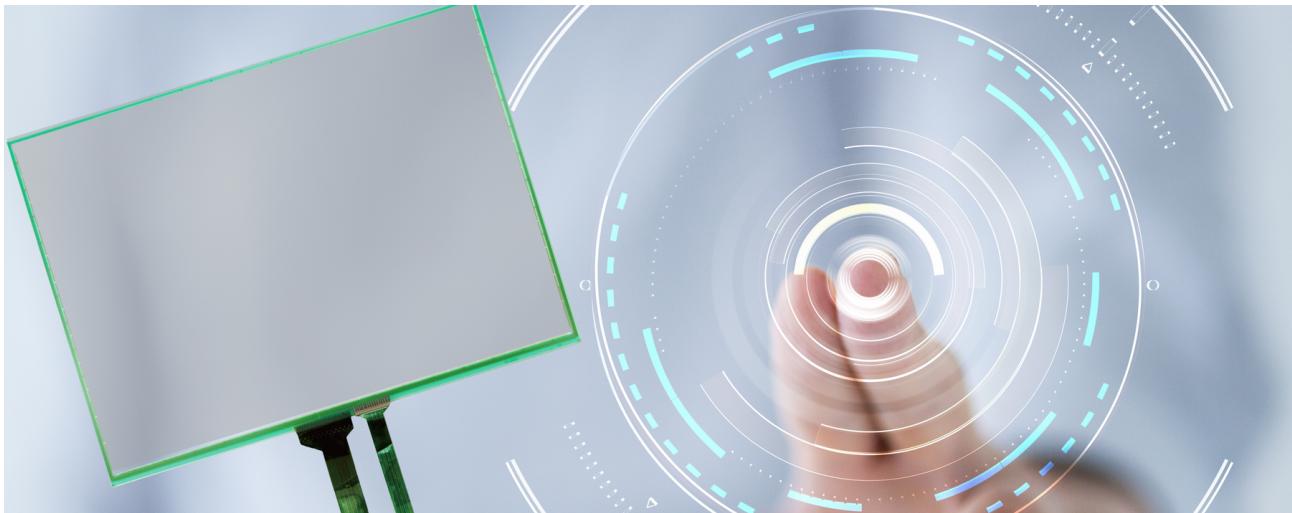


# SWITCHING TIMES

*The official newsletter of NKK Switches of America*



## IN THIS ISSUE:

- |   |  |
|---|--|
| 3 | THE EVOLUTION OF SWITCHES AND NKK: CELEBRATING 70 YEARS            |
| 4 | TOGGLE UP! A & B SERIES SUBMINIATURE TOGGLES                       |
| 5 | HOW TO PICK OUT THE PERFECT SWITCH: 7 QUESTIONS TO SELECT A SWITCH |
| 6 | UNDERSTANDING IP RATINGS   |
| 7 | NKK HELPS REDESIGN A MEDICAL GAS ALARM SYSTEM                      |
| 8 | FUN WITH SWITCHES!   |

## NEW PRODUCT! **Series ZE Touch Screens: Bridging Innovation with Intuitive Design**

In today's rapidly evolving digital landscape, the role of human-machine interfaces, particularly touch screens, is pivotal. These screens both dictate the functionality of devices and significantly influence user experience.

Leading the charge in this domain is NKK with its latest launch: the Series ZE Multi-Touch Resistive Touch Screens.

### *A Class Apart in Touch Screen Technology*

The Series ZE isn't just another addition to the ever-growing world of touch screens; it's a testament to what happens when cutting-edge technology meets practical design.

From industrial automation and communication systems to POS devices and medical equipment, the ZE seamlessly integrates with a plethora of applications. Its versatility extends to gaming and entertainment sectors, broadcast setups, and even in food service and cash registers.

*(continued on next page)*



## Key Features

### Light Touch Operation

The Series ZE Touch Screens are designed with a structure that reduces friction when the film and glass come into contact. The Series ZE is able to perform with less pressure when compared to traditional resistive touch screens. The ZE has a 0.03N-0.3N activation force, which is 50% less than the traditional touch screen.

### Operate via a Finger, Glove, or Stylus

The Series ZE Touch Screens are versatile and can accept a variety of input operations. The sensor can be operated via any material as long as it is physically pressed. The operator can use a finger, glove, stylus, or any other material. It's now easier than ever to use touch screens in variety of applications.

### Unparalleled Power and Precision

Beneath its sleek design, the Series ZE is an electrical powerhouse. It operates at a maximum power level of 6V DC. The screen promises precision with a linearity of  $\pm 2.5\%$  maximum after a 4-point calibration, ensuring accurate touch responses every time.

### High Noise Resistance

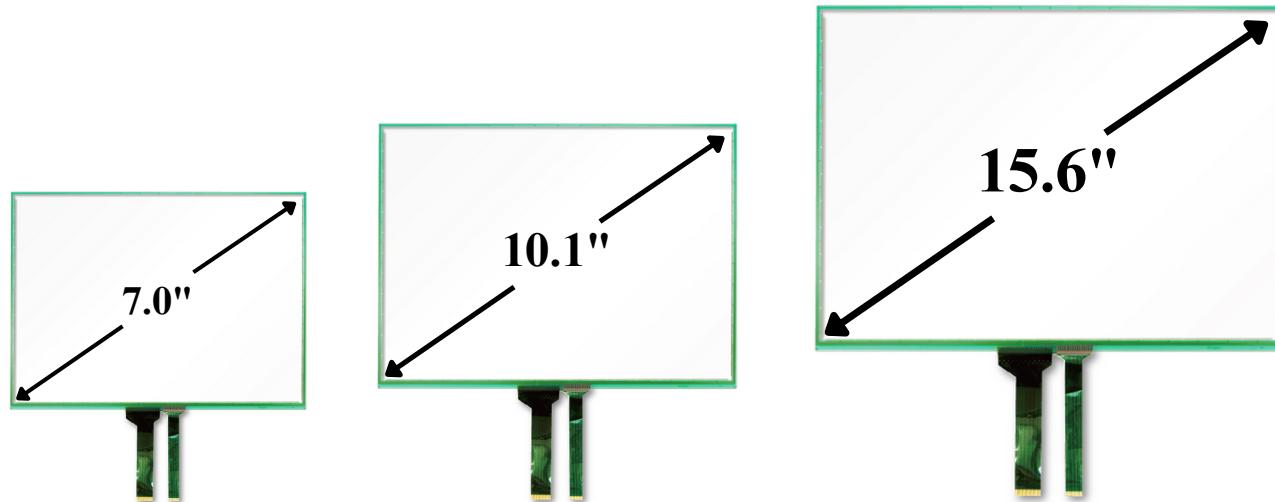
The Series ZE only detects touchpoints when the top conductive film makes contact with the bottom's conductive glass. Because the ZE requires that physical contact must be made to actuate the switch, electrical noise will not cause the Series ZE Touch Screen to malfunction.

### Dual-Touch Controller Boards

NKK provides compatible controller boards for the Series ZE, which allows a smooth and effortless operation between the two. They are high specification touch controller boards with fast rates of coordinate outputs that are able to recognize dual inputs.

### Adaptable to Extremes

Operating in varying environmental conditions is a breeze for the Series ZE. Whether it's the chilly breeze at  $-20^{\circ}\text{C}$  or the sweltering heat at  $+80^{\circ}\text{C}$ , the screen remains unyielding in its performance.



The Series ZE is available in 3 sizes: 7.0", 10.1", and 15.6"

# The Evolution of Switches and NKK: Celebrating 70 Years of Innovation

The annals of technological history are vast, but few components have marked their presence as profoundly as the electromechanical switch. The journey of the switch is an illustrious tale, spanning millennia, and intertwined with human ingenuity and progress.

It's fascinating to think that ancient civilizations used primitive switches to control water in aqueducts. The Roman architect Marcus Vitruvius Pollio in *De architectura* described the use of water wheels and basic switches to automate water flow in the 1st century BCE. However, the inception of electricity in the 19th century revolutionized switch design. Sir Humphry Davy, in 1800, demonstrated the "electric arc" using two charcoal sticks connected to a 2000-cell battery, marking one of the earliest instances of an electrical switch.

Enter NKK, a stalwart in the realm of switch innovation. Established in 1953, NKK embarked on a mission to redefine the paradigms of switch design, functionality, and reliability. As we stand on the brink of our 70th anniversary, our legacy is built upon seven decades of pioneering solutions that have catered to industries worldwide.

The 20th century was transformative for electronics. Switches metamorphosed from mere toggling devices to multifunctional components that were integral to intricate circuit designs. Throughout this evolution, NKK consistently introduced innovative switch solutions, be it the world's smallest PCB mount switch in the 1970s or the programmable OLED switches in the 2000s.

Today, switches underpin the fabric of modern life, ensuring our devices, from smartphones to cars, function seamlessly. NKK's ceaseless drive for innovation has given us switches that are resilient, aesthetic, and in tandem with the digital age.

As we celebrate NKK's 70th anniversary, we invite you to partake in our journey. From our humble beginnings in 1953 to our position as a global leader today, NKK's story is testament to human innovation and persistence. Our past inspires our future, and with the burgeoning fields of IoT, AI, and quantum computing, the story of the switch and NKK promises many more groundbreaking chapters.

Join us in marking this milestone, as we commemorate our past, cherish the present, and eagerly anticipate a future filled with infinite possibilities.

## *The Rise of Electrical Switches:*

- 1800: Sir Humphry Davy showcases the electric arc, hinting at the possibilities of electrical switches.
- 1830s: The telegraph, developed by Samuel Morse and Alfred Vail, utilizes early forms of electrical switches to send messages across long distances.
- 1880s: John Henry Holmes invents the quick-break light switch in England, allowing for the efficient and safe control of electric lights.
- 1880s: Rotary switches are invented by Almon Brown Strowger, an undertaker. They find use in numerous applications.

## *20th Century – A Century of Innovations:*

- 1900s: Pushbutton switches become more prevalent with the advent of Bakelite and other plastics.
- 1910s: Various mercury tilt switches are invented.
- 1960s: Miniaturization leads to the development of micro-switches, commonly used in appliances and machinery.
- 1950s: NKK creates and patents their first switch, with the ability to convert a vertical pressing motion to a rotational seesaw motion.
- 1970s: NKK pioneers the world's smallest PCB mount switches.
- 1980s: Silicon-controlled rectifiers and transistors further revolutionize switch technology, leading to the development of solid-state switches with no moving parts.
- 1980s: NKK introduces both programmable switches and the first multi-function switch (the SmartDisplay).

## *21st Century – The Digital Era:*

- 2000s: Touch screen technology becomes mainstream, eliminating the need for physical switches in many applications.
- 2010s: Programmable switches, like NKK's OLED and LCD programmable switches enter the market offering dynamic user interfaces.
- 2010s: NKK introduces the frameless OLED.
- 2020s and Beyond: Anticipations around Quantum computing and IoT suggest further evolution in switch technology, focusing on energy efficiency and seamless integration.



# Toggle Up! Series A & B Subminiature Toggles

NKK Switches stands as an industry leader, continuously pushing the boundaries of innovation. Among their remarkable lineup of electromechanical switches, the Series A and Series B Subminiature Toggles have earned a reputation for their unparalleled reliability, space-saving design, and remarkable versatility.

## ***Series A Toggles: Compact and Reliable***

The Series A Toggle boasts a completely sealed body construction, providing an impervious shield against contamination. These switches are a formidable asset for any application where environmental factors could jeopardize performance. The robust sealing also allows for automated soldering and cleaning processes, saving valuable time and resources during assembly.

Developed specifically for logic-level applications, the Series A Toggles excel in various industries, including automotive, medical devices, industrial automation, applications for the entertainment industry. Their subminiature size is a game-changer, conserving precious space on PCBs without compromising functionality.

At the heart of the Series A Toggles lies the unique sliding twin contact (STC) mechanism, an award-winning breakthrough. This mechanism delivers a smooth, positive detent actuation, offering increased contact stability and unparalleled logic-level reliability. The gold-plated contacts ensure uninterrupted dependability, as they are wiped clean with each actuation, preventing any disruptions.

Models within the Series A Toggles lineup are available with molded-in, epoxy sealed, or ultrasonically welded PC terminals, safeguarding against the entry of flux, solvents, and other contaminants. Additionally, these terminals conform to standard PC board spacing, making integration a seamless process.

To cater to diverse needs, NKK Switches offers various toggle shapes, such as bat, flatted, or snap top for paddle levers, and multiple pole and circuit options. The model with the antistatic bat lever is particularly recommended for applications that require dissipating electrostatic discharge. The Series A Toggles' PC terminal choices include straight, straight with bracket, and right angle or vertical with bracket, ensuring flexibility in installation. Caps for the bat levers and paddles for the snap top model are also available, further enhancing customization possibilities.

## ***Series B Toggles: Defying Contamination and Enabling Reliability***

Just like their Series A counterparts, the Series B Toggles exhibit a completely sealed body construction, providing an unmatched defense against contamination. These switches are the embodiment of reliability and durability, making them ideal for demanding applications in challenging environments.

Catering to logic-level applications, the Series B Toggles combine compact size with an antistatic superstructure, which prevents static discharge to the contacts. This extra layer of protection ensures uninterrupted performance even in environments with elevated electrical activity.

Similar to the Series A Toggles, the Series B Toggles also feature the STC mechanism, providing the benefits of smooth, positive detent actuation and increased contact stability. The gold-plated contacts further ensure uninterrupted dependability, as they are wiped clean with each actuation, maintaining optimal functionality.

The Series B Toggles come in various toggle shapes, such as bat, flatted, or snap top for paddle levers, and offer multiple pole and circuit options. Their PC terminals are available in molded-in, epoxy sealed, or ultrasonically welded variants, guaranteeing protection against flux, solvents, and contaminants. The terminals adhere to standard PC board spacing, making integration effortless and efficient.

NKK Switches offers PC terminal choices of straight, straight with bracket, and right angle or vertical with bracket, providing versatile installation options. The Series B Toggles also come with the option of caps for the bat levers and paddles for the snap top model, enabling customization for specific applications.

## ***The Very Best***

NKK Switches' Series A and B Toggles represent the pinnacle of switch technology, combining reliability, precision, and space-saving design to deliver unparalleled control excellence. Whether in industrial automation, medical devices, consumer electronics, or any other industry, these toggles provide the perfect blend of innovation and dependability.

The completely sealed body construction, STC mechanism, gold-plated contacts, and antistatic superstructure are just a few of the features that set the Series A and B Toggles apart, making them the go-to choice for demanding applications. With NKK Switches leading the way, the future of switches has never looked more promising.

# How to Pick Out the Perfect Switch: 7 Questions to Select a Switch

## **1. What type of switch (actuator) is needed for the application?**

- Toggle
- Rocker
- Paddle
- Pushbutton
- Programmable
- Keylock
- Rotary
- Slide
- Tactile
- Tilt
- Touch Screen
- Membrane
- Emergency Stop

## **2. What are the electrical requirements?**

- Voltage
- Current (eg: 6A @ 125V AC)
- Logic Level
- Loads (resistive, inductive, motor)
- Configuration (poles and circuits)
- Power Circuit

## **3. What size of switch do you need?**

- Ultra-miniature
- Subminiature
- Miniature
- Standard

## **4. What type of termination?**

- Solder Lug (Wire Harness)
- Screw
- PCB
- Quick Connect
- SMT (Surface Mount Technology)

## **5. How is the switch going to be mounted?**

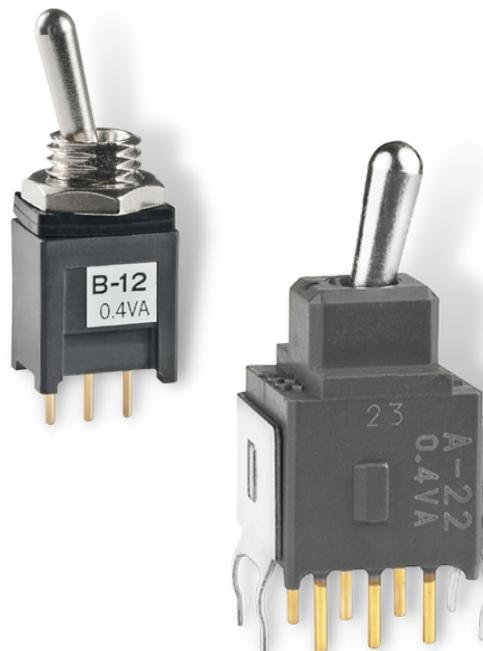
- Panel Bushing Mount (Threaded)
- Snap-In Panel Mount
- PCB Mount
- SMT (Surface Mount Technology)

## **6. What type of industry will it be used in?**

- Live Entertainment
- Automation
- Medical
- Telecom
- Security
- Transportation
- Defense

## **7. Are there any unique requirements that need to be met?**

- Sealing
- IP Rating
- Illumination
- Standard or Certifications
- Value Added Services (custom legends, prototyping, assemblies, machining, coatings, sheet metal work)
- Custom Engineered Solutions



NKK's Series A & B Subminiature Toggles

# Understanding IP Ratings: Safeguarding Electronics in Harsh Environments

In an increasingly interconnected world, electronic devices are omnipresent, serving critical roles in industries ranging from automotive to healthcare, industrial automation to consumer electronics. As these devices venture into diverse environments, they face the challenge of safeguarding against dust, water, and other potentially damaging elements. This is where IP ratings come to the rescue, offering a standardized system for assessing a device's protection level against these environmental factors.

## **What is an IP Rating?**

An IP (Ingress Protection) rating is a two-digit code that classifies the degree of protection an electronic device or enclosure provides against the intrusion of solid particles, such as dust, and liquids, like water. The IP rating is established based on international standards defined by the International Electrotechnical Commission (IEC 60529).

## **Decoding the IP Rating System:**

The IP rating system is composed of two digits: the first digit indicates the level of protection against solid particles, while the second digit denotes the level of protection against liquids.

### **First Digit: Protection against Solid Particles**

**IP0X:** No protection against solid particles.

**IP1X:** Protection against solid objects greater than 50mm in size (e.g., a hand).

**IP2X:** Protection against solid objects greater than 12.5mm in size (e.g., fingers).

**IP3X:** Protection against solid objects greater than 2.5mm in size (e.g., small tools).

**IP4X:** Protection against solid objects greater than 1mm in size (e.g., wires, small screws).

**IP5X:** Dust-protected; limited ingress permitted (dust cannot completely enter, but it may enter in minimal quantities).

**IP6X:** Dust-tight; no ingress of dust.

### **Second Digit: Protection Against Liquids**

**IPX0:** No protection against liquids.

**IPX1:** Protection against vertically falling drops of water (e.g., condensation).

**IPX2:** Protection against water drops at an angle up to 15 degrees from vertical.

**IPX3:** Protection against water spray at an angle up to 60 degrees from vertical.

**IPX4:** Protection against water splashes from any direction.

**IPX5:** Protection against low-pressure water jets from any direction.

**IPX6:** Protection against high-pressure water jets from any direction.

**IPX7:** Protection against temporary immersion in water up to 1m depth.

**IPX8:** Protection against continuous immersion in water under conditions specified by the manufacturer.

## **Choosing the Right IP Rating for Your Application:**

Selecting the appropriate IP rating depends on the application's specific requirements and environmental conditions.

**Environmental Conditions:** Identify the environmental hazards your device or equipment may encounter, such as dust, water, or potential contact with solid objects.

**Application Environment:** Consider the application's location, whether it is indoors, outdoors, or in specialized environments like industrial or marine settings.

**Protection Level Needed:** Determine the level of protection required to ensure the device's reliable performance and longevity.

**Industry Standards:** Check if there are any industry-specific standards or regulations that dictate a minimum IP rating for the intended application.

**Future Proofing:** If there is a possibility of future changes in the application's environment, it might be wise to choose a higher IP rating to ensure compatibility with evolving needs.

By understanding the IP rating system and choosing the appropriate level of protection, one can ensure that devices will operate flawlessly in harsh conditions. IP-rated devices offer the peace of mind of reliability and durability, making them an indispensable aspect of modern technology.

# NKK Switches Helps Belmed Redesign a Medical Gas Alarm System Used for Conscious Sedation

Belmed manufactures both a wall mounted and a desk alarm manifold that is used with a medical gas device. The manifolds deliver a consistent gas supply to a dental facility at a constant pressure rate and monitor the pressure that is left in the gas cylinders. This system lets the dental office know when there is a low pressure reading coming from the tanks and notifies them when they need to either switch to new, full tanks or schedule a gas delivery. This is vital to ensure that there is always an uninterrupted gas (O<sub>2</sub> and/or N<sub>2</sub>O) supply during conscious sedation procedures.

The alarm system's board was in a dire need of an improvement. Belmed enlisted the help of NKK Switches' engineering team, who were instrumental in updating the product with a new streamlined behind panel design, preventing a full redesign. This was done by replacing incandescent switches that required a wire harness to new LED switches that are now mounted via sockets to simply be soldered in. In addition, NKK was able to provide them with a PCB assembly that included everything but the switches and the front panel. This saved time spent on labor because the recommended switches were easier to install as there was no more crisscrossing wires from the old switches.

## ***Challenge***

Dental equipment used in conscious sedation procedures needed to be overhauled due to their overly complex assembly. The panel was developed in-house and had not been updated since the invention of the device. This led to inefficient assembly and a complex design behind the panel. Four to six switches, depending on the device, were assembled by the Belmed team with a wire harness. This created an intricate and highly specialized set of assembly instructions. Belmed wanted to reduce the time and money that was spent on manufacturing.

## ***Enter NKK Switches***

Belmed and NKK Switches worked together to create a streamlined design for the new alarm system. NKK provided a simplified printed circuit board (PCB) which eliminated the need for wiring the switches—they could be directly soldered in. In the process, NKK's team noted that LED illuminated switches would need to replace the current incandescent lamp illuminated pushbuttons. NKK's engineers recommended the LB Series illuminated pushbutton with a panel seal option. This was the most sanitary option because it ensured easy cleaning of the device that was used in a medical setting.

## ***Result***

Belmed was able to cut costs and save assembly time by utilizing NKK's engineering department's design. Having all necessary materials sourced from one supplier, as well as the reduction of necessary individual parts like the wires, that has allowed for fewer 'golden screw' supply disruptions over the course of production. Additionally, NKK's suggestions prevented a full redesign of the panel. This saved Belmed the cost and hassle of sourcing for new materials.

## ***Get in touch with NKK's Eastern Sales Contacts***

### **Regional Sales Manager – Leticia Manuel**

Phone: 480-505-3770

lmanuel@nkkswitches.com

### **Regional Representation – GSA Organization**

Phone: 609-242-5783

sales@gstatech.com



*Belmed's medical alarm system is outfitted with NKK's LP Pushbuttons*

F  
U  
NW  
IT  
HS  
W  
I  
T  
C  
H  
E  
S

## SCRAMBLED SWITCHES

1. lapne laseed
2. stomuc
3. trcciu
4. selfsamer
5. cipaycat
6. guhnibs
7. pewarriw
8. cllimhorenaetacec



## JOKING AROUND

**Why do programmers prefer to work in dark mode on their computers?**

Because light attracts bugs!

**What's a computer's favorite snack?**

Microchips!

**Why did the two switches never fight?**

They always connected well!

**What did the circuit say to the switch?**

"I can't function without you!"

## RIDDLES

1. I can flow, I can fly, I can twist, and I can fry. I'm not liquid, not a bird, but I am sometimes heard. What am I?
2. I am not a snake but I coil around. When currents flow a magnetic field is found. What am I?

## ANSWERS

- |                |                     |               |              |
|----------------|---------------------|---------------|--------------|
| • panel sealed | • bushing           | • busing      | • capacitive |
| • custom       | • wirewrap          | • an inductor | • frameless  |
| • electrical   | • electromechanical | • circuit     | •            |

RIDDLES

SCRAMBLED SWITCHES