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NKK Switch Basics



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NKK
SWITCHES

Introduction

Purpose:

- To help potential switch users understand the basics of electromechanical switches and to aid in choosing the appropriate switch for a specific application.

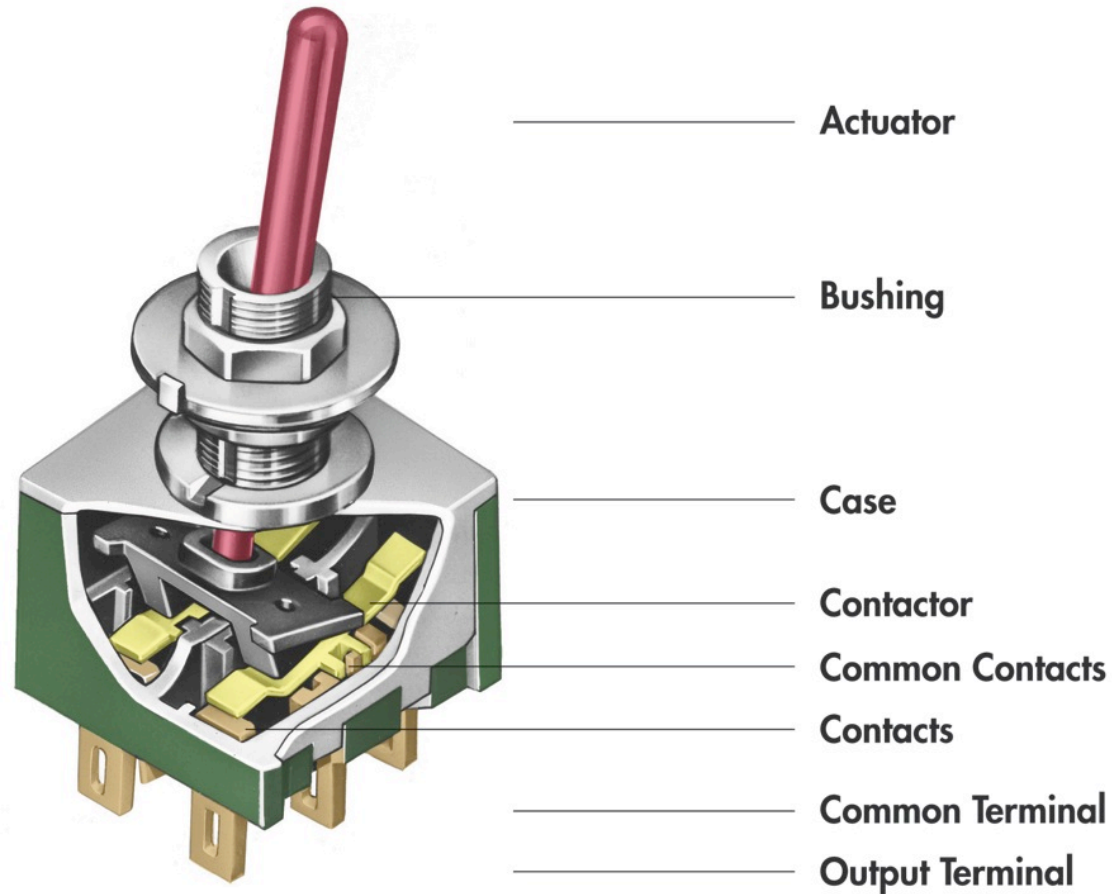
Objectives:

- Basic structure of a switch
- Review and explain the relationship between circuits, poles and throws
- Explain the difference between Momentary and Alternate Action as well as Normally Closed and Normally Open contacts
- Review the benefits of isolated circuits for the LED's on illuminated switches
- Describe the different types of switch terminals, mounting and actuators
- Explain the uniqueness of NKK's sliding Twin Crossbar contacts
- Review the options for panel sealed, IP-Rated switches as well as splash proof boots and NKK's value added capabilities
- Review switch approvals and agency ratings

Note: Please check the presentation speaker notes for additional slide information.



Basic Structure of a Switch

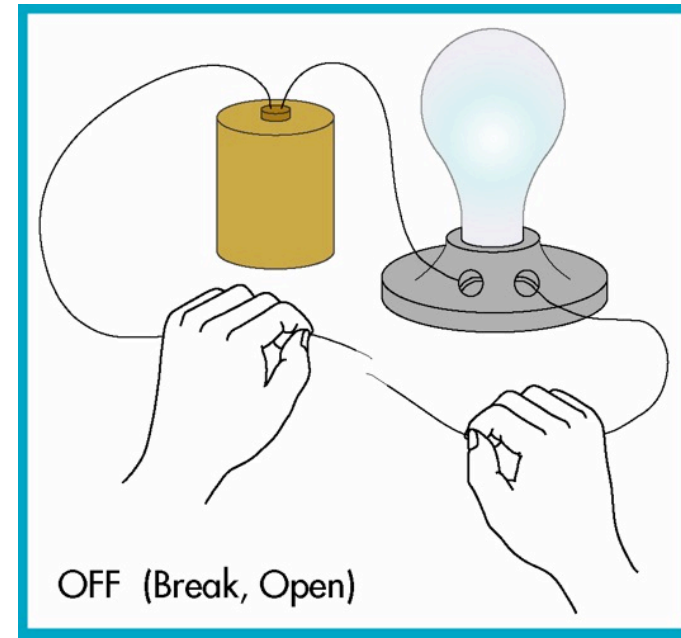
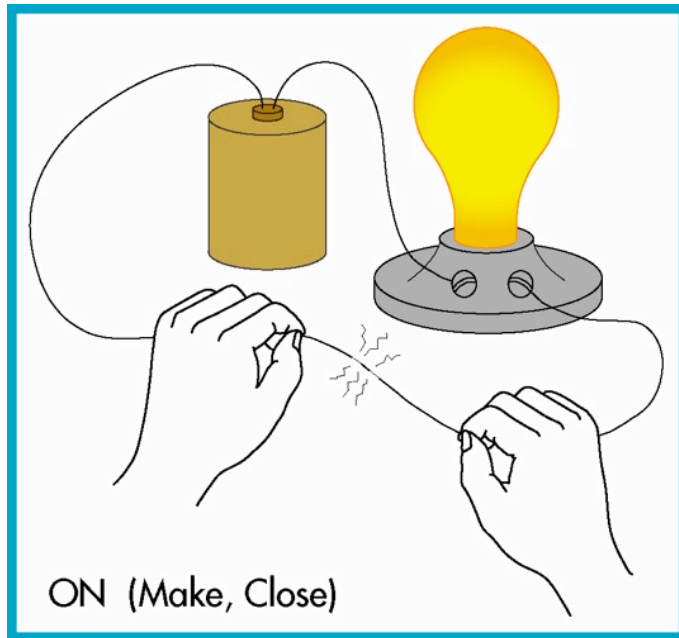


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Electrical Circuit

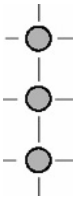
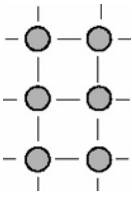
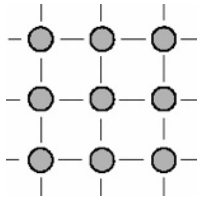
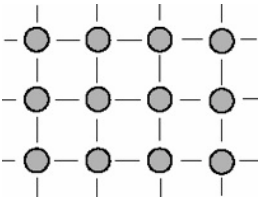
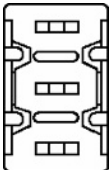
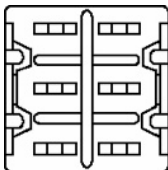
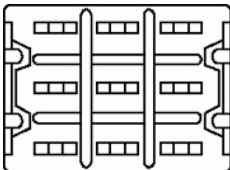
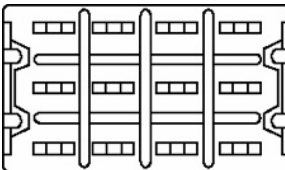


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Poles and Schematics

	Single Pole	Double Pole	Three Pole	Four Pole
Footprint				
Bottom View of Switch				

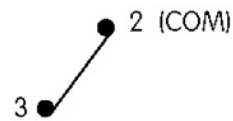
Pole - Number of circuits the switch can control at one time

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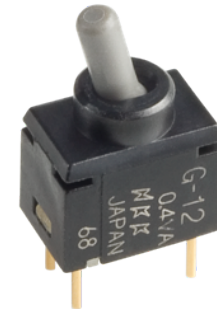
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Throw



Single Throw Switch
ON-NONE-OFF



Double Throw Switch
ON-NONE-ON

Throw - Number of electrical circuits within a pole

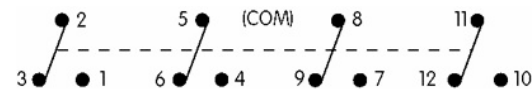
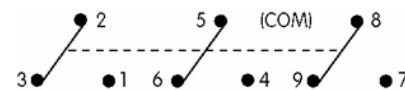
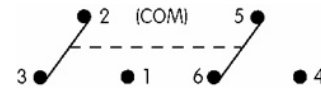
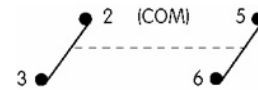
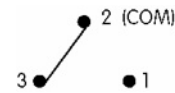
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Examples of Pole and Throw

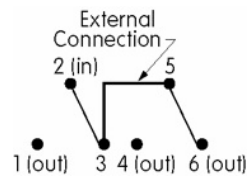
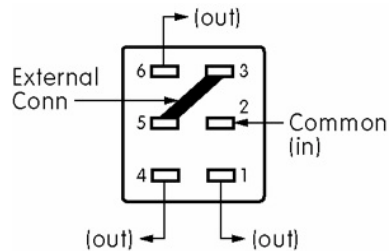
- SPST – Single Pole Single Throw
- SPDT – Single Pole Double Throw
- DPST – Double Pole Single Throw
- DPDT – Double Pole Double Throw
- 3PDT – Three Pole Double Throw
- 4PDT – Four Pole Double Throw



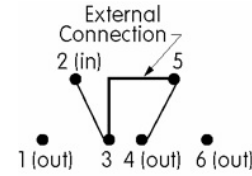
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Special Circuits – Three Throw ON-ON-ON

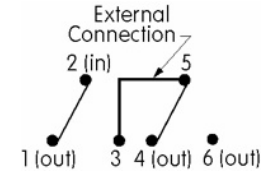
Single Pole Three Throw



2-3, 5-6 connected

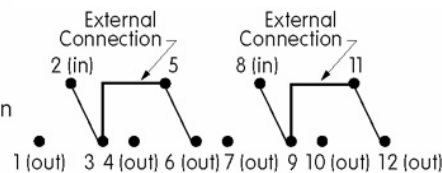
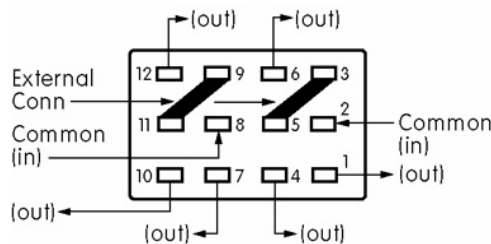


2-3, 5-4 connected

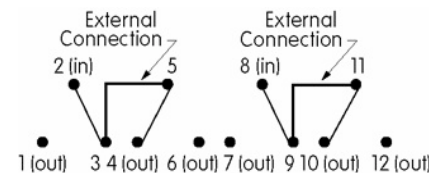


2-1, 5-4 connected

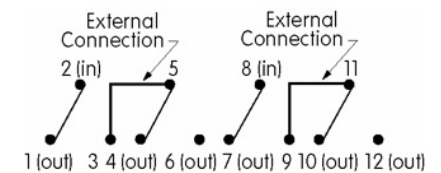
Double Pole Three Throw



2-3, 5-6 connected
8-9, 11-12 connected



2-3, 5-4 connected
8-9, 11-10 connected



2-1, 5-4 connected
8-7, 11-10 connected

Note: 3-5 and 9-11 external connection must be made during field installation

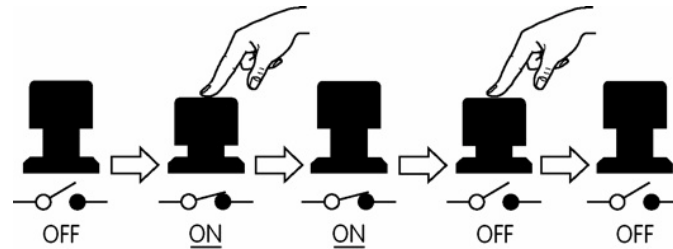
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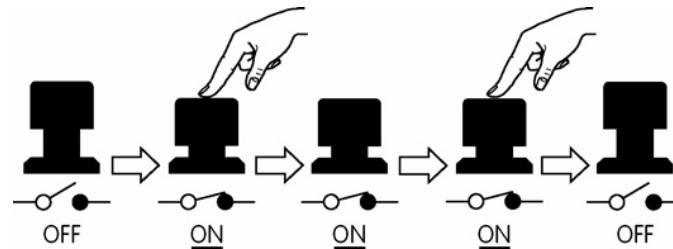


Alternate and Momentary

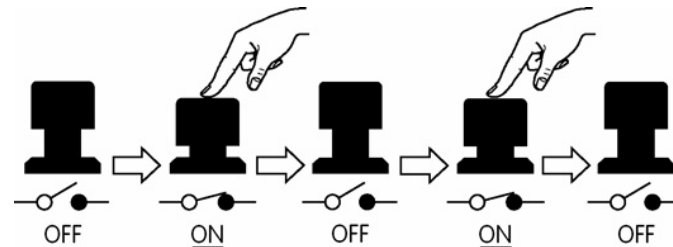
Alternate with No
Latchdown



Alternate with
Latchdown



Momentary



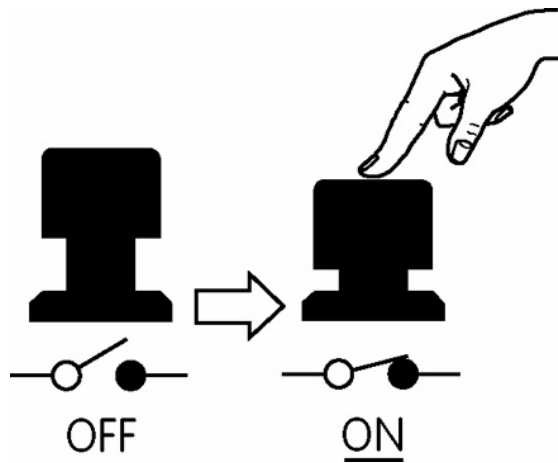
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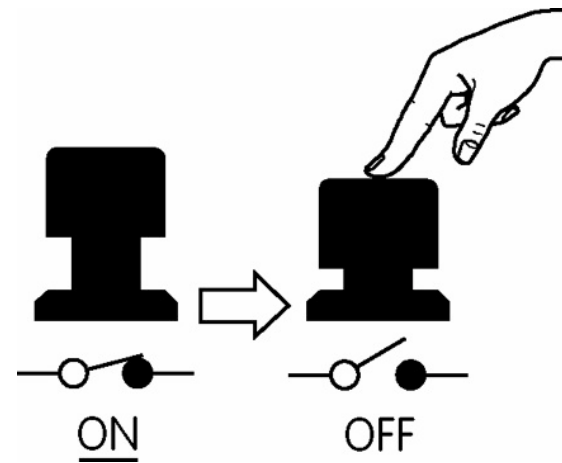
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Normally Open (N/O) and Normally Closed (N/C)

N/O = Normally Open



N/C = Normally Closed



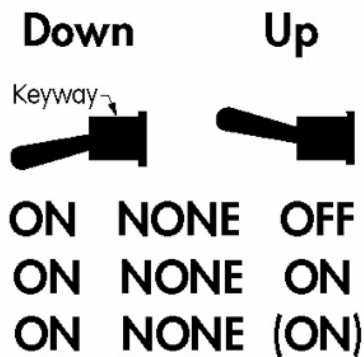
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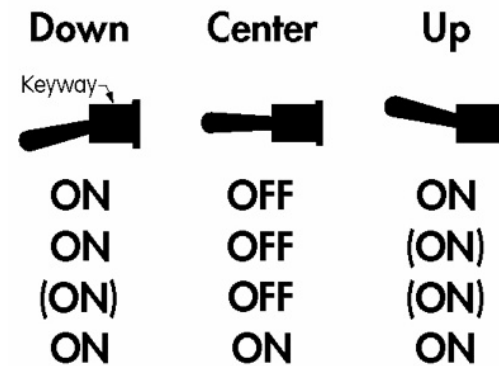


Lever Position and Circuits

Two Position Toggle



Three Position Toggle



(ON) is Momentary

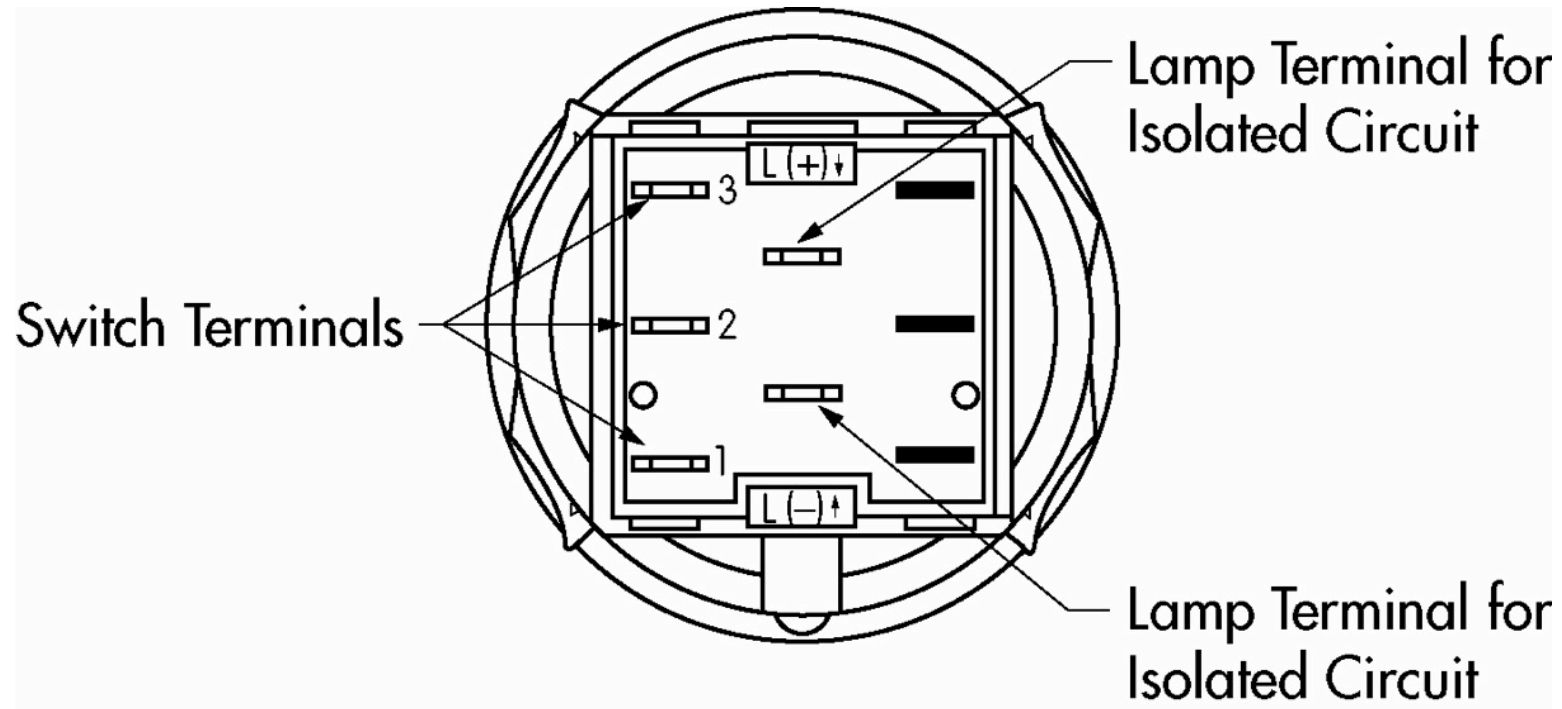
Note: There is a distinction between “throw” and “position”. Among two position switches there are single throw ON-NONE-OFF and double throw ON-NONE-ON.

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Isolated Circuits for Illumination






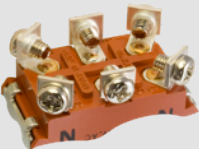






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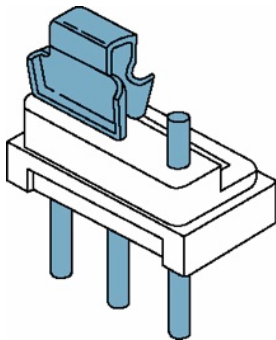
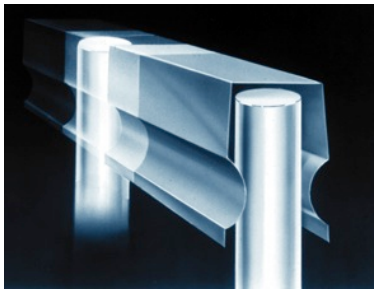
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Types of Switch Terminals

Solder Lug 	Wire-wrap 	Straight PC 	Straight PC w/ Bracket 	Right Angle PC 	Vertical PC 
Screw Lug 	Quick Connect 	Solder Lug 	Solder Lug w/ Quick Connect 		
SMD 	SMD w/ Bracket 	Right Angle SMD w/ Bracket 			

Sliding Twin Crossbar Contacts



everything starts here.

NKK's Sliding Twin Crossbar (STC) contacts provide the industry's most reliable contact mechanism.

The award-winning contact mechanism offers benefits unavailable in conventional mechanisms: smooth, positive detent actuation, increased contact stability, and unparalleled logic-level reliability.

These contacts are available in ultra-miniature and subminiature toggles, rockers, pushbuttons, and slides.

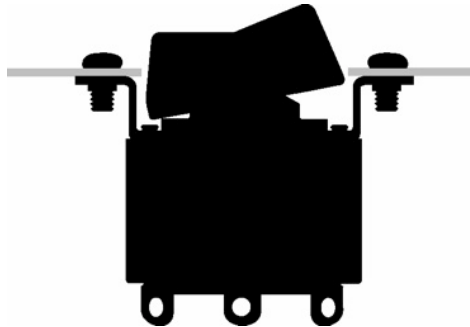
Featured in A, B, G, G3, SS, SS3 series.

Switch Mounting Options

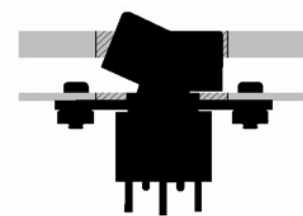
Panel Mount



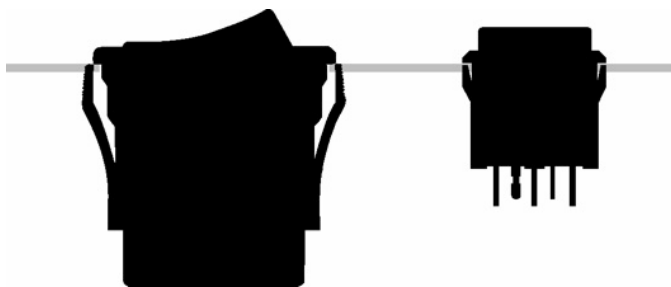
Front Panel Mount



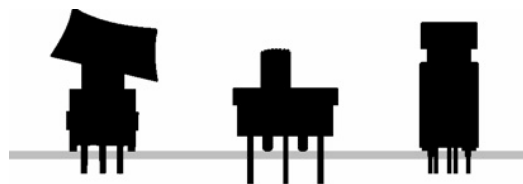
Subpanel Mount



Snap-in Mount



PC Mount



Surface Mount









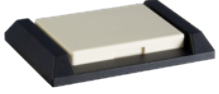









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Different Types of Switch Actuators

Toggle					
	Standard	Flat	Locking Lever	Cone	Large Bat
Rocker					
Pushbutton					
Paddle					

Different Types of Switch Actuators (Continued)

Slide				
Rotary				
Keylock				
DIP Rotary				

Panel Sealed Switches

Environmentally Sealed			Panel Seal with O-Ring	Splashproof Boot
WT 	WB 	YB 	S2AW 	S1A w/ AT402 
Sealing at front and back panel meets IP67 and IP60 of IEC60529 Standards.	Conforms to IP67 of IEC60529 Standards at front and behind panel (dust and water protected for temporary immersion).	Dust and oil tight and splash proof panel seal meet IP65 of IEC60529 Standards. Panel seal models come with exterior o-ring.	Panel seal model conforms to IP65 of IEC60529 specifications.	Boot protects interior parts of the switch as well as the front panel from entry of dust, liquid spills, and splashes.

IP-Rated Devices and Splashproof Boots

- IP-Ratings:
 - IP60: Dust tight, but not protected against water
 - IP64: Dust tight, protected against splashing water
 - IP65: Dust tight, protected against low-pressure water jets
 - IP67: Dust tight, protected against effects of temporary immersion
- Splash Proof Boots:

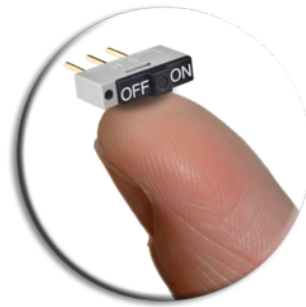
PN	AT401 Half Boot	AT402, AT402S Full Boots	AT428 Full Boot	AT4041, AT4042 Full Boots	AT4043 Full Boot	AT4181 Full Boot
Material	 AT401A: Nitrile butadiene rubber AT401H: Ethylene propylene rubber AT401S: Silicone rubber	 Silicone rubber	 Silicone rubber	 Silicone rubber	 Silicone rubber	 Silicone rubber
Color	Black for AT401A Gray for AT401H Black for AT401S	Black, Red, Yellow, Green, and Gray	Black	Black	Black	Black
Bushing	12mm	12mm	M6 or 1/4-40 Thd	M6 or 1/4-40 Thd	12mm	12mm

Value-Added Capabilities

Methods for All Applications

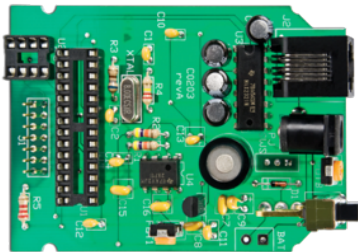
Custom Printing:

- Laser Etching
- Screen Printing
- Pad Printing



Custom Assembly:

- Cables & Harnesses
- Electronic
- Electro-Mechanical
- Mechanical



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Standards and Approvals

Many of NKK's switches are recognized or certified by UL, cULus, and CSA.



VDE approved models include: JP, JW, P, SW3006A, and WR

Other Standards:

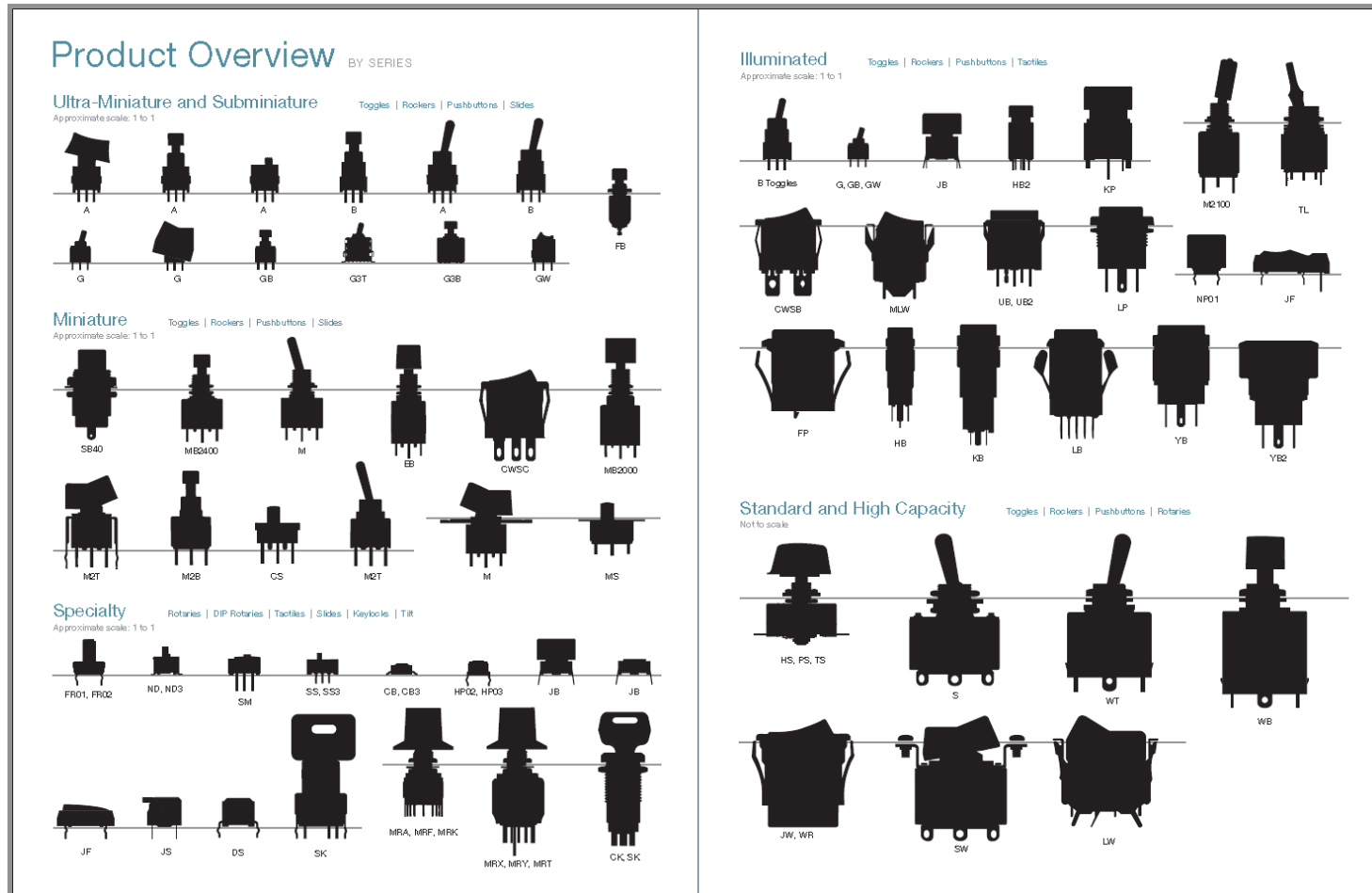
- UL94V-0 rating on several switch lines
- TV rating (TV-5, TV-8) for JW rocker series

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NKK Switch Product Overview



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Thank you!

Have questions? Contact NKK Switches at 877.2BUYNKK

NKK also provides FREE switch samples and online 3D CAD Models. Go to www.nkkswitches.com to get yours today!



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