

MODULAR SERVO DRIVE WITH INTEGRATED SAFETY FUNCTIONALITY

PL e AND SIL 3 CERTIFIED



Integrated safety is the latest addition to Moog's Modular Multi-Axis Servo Drive System (MSD). This enables machine builders to implement a complete safety solution using servo drives. The servo drive not only offers approved safety functions per IEC/EN 61800-5-2 but also Safety PLC functions. This eliminates the need for external safety PLCs and the associated complexity.

Handling of multiple safe inputs and outputs (e.g., emergency stop, mode selectors, light curtains etc.), is performed transparently per a safe cross communication channel linking multiple drives. Programming is achieved with a functional block diagram language similar to IEC/EN 61131-3. This visual approach gives the user an intuitive environment in which to create their safety applications. Integrated safety functionality is available in frame size 1 to 5.



ADVANTAGES

- Integrated safety functions and Safety PLC
- Save costs and installation effort due to reduced system complexity and component count
- High count of distributed safety I/Os available with the servo drive
- Automatic configuration report for validation
- Retrofit friendly: Same form and fit to existing drives

APPLICATIONS

- Metal forming machinery
- Plastics machinery
- Test and simulation
- Motor winding machinery
- Machine tools
- Material packaging machinery



FEATURES - INTEGRATED FUNCTIONAL SAFETY

Safety functions			
Speed-dependent	STO	Safe Torque Off	6/1 per axis
	SS1	Safe Stop 1	12 (optionally SS1 or SS2)
	SS2	Safe Stop 2	
	SLS	Safe Limit Speed	48 (optionally SLS or SLS _{max})
	SLS _{max}	Safe Limit Speed maximum	
	SDI	Safe Direction	6/1 per axis
	ECS	Encoder Supervisor	
Speed- or position-dependent	ESM	Encoder Standstill Monitoring	
	SOS	Safe Operating Stop	6/1 per axis
	SCA	Safe Cam	64
Position-dependent	SLI	Safe Limited Increment	6/1 per axis
	SLP	Safe Limited Position	12
	SCA	Safe Cam	64
	Sref	Safe Reference	6
Brake	SEL	Safe Emergency Limit	
	SBC	Safe Brake Control	1 per axis
	SBT ¹⁾	Safe Brake Test	
	SCC	Safe Cross Communication	
	FSoE ¹⁾	Functional Safety over EtherCAT	

1) Project specific

PC software	
Servo Drive Software with Safety PLC Functions	Configuration
	Programming
	Validation

System	
Configuration mode	User-programmable safety control
Safety acceptance tests	SIL 3 according to IEC/EN 61508, IEC/EN 62061 PL e and cat 4 according to EN ISO 13849

Control hardware	
Safety digital inputs	4
Safety digital outputs	4
Safety digital outputs of which usable as safe pulse outputs	4
Safe brake outputs	2
Supported safety sensors	Light grids, emergency stops, guard doors, laser scanners, mode selector switches, guard locks, enable buttons, etc.
Analog standard inputs (±10 V, 12 bits)	2
Digital standard inputs	6

ORDERING INFORMATION

G392 series (air-cooled)	G392-xxxAxx1-xxx (1 x 230 V, 4 A, size 1)
	G392-xxx-xx1-xxx (3x230/400/480 V, 4 to 72 A, size 1 to 5)
G393 series (air-cooled)	G393-xxx-xx1-xxx (560 V _{DC} - 770 V _{DC} , 4 to 72 A, size 1 to 5)
G395 series (liquid-cooled)	G395-xxx-xx1-xxx (3x230/400/480 V, 16 to 84 A, size 3 to 5)
G397 series (liquid-cooled)	G397-xxx-xx1-xxx (560 V _{DC} - 770 V _{DC} , 20 to 84 A, size 3 to 5)

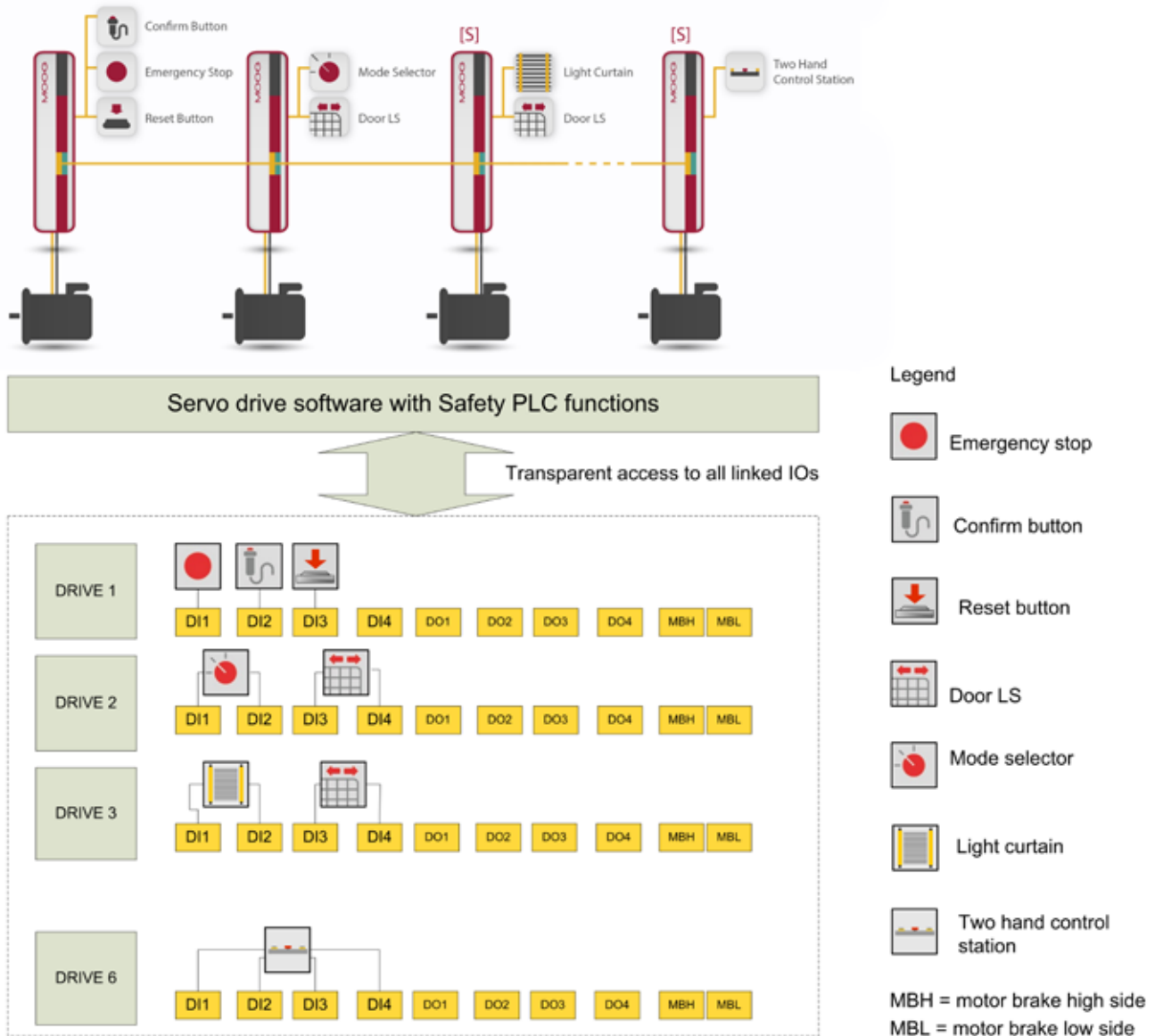
Note: See Servo Drives catalog for complete ordering information.



SYSTEM DESCRIPTION

Setup

Moog's Modular Servo Drives with integrated safety functions provide a complete, freely programmable functional safety system for safe handling of machines. The system provides the various safety functions as defined in IEC/EN 61800-5-2. In addition to these standard functions, the Safe Cross Communication (SCC) feature enables up to six drives to be linked to form a network. This enables a complete machine safety solution independent of the control. The SCC allows centralized evaluation of safety switching elements connected to the drives as well as exchange of status information.



Programming

Creation of safety programs is achieved using an intuitive graphical function block diagram language similar to IEC/EN 61131-3. The "Servo Drive Software with Safety PLC Functions" includes pre-programmed modules for all commonly used sensors, each available as a logic element. Similarly, the safety functions (SLS, SLI, etc.) can be selected and are also represented as logic items with one logic input and output. Programming is then achieved by linking the various input devices and safety functions with standard logic functions (AND, OR, XOR, time, etc.). Once developed, each axis in the network is programmed and parameterized by the master drive, thereby simplifying the overall development and series production process.

Validating

On completing the safety configuration, parameterization and programming, validation needs to occur. Here too, the system assists by providing configuration reports which can be used for validation. Once validated, the parameter data is locked preventing further change and allowing the validated parameter set to be deployed on the production machine.

TAKE A CLOSER LOOK.

Moog designs a range of motion control products to complement those featured in this document. Moog also provides service and support for all of our products. For more information, contact the Moog facility closest to you.

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