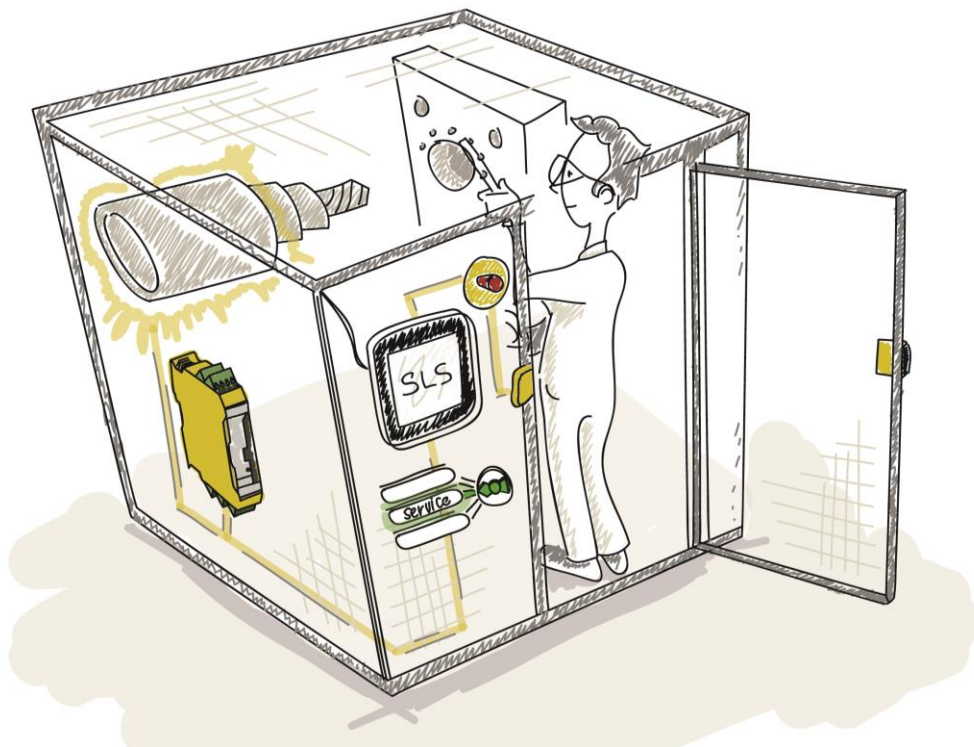


PSR-MM30 compact zero-speed and over-speed safety relay

Superior protection, low start-up and maintenance costs

The European Machinery Directive 2006/42/EC specifies the basic requirement for protecting persons from hazards that may arise from the moving parts of a machine. The operators of the applications also expect that their design engineers prevent downtimes in order that the equipment produces at optimum conditions. Both of these requirements can be met through the integration of modern safety technology (lead).



Lead Image

Protecting employees against hazardous machinery motion is frequently achieved by shutting down the drive in question via power or motor starter switches whenever the need arises. When the movable guard, i.e. the safety door, is opened, the motor is stopped via the drive and is also shut off after a preset period of time via a safety relay. If the machine operator then wants to continue running the drive electrically for setup or maintenance work, for example, doing so is no longer possible under this scenario. However, if the application requires that the electrical drive moves with the safety door open, the designer can achieve this by implementing a variety of safe alternatives. These include using a hand-held operator panel, performing the movements in enabling/inching mode, and traveling along individual axes or performing movements at reduced speed.

Universal and drive-independent usage

In order to also control potentially hazardous motions in the event of errors, either electrical power drive systems with built-in safety functions, safe frequency or servo converters, or zero-speed and over-speed monitoring, safety modules are used. Which technology the user decides on will depend on that user's specific requirements. Standalone safety modules can be used anywhere, operate independently of the drives, and are easy to configure and operate. On the other hand, electrical power drive units with integrated safety components are often ideal with their expanded monitoring functions, rapid response times to malfunctions, and the option to network them with other components.

We can assume that the trend toward safe drives will continue. However, this trend also shows that solutions that are separate from the drive itself are still holding their own against safe drives in many application areas. Modern standalone solutions combine key advantages from both technologies - simplicity and safety, for example. The safety functions that need to be implemented with motion monitoring depend on the type of application and the results of the required risk assessment. The EN 61800-5-2 standard, an important directive on functional safety in electrical drive units, defines requirements and addresses recommendations that designers can adopt. Current systems are certified in accordance with EN 61800-5-2 and offer already incorporated safety functions.



Figure 1 - The PSR-MM30 can monitor up to three different speed thresholds on one machine, along with zero-speed monitoring

Simple configuration via software

Users should be able to simply start up and operate their safety solution. For that reason, Phoenix Contact's PSR-MM30 zero-speed and over-speed safety relay, which is just 22.5

millimetres wide, is designed such that you can configure it using the clearly designed and intuitive PSRmotion user software. All application-related parameters, such as sensor type and speed thresholds, are easy to select in the tool. Once the parameters have been configured, the settings are transferred from the PC to the zero-speed and over-speed safety



Figure 2 - Application-specific parameters for the zero-speed and over-speed safety relay can be set using the PSRmotion software

relay via a standard USB interface (Figure 1). The software's online monitoring function enables the data on the motion being monitored to be displayed during machine operation. Using the graphically displayed actual value and limit value display, along with the necessary status and diagnostic data, you can minimise the costs arising during start-up and maintenance (Figure 2).

Reliable monitoring of multiple operating modes

The PSR-MM30 can be used with all commercially available encoders and linear measurement systems with HTL, TTL, or Sin/Cos interfaces functioning as sensor systems. As an alternative, it can also be used with proximity switches that are directly attached to the motion of gear wheels or perforated disks (Figure 3). Up to three individual



Figure 3 - Selection of commercially available sensor systems for the zero-speed and speed monitoring

speed threshold settings can be made in order to enable the user to monitor the various operating modes of a machine, such as setup, service, or automatic mode. This option constitutes implementation of the SLS (Safety Limited Speed) safety function outlined in the EN 61800-5-2 drive standard. In addition to the over-speed function, the zero-speed and over-speed safety relay supports an additional zero-speed monitoring option. If the predefined limit value for a motion is exceeded, the module's safe relay contacts can release an electromechanical guard locking device, for example.

A wide range of possible applications

The PSR-MM30 is a good choice for both new machine design and for retrofits. Thanks to the flexibility of this standalone device, the application possibilities range from simple machining tools to complex applications. One option is that the safe relay outputs for the zero-speed and over-speed monitoring can shut off the actuator engineering. Alternatively, the outputs can be read in and processed by a higher-level safe controller. In wind turbine generators, for example, this approach can be used to monitor the speed of the rotors. When the maximum speed is exceeded, the controller initiates a braking procedure. On machine tools and wood processing machines, the speed of the mandrel can be monitored during setup operations with the safety equipment open. If the application exceeds the pre-set speed due to an error in the drive system, creating a hazard for the operator, the drive

immediately shuts off. In logistics systems, it can also be used to monitor the safely reduced speed of aisle stackers or electric monorail systems in inching mode.

Comprehensive product portfolio

The safe PSR-MM30 zero-speed and over-speed safety relay meets the highest standards of functional safety. Depending on the sensor and actuator system used, the user can deploy the safety module in applications up to Performance Level (PL) e or Safety Integrity Level (SIL) 3. Phoenix Contact's compact safety relays from the PSRmini product range are well suited for any other safety functions the machine may be equipped with, such as emergency stop, light grid, or transponder switches (Figure 4).



Figure 4 - The PSRmini family of safety relays is available in overall widths ranging from six to 12.5 millimetres

More information:

www.phoenixcontact.de/safety

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Safety technology requirements for power drive systems

The EN 61800-5-2 standard covering electrical drives spells out safety technology requirements and recommendations for controllable power drive systems. The power drive system, or PDS (SR) (Power Drive System – Safety Related) for short, includes all of the functional elements of an electrical drive, from the sensor engineering to the control unit, the communication and the I/Os, up to the power unit and motor. The EN 61800-5-2 standard applies for PDS (SR) manufacturers and suppliers, although the specifications described in the standard can also be employed by users, that is, machine and system designers.

The safety functions defined in EN 61800-5-2 include the following:

- Safe Torque Off (STO)
- Safe Operation Stop (SOS)
- Safe Limited Speed (SLS)
- Safe Speed Monitor (SSM)
- Safe Speed Range (SSR)
- Safe Direction (SDI)

The technical measures that must be taken to reduce risks in a machine depend on the results of a risk assessment that must be carried out. Product standards (C standards) are in place for certain machines that precisely outline the safety requirements for the application areas in question.