



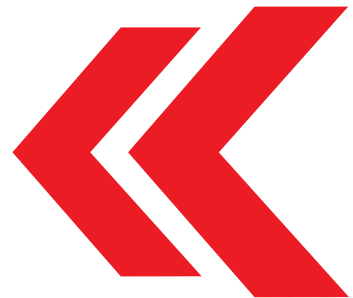
WHITE PAPER

Keep It Simple: The Role of Switch Selection in Simplifying Electronic Designs

Introduction

Albert Einstein said, “Everything should be made as simple as possible, but not simpler.” Whether in architectural design, software code, engineering discipline or personnel management, simplicity is an overriding goal and success is achieved when a product or process is at its maximum simplicity.

Electronic design engineers have the challenging job of making very complex processes simple with their design and most hold true to the Keep It Simple (KISS) principle. However, there are several factors to think about when simplifying your design from power management to sensor solutions, nowhere is simplicity more important than the initial and primary interface with the user: the electromechanical switch.



Switch Selection: The Gateway to Simplicity

Switches are the primary interface between the user and the machine, making their selection crucial for achieving simplicity. Designers need to consider various criteria to ensure the interface is both intuitive and effective. Here are some key questions to guide the switch selection process:

| How Will the End User Interact with the Machine?

The needs of the end user must be considered first and foremost. This includes factors such as feedback, illumination and legends to indicate dedicated functions or statuses. Designers should consider if feedback needs to be tactile, audible or visual. Tactile feedback transmits a sensation to the operator to indicate transfer of circuit.

Illuminated and **programmable interfaces** improve visibility, operator feedback, and control interaction.

Another option for indicating switch status is legends. Legends, which include engraving, screen printing, pad printing and Mylar inserts, can be used to identify specific functions.

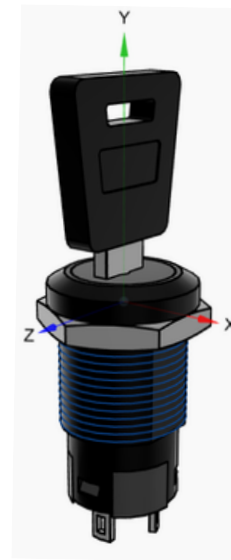
Some LED switches offer alternating legends and colors that display different combinations when the switch is ON or OFF. For example, bicolor LEDs use standard RGB colors that alert users to different options based on preprogrammed functions and add aesthetic appeal to the switches.



| What About Switch Size?

The size, location, and application of the human machine interface play a significant role in determining the appropriate switch. While smaller switches are often preferred, it's essential to balance size with user-friendliness, especially in consumer products. The switch should fit the design parameters and be easy to operate.

Engineers evaluating panel fit, spacing, and mounting constraints may benefit from reviewing available 3D CAD resources during the specification process.



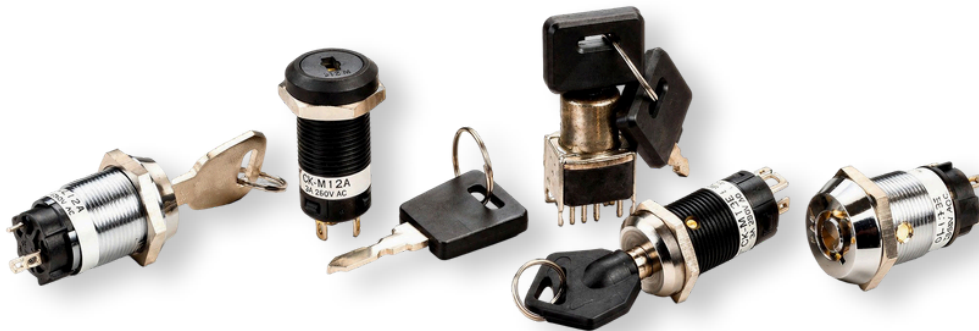
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| What is the Best Actuator for the User?

Actuators come in a wide selection of categories, such as pushbutton, toggle, rocker, paddle, rotary, keylock and slide actuated, and within each category a multitude of sub options are available. No matter what the actuator type, these switches have one hardwired function.

The key to determining the best actuator type for a switch design is to determine what the switch will specifically be used for and by whom it will be used, and then logically consider each actuator option in those terms.

Keylock switches, for instance, are often used to enhance the security of a system. A server blade in a data center may use a keylock switch that requires the user to insert a key to operate the switch. This helps to reduce human error and to prevent tampering. The choice of actuator depends on the switch's intended use and the user's needs.



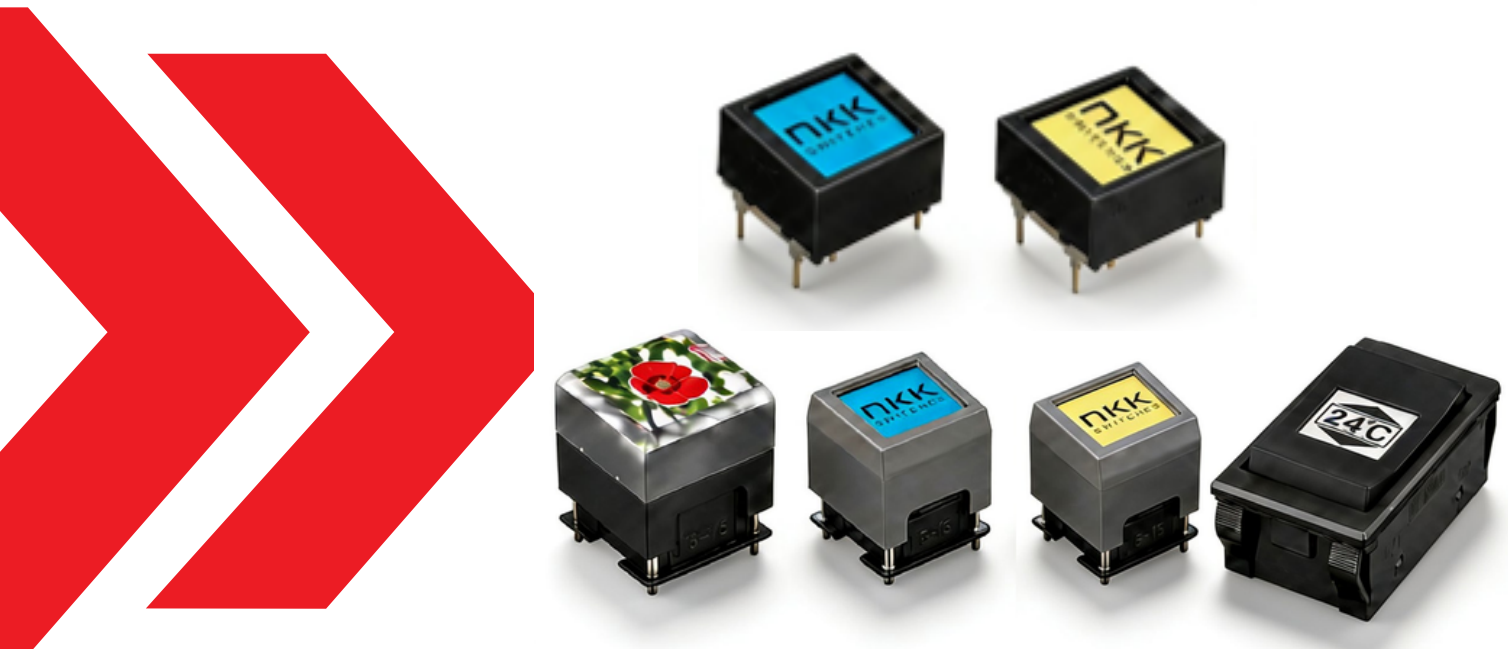
| Will Your User and Design Benefit from a SmartDisplay™ Switch?

As demand for greater functionality from devices and equipment continues to increase, many designers have found that the use of traditional switches, whether toggle, rocker or pushbutton, in certain scenarios is no longer sufficient.

Programmable switches have become a useful option.

Programmable switches combine the easy-to-read, well-illuminated menus and multiple functions of a touchscreen with the tactile feedback of a dedicated function key. These smart switches provide designers with space saving, multifunctional alternatives to traditional switches. In large banks of switches, programmable switches can be invaluable to simplify your design and assist users in completing tasks more efficiently.

For example, control room and live-production systems often use programmable interfaces to consolidate control functions while maintaining fast operator access. Complex control panels can quickly become littered with dedicated function keys. However, programmable switches allow for more functionality from a smaller panel size because a single programmable switch can accomplish the same functions as multiple dedicated function keys.



Equipment used in the food service industry can also use programmable switches to simplify tasks, reduce human error and increase safety. Quick-service restaurants may use a programmable switch to alert workers when a grill is hot, when to flip the burger and when to remove it. The ability to program the switch not only ensures consistent cook times, but also reduces training time, speeds up service and makes food handling safer.

Examples of Modern Interface Applications

Robotics & Automation: Compact control interfaces and illuminated feedback systems help operators manage increasingly complex machine functions within limited panel space.

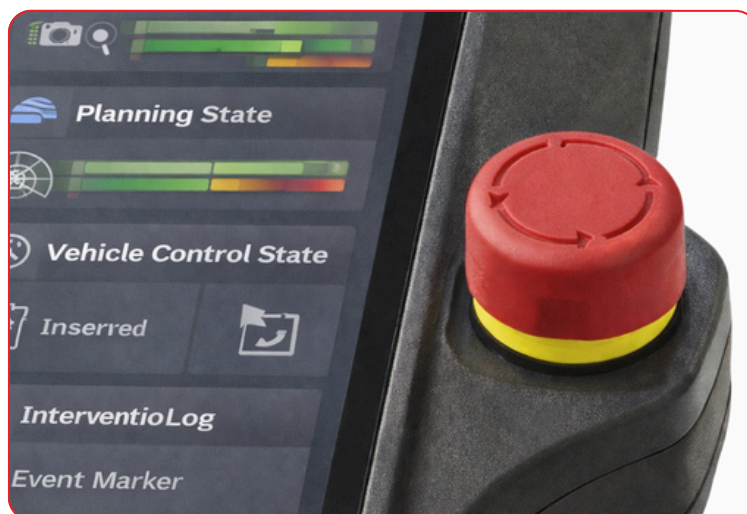
Medical Equipment: Operator interfaces require clear visual indication, tactile feedback, and reliable actuation for critical functions and diagnostic workflows.

Industrial Control Systems: Programmable interfaces simplify machine interaction by consolidating multiple control functions into smaller operator panels.

Mobile Equipment&Outdoor Systems: Environmentally protected interfaces help maintain reliable operation in applications exposed to vibration, moisture, dust, and temperature variation.

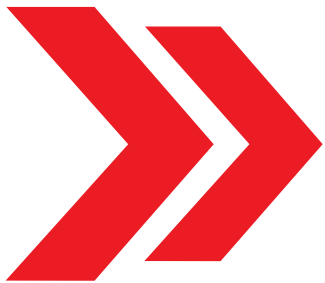
SmartEquipment&Embedded Systems: Compact switch architectures support modern product designs where space constraints, usability, and interface visibility must all be balanced.

Control Rooms & Live Production Systems: Programmable control interfaces reduce panel complexity while maintaining fast access to critical system functions.



Remember to “Keep It Simple”

For the design engineer, creating the human machine interface often feels like a work of art, as this is where your device shows the user the simplicity of your complex design. If the designer does a poor job with the human machine interface, the device will be difficult to use and ultimately fail. However, if you keep in mind the acronym KISS and the words of Albert Einstein, your design will clearly indicate what is going to happen next and make the interface intuitive.



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