOUNT



**4004 REAR MT. END PLATE**  
(2 pcs. required for complete assembly)

4004 SPECIFY BLACK OR GRAY

#### FOR TYPE '2' REAR MOUNT

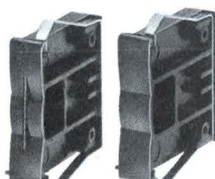


**4732 REAR MT. END PLATE**  
(2 pcs. required for complete assembly)

4732 SPECIFY BLACK OR GRAY

### BLANK (INACTIVE) SECTIONS

#### FOR TYPE '0' FRONT MOUNT



**4136 BLANK SECTION W/RIB**  
**4135 BLANK SECTION (PLAIN)**  
FRONT MOUNTING W/ SPRING .315 (8,00) width  
SPECIFY BLACK OR GRAY

4136 4135

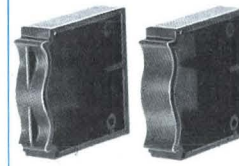
#### FOR TYPE '1' REAR MOUNT



**4006 BLANK SECTION W/RIB**  
**4008 BLANK SECTION (PLAIN)**  
REAR MOUNTING .350 (8,89) width  
SPECIFY BLACK OR GRAY

4006 4008

#### FOR TYPE '2' REAR MOUNT



**4734 BLANK SECTION W/RIB**  
**4733 BLANK SECTION (PLAIN)**  
REAR MOUNTING .350 (8,89) width  
SPECIFY BLACK OR GRAY

4734 4733

### HARDWARE FOR FIELD ASSEMBLY

#### SCREWS FOR FIELD ASSEMBLY OF THUMBWHEEL SWITCHES (2 Screws needed per assembly + 4035 nuts)

* SCREW PART NUMBER	NUMBER OF SECTIONS IN ASSEMBLY					
	FRONT MOUNTING 315" Mtg. Style - 0 Assy. Type - 0	REAR MOUNTING 350" Mtg. Style - 1, 2 Assy. Type - 0	FRONT MOUNTING 10mm Mtg. Style - 0 Assy. Type - 3	FRONT MOUNTING 5" Mtg. Style - 0 Assy. Type - 4	FRONT MOUNTING 5" Mtg. Style - 1, 2 Assy. Type - 4	REAR MOUNTING 5" Mtg. Style - 1, 2 Assy. Type - 4
4127-00	1-2	1-2	1	1	1	1
4127-01	3-4	3	2-3	2	2	2
4127-02	5-7	4-6	4-5	3-4	3-4	3-4
4127-03	8-10	7-9	6-8	5-6	5-6	5-6
4127-04	11-13	10-12	9-10	7-8	7-8	7-8
4127-05	14-16	13-15	11-13	9-10	9-10	9-10

\* Note: Thread size is 0-80 UNF.

#### 4029 STOP PIN



**4035 NUT**  
2 nuts required per assembly and screws.



**4061 NUT DRIVER FOR #4035 nut**  
Not required for assembly  
Not supplied w/sample pieces.



R



For "Special" Configuration — copy, fill out and submit to C&K or sales representative



## CONFIGURATION FORM; THUMBWHEELS

<b>3</b>																	
----------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

\* BASIC ASSEMBLY NUMBER

CUSTOMER PART NO. ASSIGNED BY C&K

\*NOTE: AREAS MARKED \* ARE TO BE FILLED IN BY CUSTOMER WHEN ORDERING

\*CUSTOMER NAME: \_\_\_\_\_

\*ADDRESS: \_\_\_\_\_

\*PART OR SPEC NO. \_\_\_\_\_ \*DATE: \_\_\_\_\_

\*ORIGINATED BY: \_\_\_\_\_ SALES REP. \_\_\_\_\_

SECTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	16 +
SECTIONS ARE SWITCH UNITS, BLANK BODIES OR DIVIDER PLATES (END PLATES ARE NOT CONSIDERED AS SECTIONS)																	SEE ADDITIONAL SHEET(S)
*SECTION TYPE ENTER NUMBER IN APPROPRIATE COLUMN REFER TO CATALOG	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
*COLOR/MARKING/STOPS DESCRIBE IN APPROPRIATE COLUMN	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

\*SPECIAL INSTRUCTIONS OR SPECIFICATIONS:

### EXAMPLES OF ORDERING

**BASIC ASSEMBLY**—If totally descriptive, "Configuration Form" not required.

3 4 2 3 1 0 0 1 1

This defines a 4 section 4, complement of BCD 23, rear mounting ass'y 1, with end plates 0, short type termination 0, matte gray body—glossy black wheel with white characters 1, and sealed switching contacts 1.

**SPECIAL ASSEMBLY**—Requires a "Configuration Form".

3 3 9 9 1 0 0 9 0 — X X X X X

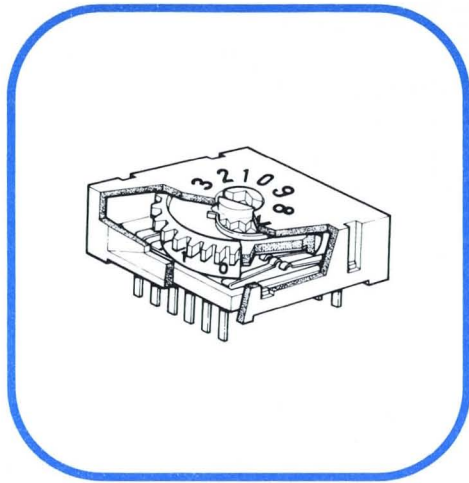
Basic Ass'y No.  
(assigned by customer)

Suffix No.  
(assigned by C & K)

This is a sample portion of "Configuration Form"

SEE SAMPLE

This defines a 3 section rear mounting assembly. Each individual section is specified by its own number and/or special instructions in word form on Configuration Form.



### SPECIFICATIONS

CONTACT RATING: Carry- 1 AMP continuous @ 28 V DC.  
Switch- 100 mA max. @ 28 V DC.  
ELECTRICAL LIFE: 10<sup>5</sup> detent operations @ 25°C.  
CONTACT RESISTANCE: Below 100 milliohms typ. initial @ 2-4 V DC, 100 mA.  
INSULATION RESISTANCE: 10<sup>8</sup> ohms min. (dry).  
DIELECTRIC STRENGTH: 250 V RMS min. @ sea level.  
OPERATING TEMPERATURE: - 10°C to 65°C.

### MATERIALS

COVER: Thermoplastic polyester.  
BASE: Glass filled nylon.  
THUMBWHEEL: Nylon.  
ROTOR CONTACTS: Hard gold over nickel over copper on epoxy fiberglass.  
STATOR CONTACTS: Copper alloy, with gold over nickel.  
TERMINALS: Solder clad over copper alloy, insert molded.

### INTRODUCTION

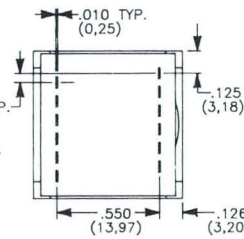
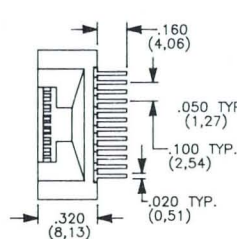
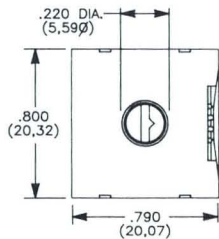
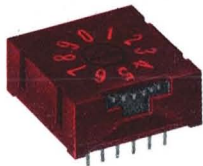
Available options for 3M SERIES MINITHUMB-WHEEL SWITCHES are shown on pages R-12 and R-13. Make selections from the following option sections: Model, Function Codes and Marking

Orientation. Each section begins with the ordering format, with the appropriate boxes enlarged. Complete HOW TO ORDER information is on page R-13.

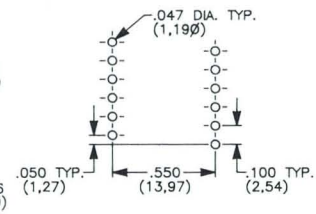
MODEL NO.



### MODEL

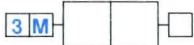


P.C. MOUNTING



MODEL SHOWN: 3M-12-0

FUNC. CODE



### FUNCTION CODES / TRUTH TABLES

**11** Decimal, CCW, 1 Pole

**12** Decimal, CW, 1 Pole

WHEEL	COMMON (C) CONNECTED TO TERMINAL INDICATED									
	0	1	2	3	4	5	6	7	8	9
0	●									
1		●								
2			●							
3				●						
4					●					
5						●				
6							●			
7								●		
8									●	
9										●

Term nos.: **11**

18	91
16	71
1C	51
10	C1
12	11
14	31

Wheel opening this side

Term nos.: **12**

12	11
14	31
1C	51
10	C1
18	91
16	71

Wheel opening this side

CCW: Counter clockwise rotation (viewed from top).  
CW: Clockwise rotation (viewed from top).  
All codes 10 position.



FUNC. CODE.

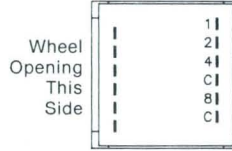


**FUNCTION CODES / TRUTH TABLES (cont'd.)**

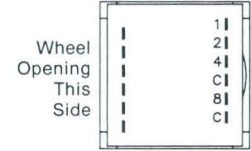
**21** BCD, CCW, 1 Pole  
**22** BCD, CW, 1 Pole

W H E E L	COMM. (C) CONN. TO TERM. IND.			
	1	2	4	8
0				
1	•			
2		•		
3	•	•		
4			•	
5	•			•
6		•	•	
7	•	•	•	
8				•
9	•			

Term. nos.: **21**



Term. nos.: **22**

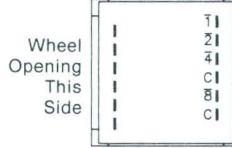


CCW: Counter clockwise rotation (viewed from top).  
CW: Clockwise rotation (viewed from top).  
All codes 10 position.  
All unused terminals should not be connected.

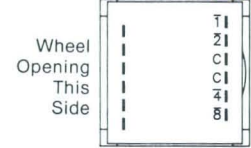
**23** Complement of BCD, CCW, 1 Pole  
**24** Complement of BCD, CW, 1 Pole

W H E E L	COMM. (C) CONN. TO TERM. IND.			
	1	2	4	8
0	•	•	•	•
1	•	•	•	•
2	•	•	•	•
3	•	•	•	•
4	•	•	•	•
5	•	•	•	•
6	•	•	•	•
7	•	•	•	•
8	•	•	•	•
9	•	•	•	•

Term. nos.: **23**



Term. nos.: **24**



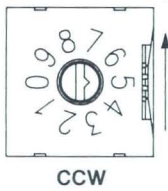
CCW: Counter clockwise rotation (viewed from top).  
CW: Clockwise rotation (viewed from top).  
All codes 10 position.  
All unused terminals should not be connected.

MARKING

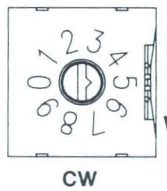


**MARKING**

**TOP MARKING (Std.)**

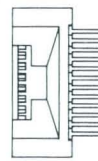


CCW

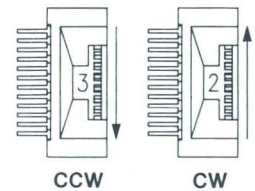


CW

**0 NO WHEEL MARKING (Std.)**



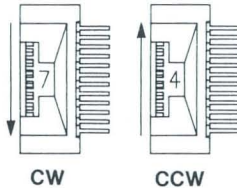
**1**



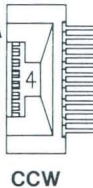
CCW

CW

**2**

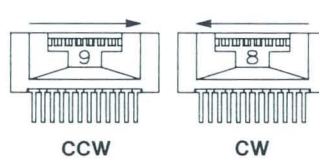


CW



CCW

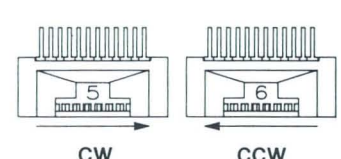
**3**



CCW

CW

**4**

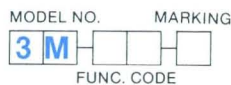


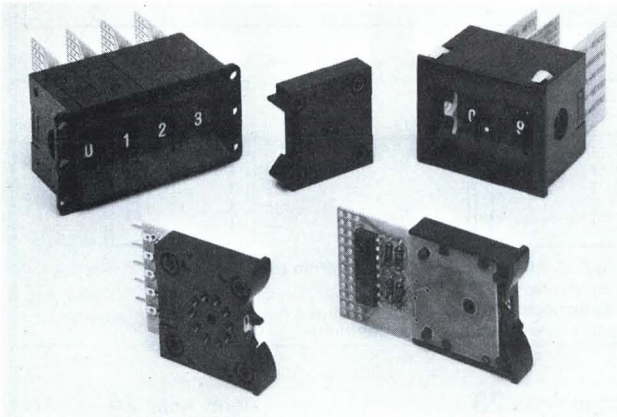
CW

CCW

**HOW TO ORDER**

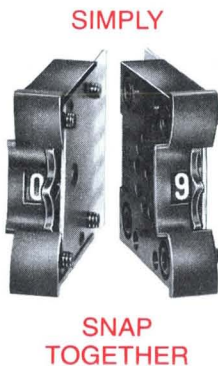
Complete the order number below by selecting the desired function code and marking orientation. Place the option codes in the appropriate boxes of the ordering format. (Example: 3 M-21-3).





- **SNAP-TOGETHER ASSEMBLY—NO TOOLS OR HARDWARE REQUIRED.**
- **RELIABLE DESIGN—1,000,000 DETENT LIFE—GOLD CONTACTS.**
- **RATING—CARRY: 2 AMPS @ 115 V AC OR 28 V DC. SWITCH: 50 mA @ 28 V DC.**
- **BLACK MATTE FINISH STANDARD—OTHER COLORS AVAILABLE.**
- **HOUSINGS—FLAME RETARDANT ABS.**
- **STOP PINS CUSTOMER OR FACTORY INSTALLED.**

### THE "NO HARDWARE" THUMBWHEEL SWITCH SYSTEM

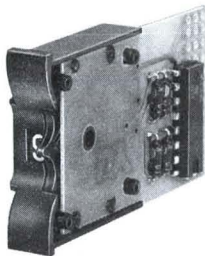


The SF and SR Series Digital Thumbwheel Switches are available in both snap-in front mount (Type SF) and rear mount (Type SR) styles. They are compact, only 0.315 in. (8mm) wide, and require no assembly tools or hardware. All components simply snap together.

Twenty-five standard output codes are available, including "Smart" switches with integral logic functions (see below). Output terminals are on .100 in. centers and can be hard-wired, mated with connectors or supplied with wire-wrap pins. Extended P.C. boards are available for mounting diodes or other components.

Standard finishes are matte black housings and black wheels with white markings. Other colors and markings available. Options include stop pins and window dust covers.

### SMART SWITCHES



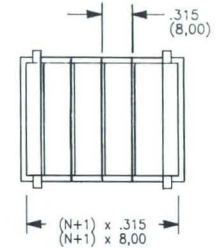
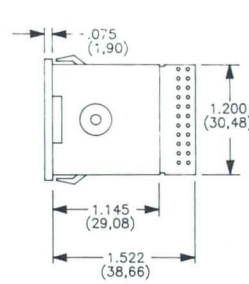
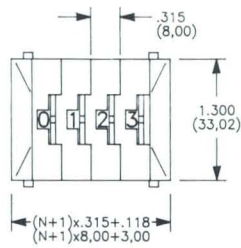
SF and SR Series Digital Thumbwheel Switches are available with integrated circuits and discrete components offering integral logic functions and a cost saving approach to system design. Functions previously provided externally are now available built right in. All required components are fully assembled and tested.

#### AVAILABLE SMART SWITCH FUNCTIONS:

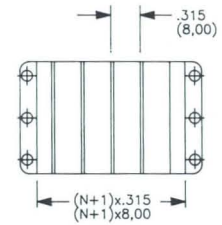
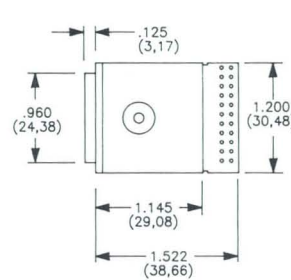
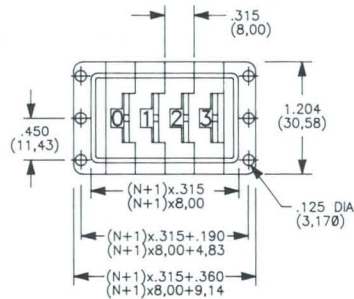
- Resistance Decades**
- Seven Segment Drivers**
- Counter / Timer Decades**
- Digital Comparators**
- Capacitance Decades**
- Kelvin-Varley Voltage Dividers**



**TYPICAL SF SERIES MODEL—SNAP-IN FRONT MOUNT**



**TYPICAL SR SERIES MODEL—REAR MOUNT**



**AVAILABLE OPTIONS**

- Extended P.C. Board with Provision for Components**
- Extended P.C. Board with Components Mounted**
- P.C. Board with Solder Pins**
- Special Marking—Housing and/or Wheel**
- Stop Pins**
- Dust Window**
- Colors**
- Mixed Assemblies—all Switches Not Identical**

**HOW TO ORDER**

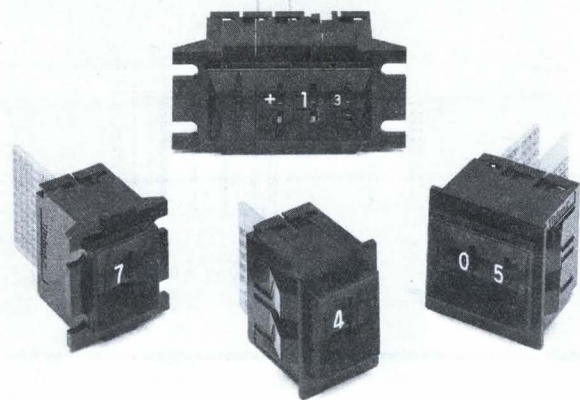
Request C&K Thumbwheel Switch Catalog No. F8612-1 for complete product and ordering information, specifications and materials for the SF and SR Series Thumbwheel Switches.

Request also C&K Sub-Miniature Thumbwheel Switch Catalog No. F8612-2 for S2D Series products (shown on next page).

See also Section R, in this catalog, for more Thumbwheel and Miniature Thumbwheel Switches.

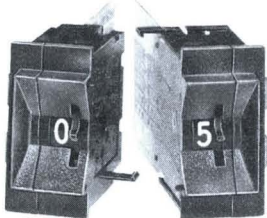
Special colors, functions, terminations, markings and other configurations available, consult factory.





- SPACE SAVING MINIATURE SIZE AND SIMPLE, RELIABLE DESIGN.
- SNAP-TOGETHER ASSEMBLY—NO TOOLS OR HARDWARE REQUIRED.
- DUAL MOUNTING VERSATILITY—SIMPLY CHANGE END PLATES FOR SNAP-IN FRONT OR REAR MOUNTING.
- RATING—CARRY: 3 AMPS @ 50 V AC OR DC. SWITCH: 125 mA @ 50 V AC OR DC.
- BLACK MATTE FINISH STANDARD—OTHER COLORS AVAILABLE.
- STOP PINS CUSTOMER OR FACTORY INSTALLED.

**SIMPLY**



**SNAP TOGETHER**

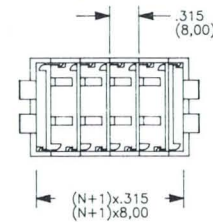
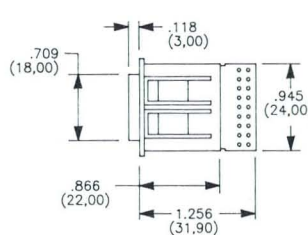
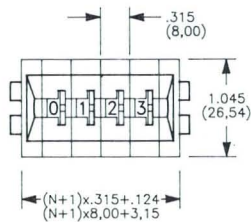
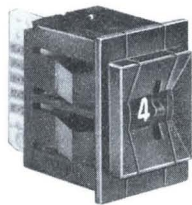
**THE “NO HARDWARE” THUMBWHEEL SWITCH SYSTEM**

The S2D Series Sub-Miniature Digital Thumbwheel Switches can be made in both snap-in front mount and rear mount styles by simply changing end plates. This universal design reduces inventory and simplifies ordering. No assembly tools or hardware are required. All components simply snap together.

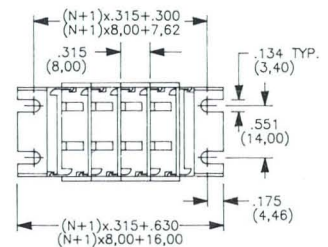
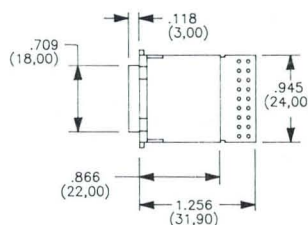
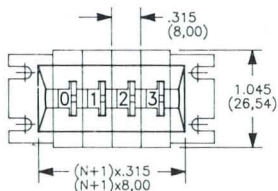
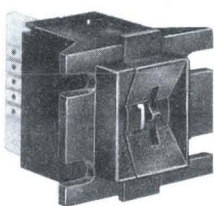
Nine standard output codes are available, with options such as stop pins, colors, markings, right angle terminations and extended P.C. board length for mounting components.

Standard finishes are matte black housings and black wheels with white markings. Other colors and markings available. Options include stop pins and window dust covers.

**TYPICAL S2D SERIES MODEL—SNAP-IN FRONT MOUNT**



**TYPICAL S2D SERIES MODEL—REAR MOUNT**



**HOW TO ORDER**

Request C&K Thumbwheel Switch Catalog No. F8612-2 for complete product and ordering information, specifications and materials for the S2D Series Sub-Miniature Thumbwheel Switches.

Request also C&K Thumbwheel Switch Catalog No. F8612-1 for SF and SR Series products (shown on pages R-14 and R-15).

See also Section R, in this catalog, for more Thumbwheel and Miniature Thumbwheel Switches.

Special colors, functions, terminations, markings and other configurations available, consult factory.

**R**





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13/9-12 Kizilay  
Ankara  
4-118-41-97: 46595 BPAT TR:

### UNITED KINGDOM:

Roxburgh Electronics, Ltd.  
22 Winchelsea Road  
Rye, Sussex TN31 7EL  
0797-223777: 957066 ROXRBYE:

### YUGOSLAVIA:

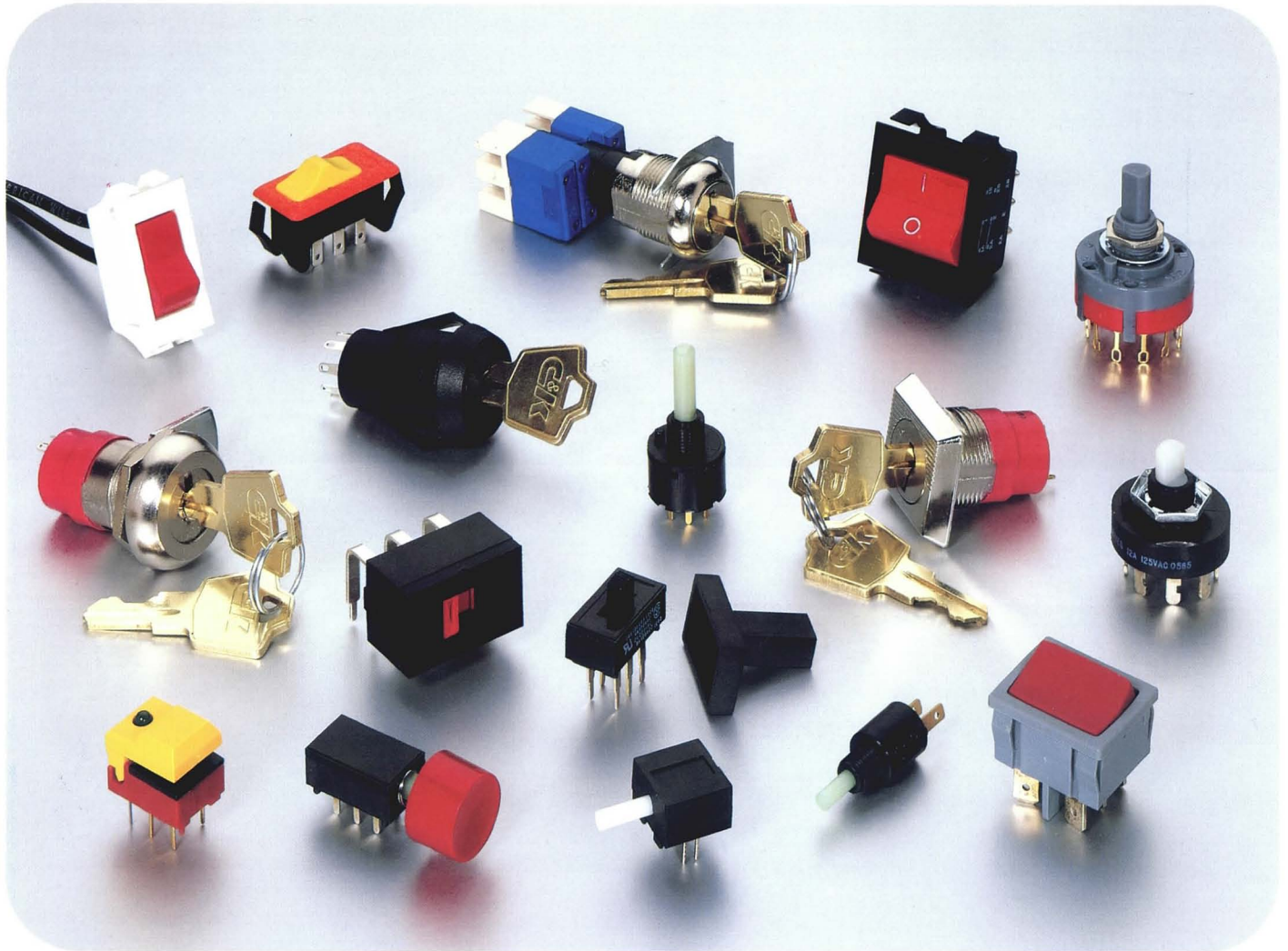
Dahms Elektronik Ges. m.b.H.  
Wiener Strasse 287  
A-8051 Graz, Austria  
0316-64-030: 311099 DAHMS A: 0316-64-030-29





The Primary Source Worldwide®

## Clayton Division Switch Products



C&K Components, Inc., a leading designer and manufacturer of electromechanical switches, has an ultramodern manufacturing facility in Clayton, N.C. This plant utilizes extensive automation to make the products that are described in a separate catalog. Whether your needs are for switchlocks, rotary, slide, rocker or pushbutton switches, you will find that C&K is The Primary Source Worldwide® for switches with consistent quality, delivery and performance. Special switches and added-value features are no problem. C&K is responsive to your special needs. We are able to produce unique designs quickly and at low cost. Consult our Clayton factory with your requirements today.

Call or return the attached card and we will send the NEW Clayton catalog.  
Tel: (919) 553-3131 FAX: (919) 553-4758.

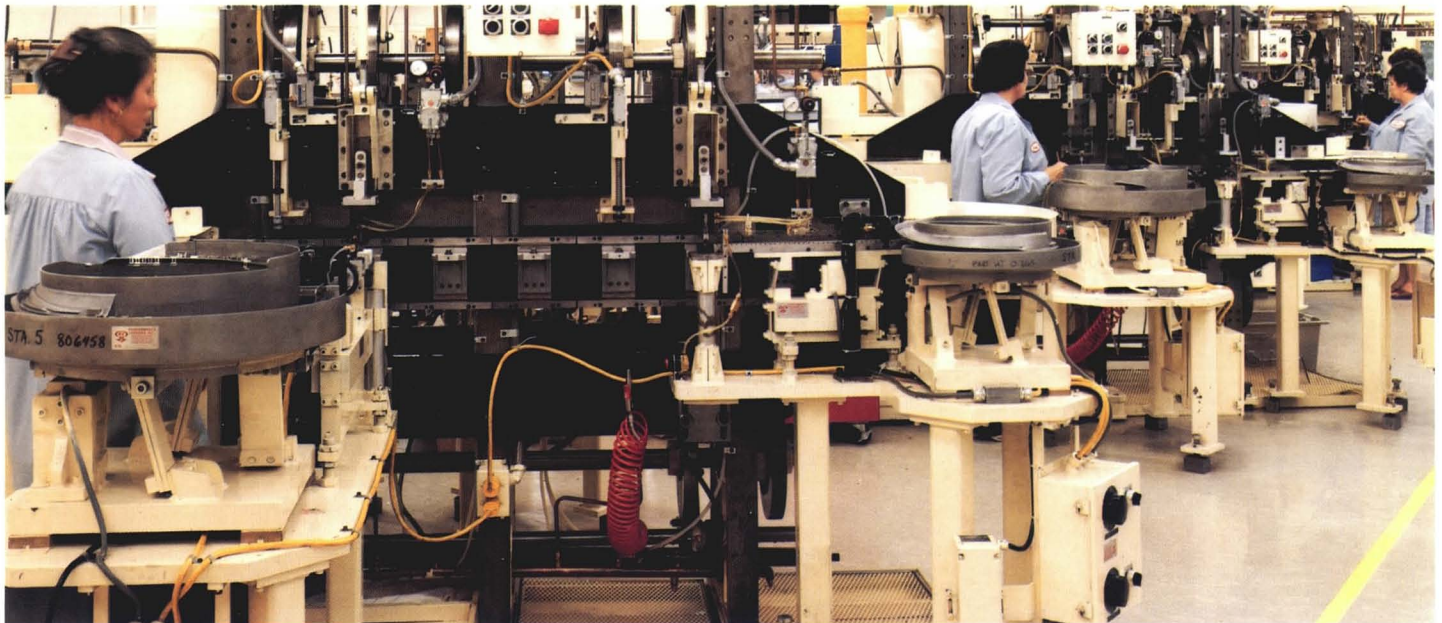




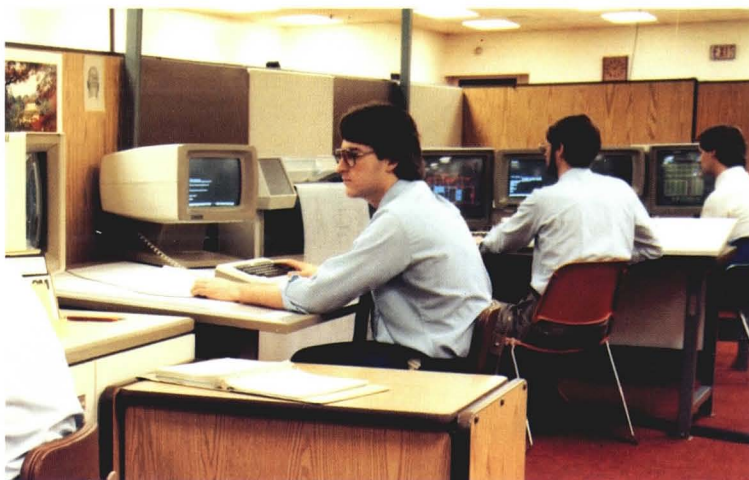


# About . . . **C&K**

C&K Components, Inc. with corporate headquarters in Newton, Massachusetts is a leading international producer of electromechanical switches for the computer and electronics industries. Other plants are located in Wallingford, Connecticut; Clayton, North Carolina; Kettering, England and Hong Kong. The product line presently includes a wide variety of miniature and subminiature switch types, including toggle, rocker, pushbutton, rotary, slide, DIP, membrane and thumbwheel. Special features such as illumination, sealing and antistatic are available and C&K's ability to create special designs to suit customer needs is well known.



Our highly automated manufacturing methods, plus modular design and standardized parts, allow hundreds of thousands of different models to be ordered from this catalog. And every switch comes with famous C&K reliability, performance and delivery.



Our CAD, or Computer Aided Design system improves response time for new or special designs, and underscores our commitment to design excellence and product quality.



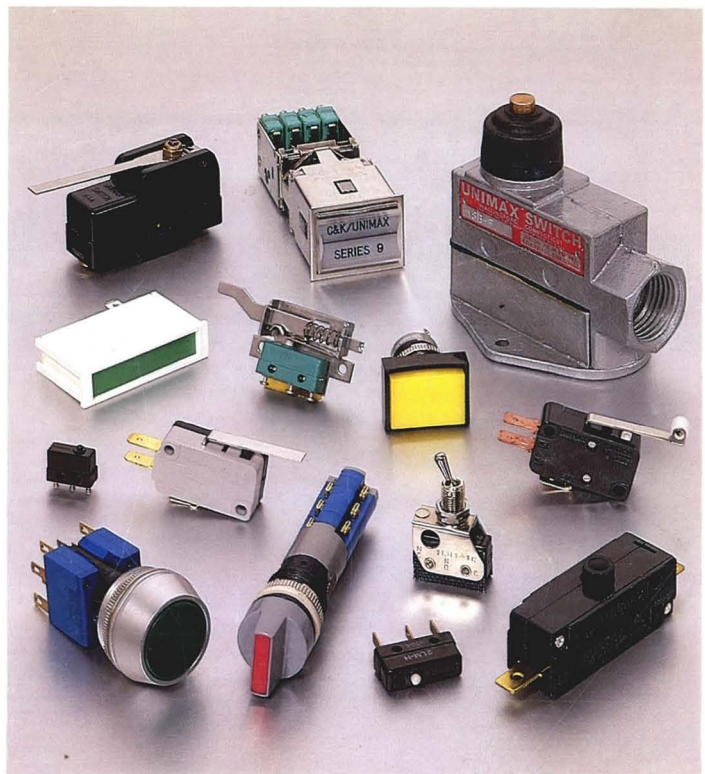
Complete testing and evaluation facilities assure consistent product quality and designed-in high performance.





#### C&K Clayton Division Switch Products

A complete line of switchlock, rotary, slide, rocker and pushbutton switches.



#### C&K/Unimax Switch Products

A complete line of snap-acting, metal-cased, lighted pushbutton and fiber optic switches and panel indicators.



The Primary Source Worldwide<sup>®</sup>

Corporate Headquarters • Main Plant

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