Introduction

In today's fast-paced industrial environments, efficient system operation is critical to ensure maximum uptime and productivity. However, **traditional hydraulic and pneumatic systems** often engage with sudden pressure surges, causing unnecessary stress on components. These abrupt starts result in **increased maintenance costs, shorter equipment lifespans,** and **higher energy consumption**. In industries such as manufacturing, automation, and material handling, such challenges can lead to costly downtime and unplanned repairs, negatively impacting business operations and profitability.

Systems that experience frequent mechanical wear are also at greater risk of **safety hazards**. In applications such as conveyor belts, fluid control, or lift systems, sudden shocks to motors and valves can cause malfunctions, compromising both performance and safety. These challenges underscore the need for a **more advanced solution** to optimize system startups and protect vital components.

The **ILSS Series (In-Line Soft Start)** by Canfield Connector offers a reliable way to overcome these issues by introducing **pulse width modulation (PWM)** control. This technology gradually ramps up voltage and pressure, ensuring smooth engagement of motors and other components. With **microprocessor-based programmability**, IP69-rated protection, and easy integration into existing systems, the ILSS Series provides a seamless way to improve efficiency, extend equipment life, and minimize downtime. This whitepaper explores the ILSS's features, benefits, and real-world applications, illustrating how it delivers measurable value to industries seeking reliable and sustainable operations.

Problem Statement

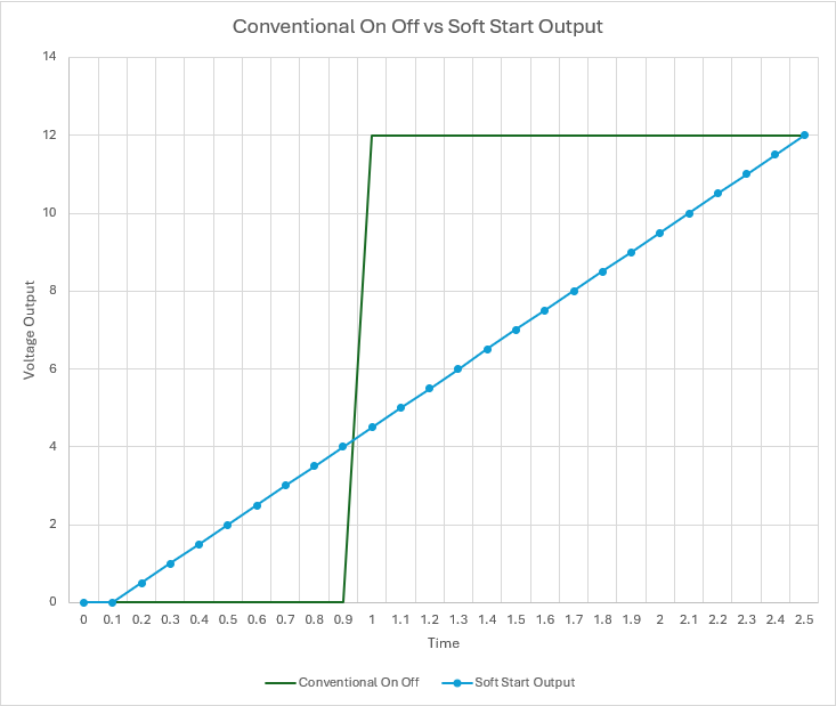
Frequent pressure surges in hydraulic and pneumatic systems cause **accelerated wear on components**, leading to **higher maintenance costs, energy waste,** and **system failures**. In traditional systems, motors, valves, and sensors experience abrupt startups that stress mechanical parts, which results in premature equipment failure. These challenges are particularly problematic for industries such as **automation, material handling, and fluid power**, where equipment reliability is essential to ensure continuous production.

The absence of a **controlled pressure ramp-up** further compounds energy inefficiencies, requiring operators to expend more resources on repairs and replacements. Without a soft start solution, companies may face **safety risks** from unexpected system failures and **frequent downtime** that interrupts workflows and affects profitability. Additionally, many existing soft start solutions are **complex or costly**, limiting accessibility for smaller operations.

The **ILSS Series** by Canfield Connector offers a low-cost, efficient solution by eliminating the need for sudden system engagement. It uses **PWM technology** to create a smoother pressure ramp-up, helping prevent wear and tear, ensuring longer equipment life, and reducing downtime. Through the ILSS, companies can achieve **energy savings, enhanced safety,** and **optimized performance**, transforming how they manage their hydraulic and pneumatic systems.

Comparison of Conventional On-Off vs. Soft Start Voltage Output:

To better illustrate this issue, the following chart shows the difference in voltage output between a conventional on-off system and the ILSS soft start system. The soft start output gradually ramps up, avoiding the sudden surge in pressure associated with conventional systems.



In this chart, the **conventional on-off system** instantly applies full power, leading to an abrupt start. In contrast, the **ILSS soft start system** uses **pulse width modulation (PWM)** to increase voltage gradually. This controlled ramp-up reduces mechanical stress on equipment, ultimately extending component life and minimizing maintenance costs.

Solution Overview

The **ILSS Series (In-Line Soft Start)** offers a solution to the challenges posed by abrupt pressure surges, reducing mechanical stress and enhancing the lifespan of hydraulic and pneumatic systems. The ILSS leverages **pulse width modulation (PWM)** technology to ramp up pressure gradually, eliminating the wear and tear associated with sudden starts. This not only extends the life of motors and valves but also minimizes downtime and ensures smoother, more reliable system performance.

A key feature of the ILSS is its **plug-and-play design**, which allows it to integrate seamlessly into existing systems with a **standard 2-wire cord**. The elimination of a third signal wire simplifies installation and reduces costs. Additionally, the ILSS provides a practical fallback solution—if the device fails, operators

can **bypass it by directly connecting the harness to the coil**, maintaining system functionality with minimal disruption.

The ILSS Series is equipped with **microprocessor-based electronics**, offering programmable control over **start-up times, ramp rates,** and **power levels**. This customization allows operators to optimize the ILSS for specific applications, ensuring it meets the unique needs of their systems. Built with **IP69-rated protection** and **Deutsch connectors**, the ILSS ensures reliable performance in **harsh environments** exposed to dust, water, and other contaminants.

Compared to other soft start controllers, the ILSS offers a **simpler, lower-cost solution** without compromising performance. With support for **both hydraulic and pneumatic systems**, the ILSS can be applied across a wide range of industries, providing a versatile and cost-effective way to enhance system reliability and reduce operational costs.

ILSS in Real-World Application: Industrial Press

To demonstrate the ILSS Series in action, consider an application with an industrial press. When integrated into a press, the ILSS allows for precise control over hydraulic pressure, preventing the sudden force that can damage the press or the material being shaped.



The ILSS soft start system not only safeguards equipment but also enhances operator safety by providing a predictable, gradual application of force. By controlling the start-up process, it reduces the risk of accidents caused by sudden mechanical motion. This makes the ILSS Series a valuable addition for industries that rely on heavy-duty equipment with demanding operating conditions.

Technical Specifications

- **Electrical Specifications:**
    - Voltage Range: 12V and 24V DC
    - PWM Control: Programmable ramp rate and power output
- **Environmental Protection:**
    - IP69-rated housing to resist dust, water, and harsh elements
    - Equipped with Deutsch connectors for secure and reliable connections
- **Materials and Build:**
    - Solid-state microprocessor electronics housed in ABS or polyurethane plastic
- **Installation and Integration:**
    - Inline connection with a standard 2-wire cord, eliminating the need for a third signal wire
    - Compact design for easy system integration
- **Compatibility:**
    - Works with both hydraulic and pneumatic systems
    - Bypass functionality allows direct coil connection in case of device failure

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Benefits and Applications

The **ILSS Series** offers several key benefits that enhance the performance and reliability of hydraulic and pneumatic systems:

- **Extended Equipment Lifespan:** Prevents mechanical shock, reducing wear on motors, valves, and other components.
- **Reduced Downtime:** Smooth startups minimize disruptions, improving overall system uptime.
- **Energy Efficiency:** Gradual pressure ramp-up optimizes energy use, lowering operating costs.
- **Ease of Maintenance:** If the ILSS fails, it can be easily bypassed by connecting the harness directly to the coil.
- **Cost-Effective Solution:** Offers a simpler, lower-cost alternative to other soft start controllers.

Applications of the ILSS Series include:

- **Conveyor Systems:** Prevents sudden motor engagement, improving belt performance and longevity.
- **Material Handling Equipment:** Ensures smooth operation of lift arms and hydraulic motors, reducing wear and tear.
- **Fluid Control Systems:** Enhances the performance of pneumatic valves by eliminating abrupt starts.
- **Outdoor Applications:** IP69-rated protection makes it suitable for harsh environments exposed to moisture and dust.

Conclusion

The **ILSS Series (In-Line Soft Start)** by Canfield Connector offers a practical, reliable solution to the challenges posed by traditional hydraulic and pneumatic systems. Through **PWM technology**, it provides smooth, controlled startups that reduce mechanical stress, extend equipment life, and enhance operational efficiency. The **plug-and-play design**, programmable microprocessor, and IP69-rated durability make the ILSS a versatile option for a wide range of industrial applications.

By integrating the ILSS Series into their systems, companies can **minimize downtime, reduce maintenance costs,** and **achieve greater energy efficiency**. Its low cost and ease of use further enhance its appeal, making it an accessible solution for industries seeking to improve performance without unnecessary complexity. Whether used in **automation, material handling, or manufacturing**, the ILSS delivers lasting value by ensuring smooth operations and longer equipment lifespans.

For more information, visit **www.canfieldconnector.com** or contact Canfield Connector's customer service team.