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Safe automation for the packaging industry – Flexible, standard-compliant, future-proof

Packaging without safety risks

Ostfildern, May 2026 – **High quality, maximum efficiency and reliable hygiene are among the basic requirements of the packaging industry. At the same time, digitisation of production processes, including their technologies, is progressing rapidly – it is becoming the norm for modern packaging machines. Holistic safety solutions are required for packaging lines, cyber-resilient architectures and reliably secured access. Against this backdrop, there is a growing focus on digital and networked machine concepts, which incorporate Safety and Security from the outset. They form the basis for ensuring that packaging machines remain flexible and can react quickly to new market, product or regulatory requirements.**

The demands placed on manufacturers and operators of automation solutions in the packaging industry are many and varied. In general, technological progress and the increasing complexity of digital packaging machines demand a higher level of machine, process and data security. In this context, the core elements of safety are: certified safety controllers, intelligent safety sensor technology and a standard-compliant, scalable safety concept – EN 415 (Safety of Packaging Machines) must be considered in particular – plus integrated safety diagnostics, such as those made possible by IO-Link Safety. Secured access points and secure software and firmware must be kept up to date.

Standards as the safe foundation for packaging systems

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Packaging machines such as forming, filling and sealing machines (FFS) usually have varying degrees of guard locking, covers, flaps or gates. They safeguard against the underlying risks of varying severity, which manufacturers and operators must avoid in accordance with the normative requirements of the current Machinery Directive, or MD, and the Machinery Regulation (EU) 2023/1230, MR for short, which will be mandatory from 2027. The EN 415 series of standards defines the safety requirements for the design, construction, installation, operation, maintenance and cleaning of packaging machines. It is a largely harmonised European standard that has been adopted in Germany as DIN EN 415 and is intended to guarantee the safety of machine operators. The standard EN 415-3 specifies the safety requirements for FFS machines in particular. FFS machines handle the production of packaging from film, as well as the filling and sealing of this packaging, in an automated process. This ensures high output, consistent dosing accuracy and hygienic production conditions in day-to-day operations. This enables high throughput and short cycle times, guaranteeing efficiency gains. At the same time, high machine speeds present safety risks that need to be safeguarded against. With strict application of EN 415-3, manufacturers can demonstrate that their machine is compliant. It defines protective measures for typical FFS hazards such as crushing, cutting, thermal risks, film-feeding mechanisms and tool changes. It also calls for safe access points, emergency stops, protective cladding, monitored movements and safe controllers for all FFS machine types. To protect operators in this area from crushing and entanglement hazards in accordance with the

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standards, safety sensors (interlocking devices) can be fitted to flaps, among other measures. During an intervention, these ensure that the film feed mechanism is only released once the flap is fully closed.

Safe sensor technology supports manipulation protection

In addition to the C standard EN 415, also relevant is the higher-level internationally valid B standard EN ISO 14119 on interlocking devices for packaging machines. It places particular emphasis on protection from manipulation: those placing the product on the market must prepare a risk assessment for each interlocking device. Depending on the level of incentive for manipulation, those placing the product must select safe sensor technology on which the encryption levels and technology are appropriate to the potential risk. There are questions here that need to be clarified in advance: how exactly should gates, covers or flaps be monitored? Magnetically or mechanically, monitored safely, and also safely locked if necessary? When a guard is opened, hazardous machine movements must be stopped, for example, and a restart must be prevented. It must not be possible to either defeat or manipulate the safeguards. Safety switches are ideal for safety gate and position monitoring in accordance with EN ISO 14119.

Normative guidelines for Security too

The Cyber Resilience Act (CRA) sets out security guidelines. It obliges packaging machine manufacturers to keep the digital components on their machinery secure throughout the entire lifecycle. In future, component

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manufacturers will have to systematically assess cyber risks, manage vulnerabilities, provide security updates and, if necessary, report incidents to the authorities. At the same time, the CRA shifts a large part of the cyber security responsibility from the operator back to the manufacturer, particularly in the case of controllers, software and networked interfaces. The MR also requires a systematic risk assessment, plus protection against corruption throughout the entire machine lifecycle.

Access control a must-have for safe systems

Access control is a safety-related issue, particularly for vast, large-scale systems. Operators can use this to ensure that only authorised personnel are allowed to carry out defined tasks. This helps to ensure efficient operation, with as little downtime as possible. Manipulation-proof access systems should therefore be part of any access control solution. For example, Pilz offers a complete safety package with its Identification and Access Management system I.A.M.: it includes the PITmode, which covers operating mode selection and access permission – including Safety and Security functions – in one system. Incorrect operation and manipulation are thereby prevented and human and machine are protected. Safe operating mode selector switches are suitable for use as operational access managers. They meet the requirements of EN ISO 14119 and ensure that only appropriately qualified and trained operating personnel can carry out the defined operating modes assigned to them on the packaging system. They also guarantee that unauthorised operating modes are effectively prohibited or prevented. Only authorised operators

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are able to select set-up, cycle and any other company-defined operating modes. Conclusion: Not just Safety (machinery safety) but also Security plays a key role in determining the performance, manageability and flexibility of a packaging system.

Modular safety gate systems for customised solutions

If you also need to implement measures for safe interlocking including guard locking on gates on safety fences, covers and flaps, then the modular safety gate systems are suitable. They should be quick and easy to install with plug-in cables and should meet all the requirements of EN ISO 14119. These modular safety gate systems provide a simple way to ensure individual, flexible safeguarding of gates. When safety gate solutions combine classic “safe guard locking” with the “functions of control elements”, that's the state of the art. At Pilz, the safety gate system PSENmgate combines the classic safety locking device PSENmlock with the control elements of the pushbutton unit PITgatebox in one compact, complete solution. When packers use the PITgatebox IOLS from the automation expert's IO-Link Safety system, plant and machinery can not only be controlled safely, but also with greater ease and efficiency. This solution transmits diagnostic data directly to the higher-level plant controller in real-time via the IO-Link Safety Master. For example, it provides information on the gate status and the operating state of the safety gate systems.

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Safe control = safe packaging

Regardless of whether you're dealing with interlinked bottling plants consisting of multiple stations or compact packaging machines: the task of safe control systems is to monitor safe signals on packaging systems and trigger safety-related stops. Configurable safe small controllers are sufficient for more compact machinery with fewer functions. The Pilz small controller PNOZmulti 2 is modular and can be expanded at will, growing with the requirements and size of the machine. In addition to monitoring safety functions such as emergency stop, safety gates or light curtains, with its logic functions it can also perform control functions on a packaging machine. With PNOZmulti 2, machine manufacturers and integrators can implement the requirements of the MR in practice. Comprehensive and scalable safety concepts on packaging systems are possible even with small controllers such as PNOZmulti 2. In some applications – especially on smaller systems – safety relays are even sufficient. They are characterised by short set-up and commissioning times: there is no need for programming; settings such as operating modes or delay times, for example, can be adjusted simply via rotary knob. In addition to classic relays such as the PNOZ from Pilz, the new type of modular safety relay myPNOZ also meets the requirements of smaller or more compact packaging machines. The advantage of this Pilz safety relay is that users receive a completely pre-assembled relay, ready to use immediately in packaging applications.

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Automating packaging machines in compliance with the standards

Against the background of normative requirements, packaging companies cannot always manage to integrate safe automation solutions on their own. They can find support from external experts. For example, standards and automation expert Pilz offers support with current tasks and challenges in the form of services, which accompany machine manufacturers and operators on their journey towards a standard-compliant, safe and secure plant or machine – from risk assessment and technical planning through to CE marking. This enables packaging companies to implement holistic solutions including Safety and Security. In addition, centralised asset management platforms support the legally compliant and secure storage of data and documents. With a Software-as-a-Service solution such as the MYZEL Lifecycle Platform from Pilz, those responsible for production have the necessary overview of Safety, Security and Compliance – throughout the entire machine lifecycle.

Regardless of the type of packaging machine users need to equip: future-proof automation solutions including Safety and Industrial Security and based on current safety standards are an investment in consistent system performance.

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((BOXED TEXT: Brief profile of PILZ))

Automation partner for the packaging industry

With its comprehensive range of products, solutions and services covering sensor, control and drive technology plus visualisation, the automation company Pilz has for many years been a reliable partner for automation tasks in the packaging industry. Whether it’s a new development, a plant retrofit or a modification to the material feed system, Pilz offers both plant manufacturers and operators scalable and flexible, one-stop automation and safety solutions.

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Pilz – The Spirit of Safety

Pilz is a global supplier of products, systems and services for automation technology. As a pioneer of safe automation, Pilz creates safety for human, machine and environment. Founded in 1948, today the family business with its head office in Ostfildern is represented worldwide with 2500 employees in 42 subsidiaries and branches.

The technology leader offers complete automation solutions for Safety and Industrial Security on the machine. These include sensor, control and drive technology – as well as systems for industrial communication, diagnostics and visualisation. An international range of services with consulting, engineering and training completes the portfolio. Pilz solutions are used in many industries beyond mechanical engineering, such as intralogistics, packaging, railway technology, or the robotics sector for example.

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On our social media channels we provide background information about the company as well as the people at Pilz and report on the latest news from automation technology.

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