YASKAWA

Sigma-5

Functional Safety Options

The Sigma-5 SERVOPACKs provide safety for automation applications while complying with a variety of global safety standards. Estimate and assess potential risks and minimize hazards proactively.

Safety Functions: STO, SSI, SS2, SLS

The risk of personal injury associated with machinery in today's manufacturing environment is a serious issue. A variety of staff members including operators and maintenance personnel come in contact with automated machinery on a daily basis. Risk can be mitigated by implementing safe machine states for a variety of typical situations (ie: during machine commissioning and setup, normal operation, maintenance and service).

The safety options for the Sigma-5 SERVOPACKs provide the functionality necessary to handle the different safe machine states required in your application.

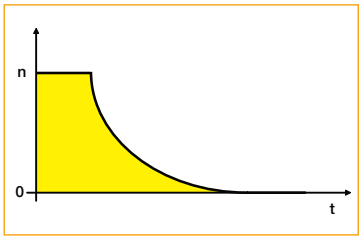
- The STO (Safe Torque Off) function is integrated into the standard SERVOPACK.
- Additional functions SS1 (Safe Stop 1), SS2 (Safe Stop 2), and SLS (Safe Limited Speed) can be accessed by choosing the advanced safety option.

Yaskawa continues to keep pace with evolving global safety standards. With the coming into effect of the European standard EN ISO 13489 1:2008 "Safety of machinery – Safety-related parts of control systems" the construction of safe machines will be assessed either according to the performance level (PL a – e) or according to the safety integrity level (SIL 1 – 4). The security relevant functions for variable speed drives are defined in the standard IEC61800-5-2.

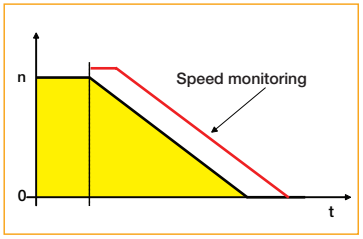
Sigma-5 SERVOPACKs are certified by TUV Sud and comply with the following safety standards:

Description	Standard	Performance
Safety Integrity Level	IEC 61508	SIL 2
	IEC 62061	SILCL2
Performance Level	EN ISO 13849-1	PI-d
Stop functions	IEC 60204-1	Stop category 0/1/2
Functional Safety	IEC 61800-5-2	STO/SS1/SS2/SLS

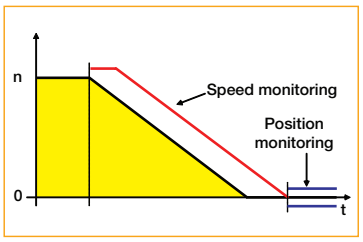
Safe Torque Off (STO)



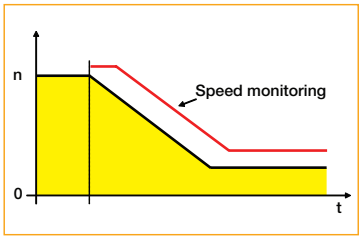
Safe Stop 1 (SS1)



Safe Stop 2 (SS2)



Safely Limited Speed (SLS)



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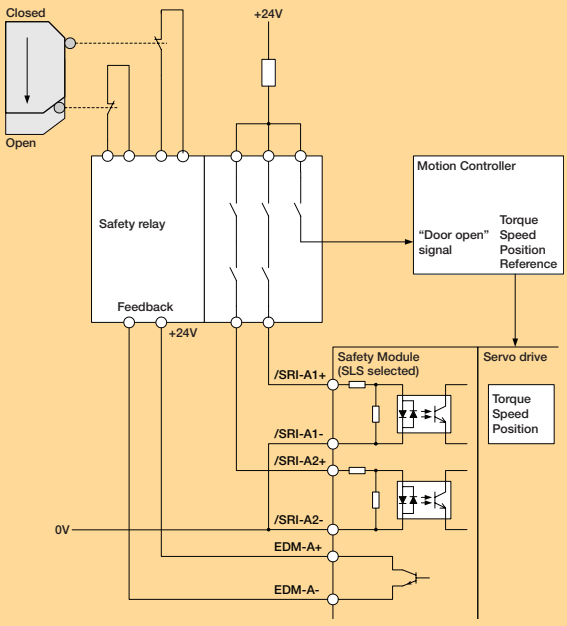
Sigma-5
Functional Safety Options

Compliance with North American Safety Standards, European Directives, and Safety Standards			
North American Safety Standards		UL508C (E147823)	
European Directives	Machinery Directive (2006/42/EC)	EN ISO 13849-1:2008	
		EN 954-1	
	EMC Directive (2004/108/EC)	EN50011/A2 group 1, class A	
		EN 61000-6-3	
		EN 61800-3	
	Low Voltage Directive (2006/95/EC)	EN50178	
		EN 61800-5-1	
Safety Standards	Safety of Machinery	EN ISO 13849-1, EN 954-1, IEC 60204-1	
	Functional Safety	IEC 61508-1 to -7, IEC 62061, IEC 61800-5-2	
	EMC Directive	IEC 61326-3-1	
Safety Function		IEC 61800-5-2	IEC 60204-1
		Safe Torque OFF (STO)	Stop Category 0
		Safe Stop 1 (SS1)	Stop Category 1
		Safe Stop 2 (SS2)	Stop Category 2
		Safely Limited Speed (SLS)	
Safety Performance	Safety Integrity Level	SIL2, SILCL2	
	Probability of Dangerous Failure per Hour	PFH ≤3.3 [1/h]	
	Category	Cat3	
	Performance Level	PLd (Category2)	
	Mean Time to Dangerous Failure of Each Channel	MTTFd: High	
	Average Diagnostic Coverage	DCave: Medium	
	Proof Test Interval	10 years	

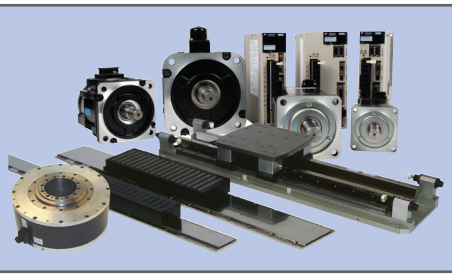
Safety Door Monitoring (Example Below): In this application example, the SLS (Safe Limited Speed) function is being utilized. When the door is opened, the machine controller is notified and consequently it activates a "creep speed" for the servo axis. The Sigma-5 SERVOPACK monitors the actual speed of the servomotor and ensures that the safe limited speed range specified is not exceeded. If the actual motor speed exceeds the limit values after an adjustable response time, the power supply for the motor is safely interrupted immediately by the safety function in the SERVOPACK.

Example: Safety Door Monitoring



The Sigma-5 series:

Compact servo drives for optimum application efficiency and highest machine quality.



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