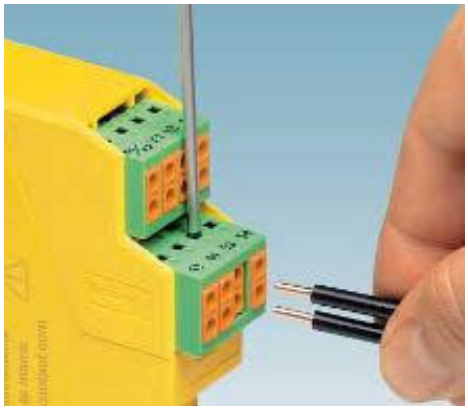
Safety solutions from Phoenix Contact: Simplicity equals safety!

PSR safety devices offer you solutions for all common applications such as:
- Emergency stop
- Safety door
- Light grid
- Solenoid switch
- Two-hand control devices
- Enable switch

PSR safety relays are suitable for applications involving up to three different safety functions. More extensive applications can be accommodated easily and in a flexible way with the configurable PSR-TRISAFE safety module. There are special modules available for downtime and speed monitoring. These can be used to implement safe stop or safely reduced speed functions on a system, for example.

Our PSR safety devices demonstrate that innovative safety solutions do not necessarily have to be complex in order to meet the high safety requirements of the machine and system engineering industry. As well as offering easy integration and handling, the modules are characterized by their compact, space-saving design as well as their high quality, safety, and reliability.

Other advantages include:
- Convenient connection method
- Quick extension
- Suitable for universal use based on all relevant approvals



Convenient connection method

All PSR safety devices are available with plug-in screw or spring-cage connection methods. The twin spring-cage connectors provide enough space for two cables per connection point.

Quick extension

The modular safety systems allow additional extension modules to be integrated easily using the TBUS DIN rail connectors. As a result, there is no longer any need to install cross-wiring for additional output contacts.

Numerous approvals

PSR safety relays conform to all relevant safety standards such as EN 954-1, ISO 13849-1, and IEC 61508. In addition, there are modules available with GL approval or certification according to EN 50156.

The safety standards at a glance

EC Machinery Directive

The EC Machinery Directive (2006/42/EC) is a binding regulation for all machines that are put into circulation on the single European market. Until now, EN 954-1 was applicable to safety-related parts in controllers in order to demonstrate compliance with the general health and safety requirements specified in the Machinery Directive. EN 954-1 has now been succeeded by harmonized standards EN ISO 13849-1 and EN IEC 62061, which describe the current state of the art and provide improvements.

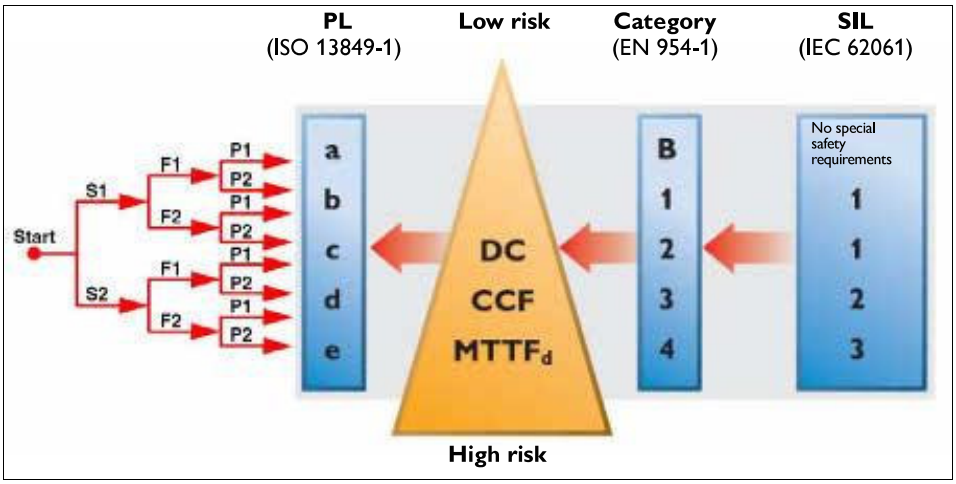
ISO 13849-1: The Performance Level (PL) is used to assess the probability of a safety-related controller component failing. With PL e, the level of probability is very low (= high safety level), whereas PL a means that it is higher (= lower safety level). A new feature is that the entire safety chain is now considered as are the $MTTF_d$, CCF, and DC variables (see below).

IEC 62061: Based on IEC 61508, IEC 62061 has been specifically tailored to complex electronic systems in machine engineering applications. Once again, a Safety Integrity Level (SIL) is determined for the safety system.. This is based on the SIL values for the individual parts (SILCL, see example).

IEC 61508: This standard is mainly applicable to the process industry. The Safety Integrity Level (SIL) indicates how reliable a functional safety system (electrical/electronic/programmable) is over its entire service life.

SIL3 is the highest safety level (SIL4 only in special cases), whereas SIL1 is the lowest.

Relationship between ISO 13849-1, EN 954-1, and IEC 62061



The required PL can be determined in accordance with ISO 13849-1 using what are known as risk graphs. This involves taking the starting point and then evaluating each of the following points in turn: injury severity (S), frequency and/or exposure time (F), and possibility of avoiding hazard (P).

S **Severity of injury**
S1 Slight (normally reversible) injury
S2 Serious (normally irreversible) injury

F **Frequency and/or exposure time to the hazard**
F1 Seldom to quite often and/or exposure time is short
F2 Frequent to continuous and/or exposure time is long

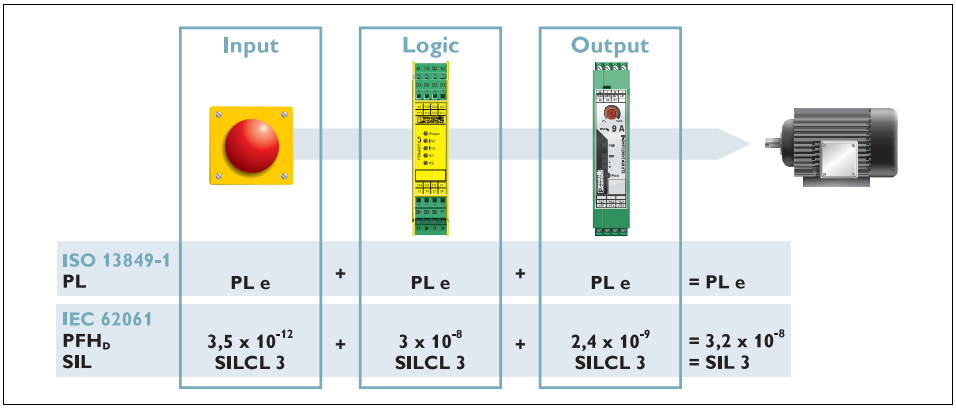
P **Possibility of avoiding the hazard**
P1 Possible under specific conditions
P2 Scarcely possible

$MTTF_d$ Mean Time To Failure dangerous - describes the reliability of individual components used as part of a safety function. Example: A contactor that is capable of performing approximately 100,000 switching cycles a year under normal load conditions will start to demonstrate dangerous failure behavior after an average of 20 years.

CCF Common Cause Failure Management refers to the ability to manage failures with a common cause. Example: In an application involving safety door monitoring with 2 safety switches, both switches fail due to an excessive ambient temperature. Remedy: Use a suitable cooler.

DC Diagnostic Coverage involves assessing the integrated diagnostic functions that a controller can use to detect faults. Example: A welded contactor contact is safely detected by evaluating a confirmation contact.

Example safety function according to ISO 13849-1 and IEC 62061



In this example, a motor is shut down safely when the emergency stop button is actuated. In this context, both ISO 13849-1 and IEC 62061 consider the entire safety chain: the emergency stop button that has to be detected, the safety relay used for signal processing, and the CONTACTRON semiconductor contactor used for shutdown.