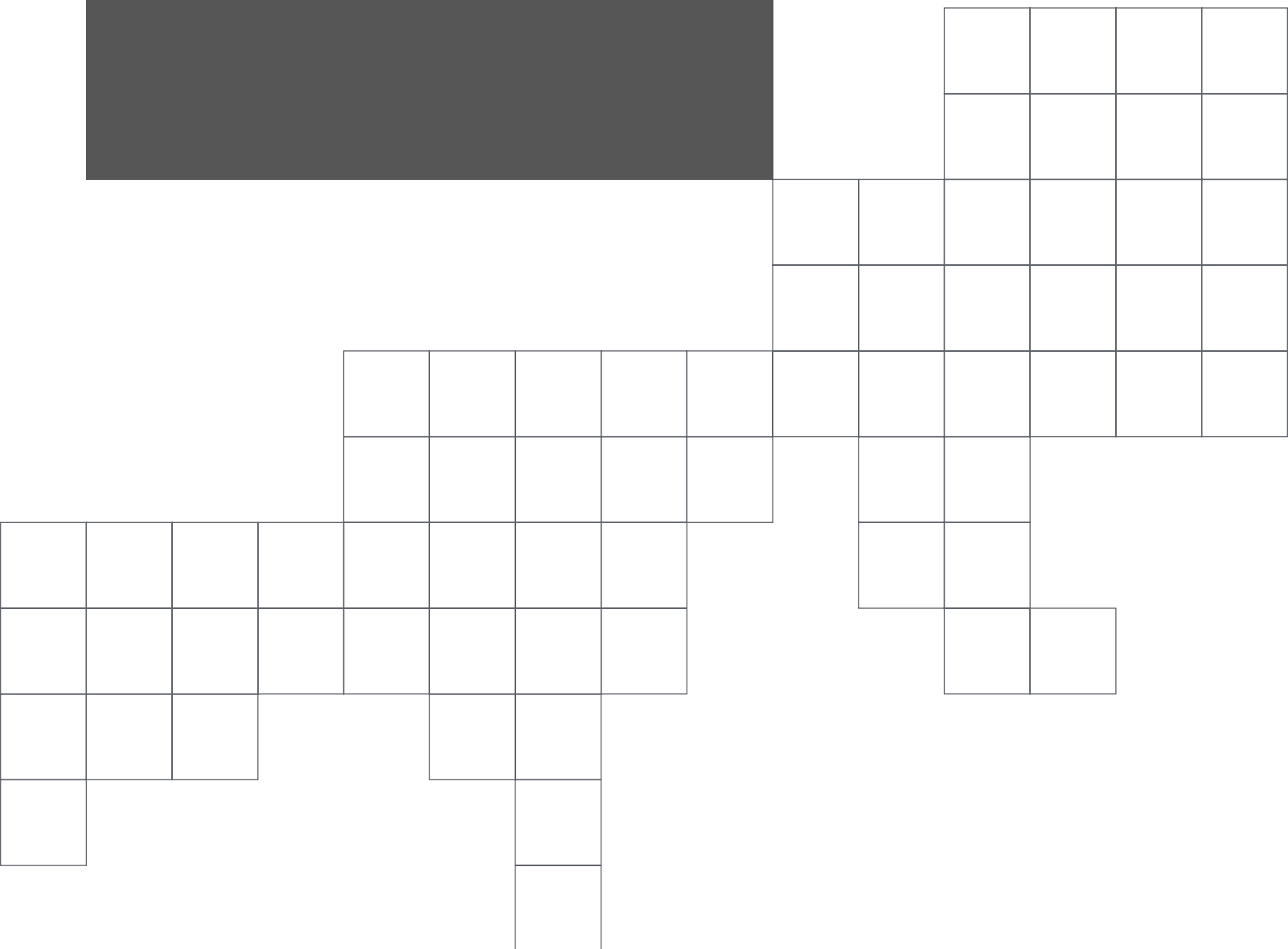


# How Switches Influence Medical Devices



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## INTRODUCTION

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Tactile Switches are used in many devices, including ventilators, CPAP machines, ultrasound machines, EEG/ECG machines, blood glucose testers, electronic inhalers, patient monitors, pulse oximeters, and insulin pumps. These devices are commonly used in medical diagnostics as well as in home healthcare devices. Tactile switches commonly play the role of power switch, mode selection, and volume change.

Tact switches can be a more user-friendly option because of the press and release function. This helps the end user understand that they have started or stopped the machine, or have selected an option. Tact switches have stable output signals, suitable product sizes, and specific actuator materials that make them more secure and reliable.

## TACTILE SWITCH FUNCTION

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Tactile switches provide an on or off electrical output to apply with an end application's circuits. The terminals should be soldered by suggestive assignment to ensure the switch circuit works correctly. Pressing the actuator down to connect the circuit will switch it to the on mode, while releasing the actuator would change the switch to off mode. The normal contact piece is the dome, which connects with the insert molding frame for the switch to be connected or disconnected to outputs. Contactors are commonly fabricated with stamped copper alloy or stainless steel plate while frames are made with polyamide resin. Tactile switches are powered with 12~32 volt DC, which is suitable for the majority of medical devices.

## EVOLUTION OF MEDICAL AND HOME HEALTHCARE

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The medical device market is growing faster, along with the increasing prevalence of chronic diseases and sudden emergence of severe infections. With the spread of COVID-19, demand for applications relating to artificial intelligence, wearable medical equipment, remote patient monitoring devices, and electronic health records have already increased. The tools medical professionals use in day to day appointments should have the ability to remain on specific settings. Ease of use becomes the general factor for any medical device's product design.

Besides functionality and accuracy, appearance also matters. Style can have a major influence in the successful adoption of devices by healthcare professionals and patients. Children are a great example of this. If a device is not designed well, it could scare a pediatric patient, making it harder for the healthcare professional to operate the device.





However, if the device is not intimidating and is easy to use, the health professional can complete the exam without hindrance.

Optimizing the user experience is one key ingredient for successful medical device development. Reducing product size has become a trend to support optimization. As a result, medical applications are becoming small, wearable devices that are more appealing and less obtrusive.

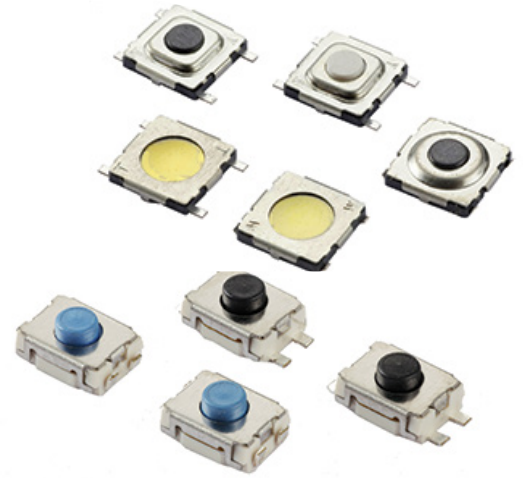
Tactile switches and illuminated tact switches are a good solution for devices needing small features. Actuators come in hard plastic or soft silicon materials, with various optional plastic caps for illuminated tact switches, providing a wide range of options for applications.

Tactile switches can be added to a device's control panel to function as a power switch, mode change, or volume change. Manufacturers may integrate multiple selections on few tactile switches, which would drive the demand for long switch life. CTS offers tactile switch families with wide life ranges from 30,000 to 5 million cycles, and our switches have excellent operational feeling, stable electrical circuit output, various choices of product dimensions, as well as the option of hard plastic or soft silicon rubber actuators. Some upgraded models come with IP57 or IP67 protection, which is ideal for use in damp or dusty environments.

CTS also has illuminated tact switch solutions for any application requiring an illumination indicator function. This type of switch is ideal for helping with power indications or level indicators. CTS' illuminated tact switches come in bi and tri-color options, and various caps are available.

### 222E, 223A SERIES TACTILE SWITCHES

The 222E Series Tactile Switch is 5x5mm in size and 1.5mm in height, making it a thin option that can be mounted in an application with very limited space. 160gf operation force could reach 1 million cycles, while 260gf could meet 200,000 cycles. The 223A Series is 4.7x3.5mm in size and 2.5mm in height with a rectangular shape, a popular style for mounting on either a PCB or panel control. This line of tact switch is envirometnally sound and has a sturdy design meant for surviving high usage.



### 222S, 223J SERIES TACTILE SWITCHES

The 222S Series Tactile Switch is designed with IP67 protection, a surface mount, and silicon rubber actuator. This makes 0.3~0.35mm travel possible by selecting an operation force of 200gf or 300gf, while providing a long life of 100,000 cycles. Optional gold plating on contact parts and terminals increase temperature ranges to -40°C to +125°C (operation) and -55°C to +125°C (storage) with a lower power rating of 32 VDC at 10mA.

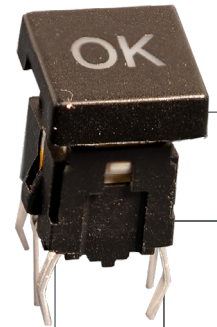
223J Series switches also offer IP67 protection for 4.2x2.8mm product dimensions, with a hard plastic actuator. This enables 0.25mm travel for an operation force option of 200gf or 300gf, with a life of 150,000 cycles at minimum. An optional ground terminal can provide a circuit design with a grounding function.



### 228E, 228B SERIES ILLUMINATED TACTILE SWITCHES

The 228E Series Illuminated Tactile Switch is designed with IP67 protection. The silicone actuator gives a smooth operational feeling that is satisfactory for the user. There are optional surface mount or through-hole terminals to combine with vertical and side actuators. Single color, bi-color, or tri-color circuit designs provide more options for various application requirements.

The 228B Series comes with a vertical operation structure in the surface mount and through-hole terminals. Single color or bi-color circuits and various types of plastic caps, style options, color combinations, and etching are available.



# Tactile Switches (Continued)

Series		Rating	Force	Options	Actuation Direction
222E 5.0x5.0 mm		12 VDC @ 50 mA 200,000 Cycles, 1 Million Cycles	160 gf 260 gf	Actuator Height, SMT Gullwing or J-Bend	Vertical
222S (IP57) 6.2x3.8 mm		12 VDC @ 50 mA 200,000 Cycles	200 gf 300 gf	Contact and Terminal Plating	Vertical
223A 4.7x3.5 mm		12 VDC @ 50 mA 100,000 Cycles, 300,000 Cycles	160 gf 260 gf	SMT Gullwing or J-Bend	Vertical
223J (IP67) 4.2x2.8 mm		32 VDC @ 50 mA 150,000 Cycles, 200,000 Cycles	200 gf 300 gf	Ground Terminal	Vertical
224A 12x12 mm		12 VDC @ 50 mA 300,000 Cycles, 500,000 Cycles	160 gf 260 gf	Through-Hole and SMT, Actuator Height, Boss	Vertical
226A 3.0x2.6 mm		12 VDC @ 50 mA 200,000 Cycles, 500,000 Cycles	160 gf 400 gf	N/A	Vertical
226E 3.5x2.9 mm		12 VDC @ 50 mA 100,000 Cycles	160 gf 220 gf	SMT Gullwing Types, Boss, Ground Terminal	Side
228B 6.0 x 6.6 mm		12 VDC @ 50 mA 100,000 cycles	160 gf	SMT Gullwing or Through-hole, Single or Bi-LED	Vertical
228E 6.8 x 7.2 mm 7.4 x 7.9 mm		12 VDC @ 50 mA 100,000 cycles	200 gf	SMT Gullwing or SMT J-Bend or Through-hole, Single, Bi or Tri-LED	Vertical Side

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