

Product note

Making safer machines and processes using AC drives



Machine safety is an essential part of today's industrial environment. Our drives offer many features that can help you achieve the required level of safety in a cost-effective way. This product note helps explain how our drive-based functional safety features are used.

Safe torque off - the basic safety function in drives for machines and processes

Safe torque off (STO) is the basic safety function used for prevention of unexpected startup, emergency stop and other stopping related functions. STO ensures that the drive will not provide a rotational field within the motor, thereby preventing the motor from generating a torque on the shaft.

Depending on the drive type, STO is either integrated as standard or built-in as an option in our drives. STO is defined in the EN/IEC 61800-5-2 standard, and corresponds to an uncontrolled stop in accordance with stop category 0 of EN/IEC 60204-1.

Additional safety functions

Additional safety functions can be built either outside or integrated into our drives, once STO is available. Safety

functions such as safe stop 1 (SS1), safe brake control (SBC) and safely-limited speed (SLS) in our drives comply with the requirements of the European Union Machinery Directive 2006/42/EC. This directive is associated with standards like EN/IEC 62061 (Safety Integrity Level, SIL) and EN ISO 13849-1 (Performance Level, PL). Our drive-based functional safety offering also suites process industry needs according to the IEC 61511 standard.

Integrated drive-based functional safety

Integrated drive-based functional safety, saves time and costs as there is less need for cabling and the integrated safety functions are certified. Our ACS880 industrial drives are compatible with the optional safety functions module (FSO-11), that offers several safety functions in one module. The module is easy to integrate and commission in our ACS880 drive, and can achieve SIL 3/PL e. The capability of risk reduction for safety functions that are built outside of the drive can achieve SIL 3/PL e (Cat. 3) or SIL 2/PL d (Cat. 2) depending on the drive type. A description of typically used safety functions together with our drives are described on the next page.

Examples of typical safety functions together with ABB's LV AC drives

	Type	STO integrated as standard	SS1	SBC	SLS	SSE	SMS
Industrial drives	ACS880	SIL 3/PL e	●	●	●	●	●
	ACS800	SIL 2/PL d ●	●●	○	●●	●● ¹⁾	●● ²⁾
Machinery drives	ACS355	SIL 3/PL e	○	○	○	○	○
	ACS850	SIL 3/PL e	○	○	○	○	○
Drives for water and wastewater	ACQ810	SIL 3/PL e	○	○	○	○	○
General purpose drives	ACS580	SIL 3/PL e	○	○	○	○	○
Motion control drives	ACSM1	SIL 3/PL e	○	○	○	○	○
	MicroFlex e150	SIL 3/PL e	○	○	○	○	○

- Available as an option integrated in the drive.
 - Available as an option for cabinet-built drives (+QXXX).
 - Safety functions are possible, with external safety devices connected to the STO in the drive.
- ¹⁾ SSE is implemented as SS1.
²⁾ SMS is implemented as a variant of SLS.

Safe stop 1 (SS1)

The safe stop 1 function initiates motor deceleration (eg emergency stop, stop category 1) and automatically activates safe torque off after an application-specific time delay or after the monitored ramp has reached standstill. This function is defined in the EN/IEC 61800-5-2 standard, and corresponds to a controlled stop in accordance with stop category 1 of EN IEC 60204-1.

Safe stop emergency (SSE)

The safe stop emergency function is a special case of STO or SS1 safety function. It can be configured to provide a category 0 (STO) or category 1 (SS1) emergency stop.

Safe brake control (SBC)

The safe brake control function provides a safe output signal to control the motor's mechanical brake. This function is defined in the EN/IEC 61800-5-2 standard. The function must always be connected to the STO of the drive in order to work. When SBC is activated in the FSO-11, this function always operates with the drives STO function.

Safely limited speed (SLS)

When demanded, the safely-limited speed function prevents the motor from exceeding the specified safe speed. This function is defined in the EN/IEC 61800-5-2 standard.

Safe maximum speed (SMS)

Safe maximum speed provides continuous protection against motor overspeed.

Wide range of ABB safety products for enhanced safety solutions

In addition to drive-based safety functions, ABB offers a wide range of safety devices together with our drives. These include safety PLC's for controlling several drives simultaneously while enhancing safety monitoring. Other devices include engineering tools, contactors, safety encoders, interlocking devices, light curtains and safety relays etc. Together with our drives these safety devices form the basis for an optimal safety solution.

For more information please contact your local ABB representative or visit:

www.abb.com/drives
www.abb.com/drivespartners

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