



Industrial Pilot Devices Explained

Comprehensive Guide

Introduction

Despite many industrial technology companies [showcasing their virtual controllers](#) at events, there will always be the need for physical industrial pilot devices to offer direct human control over operations. Whether you need to work with **NEMA, IEC, or Class 1 Div 2 Hazardous pilot devices** it is important to understand what these different devices offer you and where you would use each. As such, how can you tell them apart, and what are their roles in industrial applications?



Read on to learn about the different types of pilot devices and discover the standards the industry holds such devices to and how to leverage these to ensure you utilize the best options available, avoiding issues such as litigation.

Modern Use of Industrial Pilot Devices

While [pilot devices](#) started as simple mechanical switches, they have evolved over the years to offer much more data at a glance. When first developed, early devices would act as toggleable AND/OR logic controls and demanded a great deal of training when using them on a larger piece of technology.

However, these days, they can provide more detailed alerts or feedback for operating machines. They offer high levels of control over machinery and ensure the safety of its users.

Using Physical Devices

The use of [physical controls in machinery](#) often means there is a reason why a digital option will be less appropriate. For example, when physicality is an essential quality for safety reasons, such as in the case of an emergency stop.

It is vital to ensure you have the highest-quality device possible. This way, you can have the assurance that the device will not interfere with the work you plan to do. To maintain this high level of accessibility and, thus, safety, some of the most critical factors in choosing industrial pilot devices to prevent control issues include:

- Reliability over time
- Visibility and clarity of output
- Ergonomics long- and short-term
- Ease of installation
- Compatibility with modern systems
- Environmental resistance

Modern devices must often comply with international standards to ensure many of these features. These include those of the National Electrical Manufacturers Association (NEMA) in the US and the International Electrotechnical Commission (IEC) on a broader scale.

Overview of Key Pilot Devices

While not exhaustive, the following are some of the most common pilot devices you will likely encounter during industrial work.

Push buttons: These are [simple interactive devices](#) that initiate actions such as starting or stopping machinery.

Indicator lights: These offer visual feedback to users, informing them of the status of a machine. Such information might include whether the machine is:

- Operating
- Experiencing a malfunction
- In need of a resource to operate
- Demanding emergency attention

Selector switches: This simple device allows fast adjustments to the machine's process when switching between different operational settings.

Stack lights: A set of lights usually following a simple linear set of colors and can be used to indicate the status of a machine.

Emergency stop buttons: When you need to shut down machinery immediately, these buttons provide a fast and straightforward method of doing so. Some emergency stop buttons even lock when pressed, ensuring the device cannot reactivate until someone explicitly enables it.

Key-operated switches: Instead of using a push-button or selector switch, these rotate between different positions. They offer more options for setting controls and, in some cases, can include a literal key to ensure someone cannot alter their setting without specific permissions.

Differentiating Industrial Pilot Devices

Two common areas of confusion with industrial pilot devices are:

- Size categories
- Tower lights and stack lights

Understanding both will help to ensure the devices are compatible with your machine and meet the required functions.

Understanding 30mm Pilot Devices

30mm pilot devices are industrial pilot devices that fit into 30mm mounting holes. ***These specific devices often see typical usage in heavier-duty industrial environments due to their larger size and sturdier build.*** These qualities ensure they are a good choice for durability and visibility.

People tend to use 30mm when a user does not have the same amount of physical dexterity. For example, if someone uses gloves but needs to interact with machine controls.

Uses for 22mm Pilot Devices

22mm pilot devices and mounting holes are ideal when you need durability while prioritizing panel space efficiency. Although they offer less tactile feedback than larger devices, they are more robust than 16mm pilot devices. Serving as a balanced midpoint between size and durability, they provide a high level of versatility, making them widely used across various industries.

Applications of 16mm Pilot Devices

These smaller devices often see use on machines that are:

- Light in interactivity
- Low-impact
- Compact
- Intended to promote sleek aesthetics
- Portable

In addition to being used for lighter tasks, 16mm devices are commonly found on testing or prototyping machines, where frequent and simple adjustments are necessary. Their smaller size allows for easier reconfiguration, enabling more configurations to be tested on a single panel with minimal effort.

Exploring Stack Lights and Tower Lights

While “Stack lights” and “Tower lights” are typically used interchangeably, there are subtle differences between the two.

The term “Stack light” refers to the modular and stacked design of a series of individual light modules stacked vertically, and typically smaller in size, whereas “Tower light” is typically used when referring to taller or more prominent lights.

Stack lights are multi-segment devices designed to communicate multiple statuses using a single unit. They often feature a color spectrum from green to red, but other configurations are available. Some stack lights use a single color and rely on labeling to indicate the meaning of each status clearly.

These lights frequently integrate with other pilot devices to provide more comprehensive status information. When relying solely on sight or sound isn’t practical, machines may pair stack or tower lights with audible alarms to ensure critical information is conveyed effectively.

Industrial Pilot Device Regulatory Requirements

NEMA and IEC list regulatory requirements for industrial pilot devices and monitor compliance with each. **These standards aim to ensure the safety of equipment operators and their machines.**

When sold internationally, these devices must comply with both the IEC and NEMA to ensure:

- Compatibility
- Safety
- Performance
- Marketability
- Longevity

Compliance with these regulatory bodies often requires device testing and certification. Additionally, it’s essential to maintain these devices regularly to ensure they continue to meet evolving regulations over time.

National Electrical Manufacturers Association (NEMA)

This US standards organization oversees electrical equipment and components, including pilot devices.

These include [areas of standardization](#) including:

- Reliability in different environments
- Electrical safety
- High durability
- Impact resistance
- Vibration resistance
- Protection from intrusion from foreign objects or liquids
- Testing and certification

Adhering to NEMA recommendations offers a badge of quality to pilot devices and assures buyers of reliability.

International Electrotechnical Commission (IEC)

The IEC is a global organization that publishes international electrical and electronic technology standards. Many non-US countries recognize and use these standards worldwide, meaning adherence is vital to ensure the exportability of goods.

While many of the [requirements of the IEC](#) match those of NEMA, you should check their documentation to learn the specific details.

Differences Between NEMA and IEC

In general, the two sets of standards appeal to different markets. As such, you can expect things like the 22mm IEC and 22mm NEMA standards to focus on very different areas.

The IEC, for example, focuses on worldwide interoperability. As such, the different procedures and performance criteria they demand require you to meet international safety standards.

Instead, NEMA aims more for robustness and durability, focusing on practical performance in various situations. These standards are also more conservative, as their smaller market means they can make more assumptions about the capabilities of their market. As such, many of their standards have a smaller subset of acceptable results.

When switching between [these two standards](#), make sure not to assume any compatibility between the two.

Recent IoT Integration in Pilot Devices

Pilot devices have undergone many significant changes over the years. Recently, the integration of the Internet of Things (IoT) and greater levels of automation mean we can expect another overhaul to occur in the near future.

IoT-enabled industrial pilot devices can allow for remote monitoring these days and empower data analytics to help estimate the ongoing robustness of devices. As such, one can use pilot devices to monitor equipment and compare it to a predicted data set based on careful analysis.

Improve the Operational Reliability with High-Quality Pilot Devices

Understanding the pilot devices you use can significantly affect how reliable and safe your industrial operations are. By selecting the right tools and having the right knowledge, you can use and maintain these devices to develop a streamlined process in your business.

Ensure you investigate high-quality devices from c3controls' extensive range to reduce the chance of spiraling downtime and maintenance costs. Whether you need **30mm pilot devices**, tower lights, or something else, [check out our pilot devices](#) and raise your operations to the next level.

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