Functional safety to protect people, machines and the environment

Safety Technology
Control the unexpected

Throughout their entire life cycle, machines pose risks to people, other machinery and the environment. For this reason, it is vital to identify any hazards during the design phase of the machine and to reduce them by taking appropriate measures.

The Machinery Directive 2006/42/EC stipulates that machines should not pose any danger. However, as there is no such thing as 100 % safety in engineering, the objective is to minimize dangers and to achieve tolerable levels of residual risk. The overall safety of a machine defines the state in which it either poses no unacceptable risks to people or can be considered hazard-free. Functional safety refers to that part of the overall safety of a system which depends on the correct functioning of the safety-related systems and the external risk-reduction devices.

Get more information

Risk reduction through the use of safety-related parts in control systems

In international standards, the safety components of machine controls are referred to as "safety-related parts of control systems" (SRP/CS). Safety-related control components cover the entire functional chain of a safety function. In each case, they consist of the input level (sensor), the integrated logic (safe signal processing) and the output level (actuator).

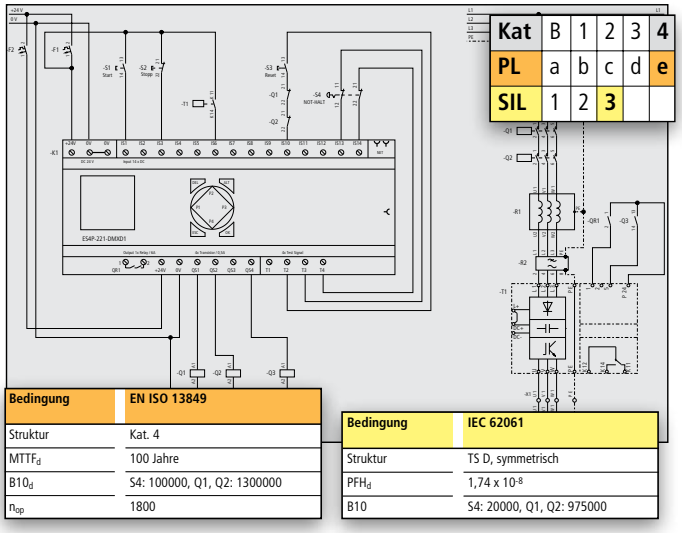
The general objective is to design these components in such a way that the control functions reduce the level or risk in line with the results of the risk analysis, even in the event that the control system malfunctions. The higher the level of risk reduction that the safety-related parts of a control system need to achieve, the higher the required safety level/technical safety performance level.

Safety Manual for machines and systems in accordance with EN ISO 13849-1 and IEC 62061

Information about machine safety can be found in Eaton's "Safety Manual", which is aimed at machine builders and system integrators, as well as at teachers and students and anyone else who is interested in the topic.

This manual provides an introduction to the comprehensive literature on safety technology. The Eaton Safety Manual provides an overview of the interplay between the relevant directives, standards and regulations that must be taken into account when designing safety equipment for machines. The safety-related contents of this manual have been certified by TÜV Rheinland Industrie Service GmbH.

Based on example circuits, the manual shows how functional safety can be implemented in safety applications by means of electrical, electronic and programmable components and systems.



Kat	B	1	2	3	4
PL	a	b	c	d	e
SIL	1	2	3		

Bedingung	EN ISO 13849
Struktur	Kat. 4
$MTTF_d$	100 Jahre
$B10_d$	S4: 100000, Q1, Q2: 1300000
n_{op}	1800

Bedingung	IEC 62061
Struktur	TS D, symmetrisch
PFH_d	1,74 x 10^{-8}
B10	S4: 20000, Q1, Q2: 975000

In addition, the Safety Manual also describes the functioning of each example circuit and contains a clear overview of the possible evaluations.

The calculated variables are based on standard assumptions about the safety applications and the safety-related switchgear being used.

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The safety-relevant variables for our products are available at Eaton.com/fusa