



Push Button Switches: Types, Uses, Features and Benefits

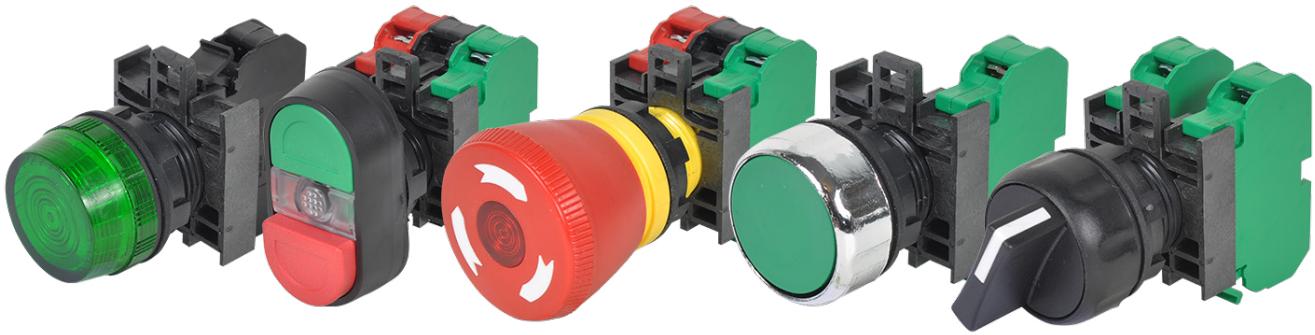
Introduction

Push buttons are among the most commonly used and integrated components in industrial automation. They allow machine operators to easily start or stop machines, whether working with simple equipment or managing tasks on a complex production line.

In this article, we touch on the types, functions and advantages of push button switches for industrial automation.

What are Push Button Switches?

A push button is a type of [pilot device](#) used to control electrical circuits. They operate by being pressed to either engage or disengage a connected device. [Push buttons](#) are most common in industrial applications where fast and dependable control of machines is essential.



Take a computer's power button as an example: pressing the button either powers the machine on or off. Similarly, in an industrial setting, machines are controlled by push buttons, which offer a simple and user-friendly way to operate equipment.

The Function of a Push Button Switch

Push button switches, like other electrical switches, are designed to control the flow of electrical circuits. When the circuit is open, the current is interrupted, preventing the connected device from operating. By pressing the push button to close the circuit, current flows, allowing the device to function. These switches can be designed to either maintain the on or off state for an extended period or operate intermittently.



Some push buttons are equipped with springs that automatically return the switch to its original position after being released, ensuring the circuit remains open until the button is pressed again.

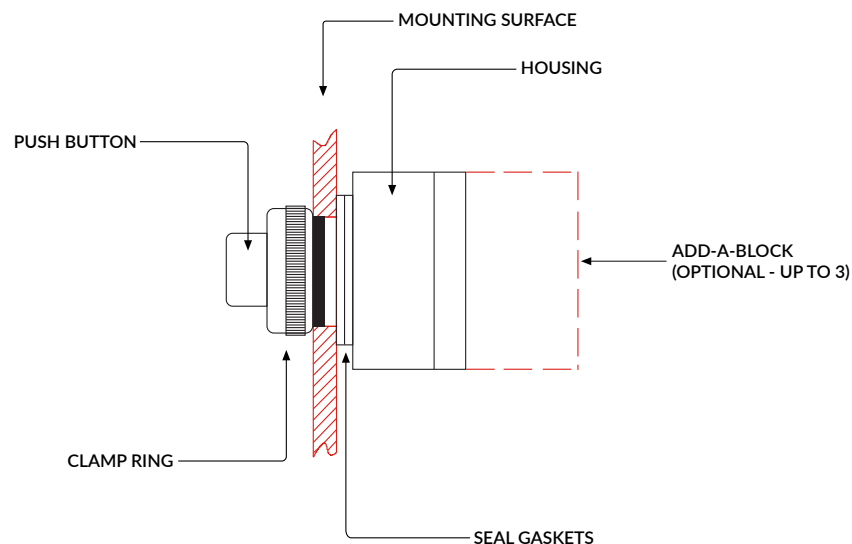
Pressing a push button may connect various terminals within the circuit, allowing electricity to flow. Some push buttons toggle between “on” and “off” states with each press. Regardless of the specific function, push buttons play a crucial role in controlling the flow of electricity.

They are designed to provide either continuous or interrupted electrical conduction, depending on user preference. Typically, they feature a contact-breaking mechanism where two conductive points are separated to interrupt the current. Modern switches often use mechanical elements to alter circuit resistance, enabling changes in the circuit's state.

The Operation of a Push Button Switch

Push button switches change circuit resistance, either opening the circuit (high resistance) or closing it (low resistance). Unlike traditional mechanical switches, push buttons do not rely on moving parts; instead, the switch is actuated without mechanical linkage. Manually or automatically moving the actuator changes the contact position, opening or closing the circuit.

External factors such as light intensity or voltage changes can also influence push button operation, as can physical mechanisms like levers or vibration.



For safety, many push button switches include fuses to prevent the connected device from overloading. Since different electronic devices and appliances vary in complexity, it's important that circuit designs match the specific needs of the application.

For instance, a simple light switch involves a basic setup with a power source, a switch, and wiring, while a computer keyboard requires intricate circuits connecting to the CPU. Regardless of complexity, push button switches remain essential in electrical circuit control across a wide range of applications.

Basic Structure of a Push Button Switch

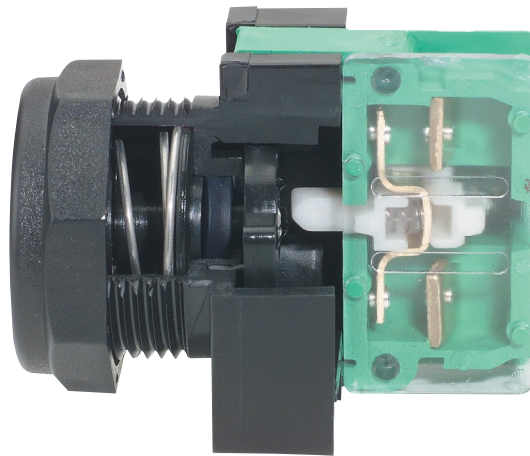
A push button switch consists of several key components:

Actuator Button

This is the external part of the switch that you press to activate it. Made of plastic or metal, it typically has a spring mechanism that allows it to return to its original position after being pressed.

Contacts

These internal conductive elements either permit or prevent the flow of current. When the button is pressed, the contacts close to complete the circuit, or they open to break it.



Terminals

These are the connection points where the electrical wires are attached. The switch's effectiveness is determined by how well it functions at these terminal points when pressed.

Push Buttons – in Industrial Automation

Push buttons are essential components in industrial automation, acting as interfaces between human operators and machines. Here's why they are important:

Usability

Push buttons offer a simple way for operators to control motorized equipment. Even complex machine functions can be activated with a single press.

Safety

Push buttons, like emergency stop switches, are critical for turning off machines quickly in hazardous situations, protecting workers from potential risks.

Durability

Designed for tough industrial environments, push buttons can withstand exposure to heat, dust, and water without compromising functionality.

Cost Efficiency

Push buttons are more affordable than many other control devices, making them a cost-effective solution for industrial settings.

Types of Push Buttons in Industrial Automation

Different [types of push buttons](#) are used for specific functions in industrial automation:

Momentary Push Buttons

Active only while pressed, these buttons return to their original position once released, breaking the circuit.



Example: A forklift horn sounds only while the button is pressed.

Maintained Push Buttons

These remain activated until manually reset. Pressing the button closes the circuit, and pressing it again opens it.

Example: A maintained button might be used to start a conveyor belt, which runs until the button is pressed again to stop it.

Emergency Stop (E-Stop) Buttons

These large, red, mushroom-shaped switches cut power to machines instantly in emergencies.

Example: In a metalworking plant, an E-stop button can be pressed to immediately stop machinery and prevent injury.

Selector Switches

The [selector switch](#) is a special type of push button allowing the operator to choose between different settings, such as “on,” “off,” or “manual.”



Example: Changing motor speed between high and low settings using a selector switch.

How Push Buttons Work in Industrial Automation

In industrial automation, push buttons are usually part of a control panel that oversees machine operations. Their functionality is straightforward:

Input

Pressing the button sends an electrical signal to the machine's control system.

Control

The control system processes the signal and initiates the requested action, such as starting a motor.

Output

The machine performs the required action based on the signal from the push button.

For example, on an automated assembly line, pressing a push button sends an electric signal to the control system, which activates the motors and starts the process.

Common Uses of Push Buttons in Industrial Automation

Push buttons have many industrial applications, including:

Emergency Situations

E-stop buttons halt machines instantly in dangerous scenarios.

Switching Modes

Selector switches allow operators to change machine modes, such as switching from manual to automatic operation.

Controlling Auxiliary Devices

Push buttons also control peripheral equipment, such as lights, fans, or alarms.

Advantages of Push Buttons in Automation

[Push buttons](#) offer several benefits in industrial automation:

Ease of Use

Simple and intuitive, push buttons require only a press to activate or deactivate a function.

Durability

Built to withstand harsh environments, push buttons are designed for long-lasting use.

Flexibility

Push buttons come in various configurations for different purposes, such as starting a machine or changing its operational mode.

Safety

Emergency stop buttons enhance safety in industrial settings by providing a reliable way to quickly shut down machines.

Low Maintenance

Push buttons require little maintenance and are integrated into control systems that minimize downtime.



Guidelines for Effective Use of Push Buttons in an Industrial Environment

To ensure the effective use of push buttons, follow these best practices:

Regular Inspection

Inspect push buttons regularly, especially emergency stop buttons. Replace damaged buttons immediately.

Strategic Placement

Place push buttons, particularly E-stop buttons, in easily accessible locations to avoid delays in emergencies.

Labeling

Clearly label all push buttons to indicate their specific functions, reducing the risk of misuse.

Training

Ensure that employees are properly trained in the correct use of push buttons, especially emergency stop buttons.

Test Safety Functions

Regularly test emergency stop buttons to ensure they work properly in case of accidents.

Conclusion

Push buttons are critical for safe and efficient machine control in industrial automation. They are essential for starting, stopping, and changing machine modes, as well as for emergency shutdowns. By choosing the right types of push buttons and following proper safety and maintenance practices, industrial operations can run more smoothly, enhancing productivity and safety.

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