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Can a contactor reversing combination be used in a safety function?

SIRIUS Industrial Controls, Safety Integrated

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2 Answer

In general reversing combination can be used for switching drives in a safety function.

For applications up to SIL 1 in accordance with IEC 62061 or up to PL c in accordance with ISO 13849-1 it is sufficient to switch off the motor contactors for clockwise rotation and counter-clockwise rotation and to monitor its mirror contact (NC) in the feedback circuit.

From SIL 2 in accordance with IEC 62061 or PL d in accordance with ISO 13849-1 a two-channel architecture is required. Therefore an additional overlaid contactor is necessary – a combination of two contactors has to be switched on for the drive to run. Thus an additional, fourth contactor is not required.

The correct function of all three contactors has to be monitored via the mirror contacts (NC). Please be advised that hard-wired reversing combination use the mirror contacts. If the contactors do not provide enough mirror contacts to also implement the feedback circuit, contactors with auxiliary switch block are necessary (In this case a 3RA23 reversing combination and 3RH29 auxiliary switch blocks are used).

The additional auxiliary switch block 3RH29 is necessary because the internal NC-contacts of the 3RT-contactors are used for the electrical interlocking of the reversing combination.

In order to avoid common-cause failures, among other measures, the control lines to the contactors have to be laid separately or similar measures must be taken.

Note If the Application requires permanently mounted auxiliary switch blocks, it is also a device version for the 3RT20 contactors available.

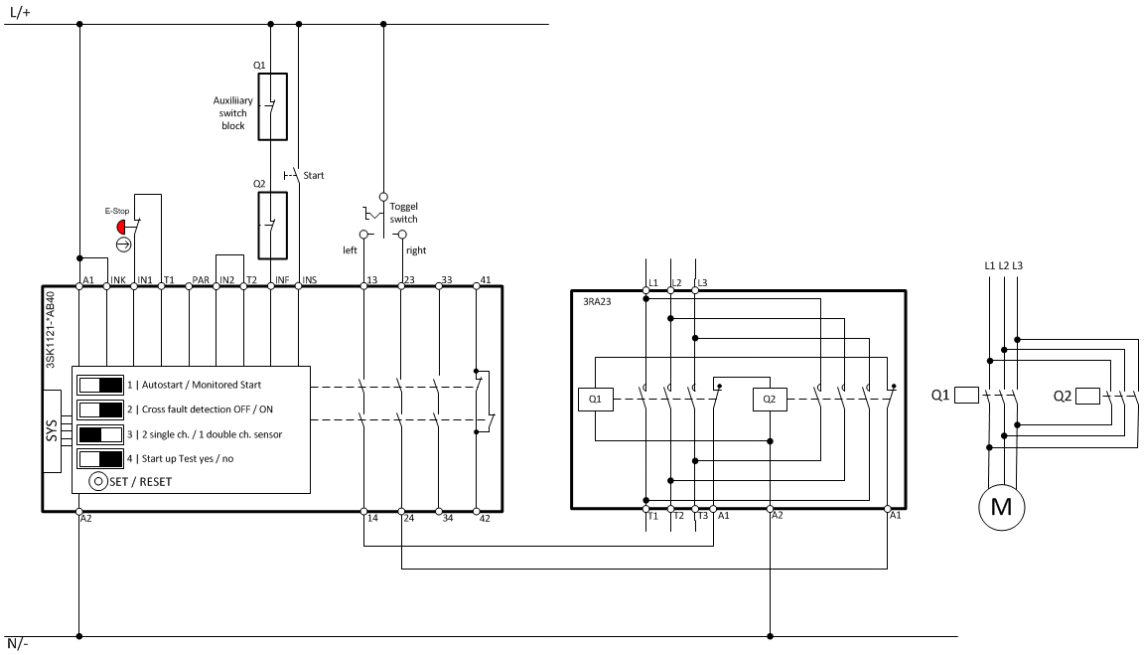
2.1 Used components

Safety relay 3SK1 or 3SK2		Contactor reversing combination	Snap on auxiliary switch blocks	Additional contactor relay for SIL 3 applications
				
3SK1 (http://www.siemens.com/safety-relays)	3SK2 (http://www.siemens.com/safety-relays)	3RA23 (http://www.siemens.com/sirius-switching)	3RH2911 (http://www.siemens.com/sirius-switching)	3RT20 (http://www.siemens.com/sirius-switching)

Note This is an example for devices from the system components SIRIUS Innovations with the frame size S00. At other power ratings other device combinations could be necessary.

3 Circuit diagrams with 3SK1 and 3SK2 safety relay

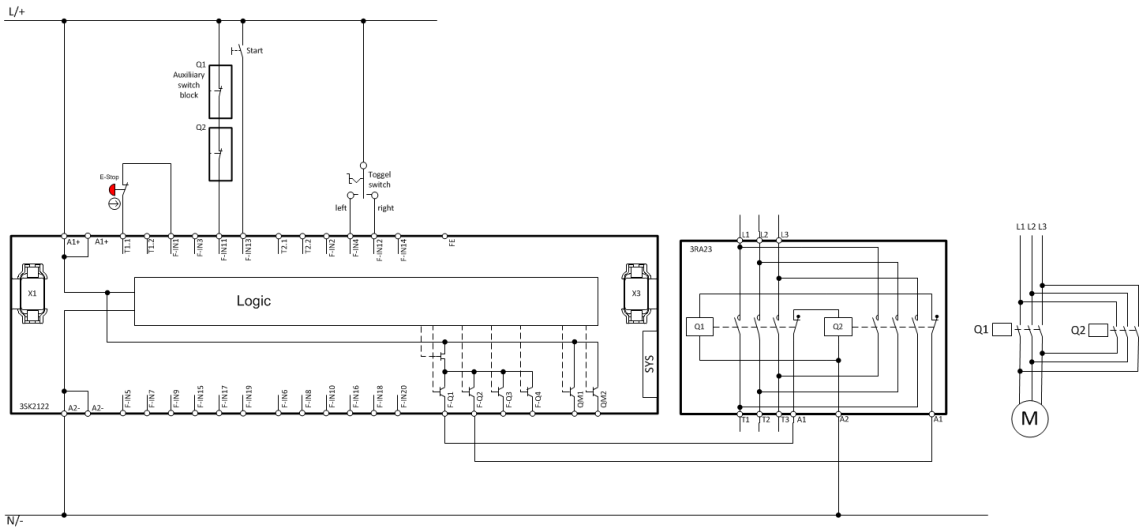
3.1 SIL 1 reversing combination with 3SK1 safety relay



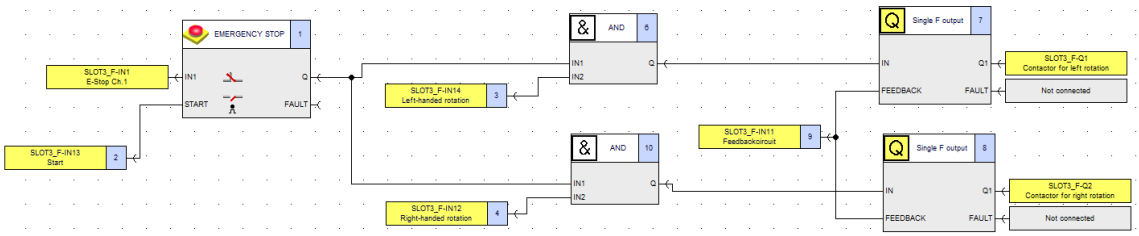
Note

The parameterization of 3SK1 devices are described in the circuit diagram with the position of the DIP switches. The specified position is represented by black marking.

3.2 SIL 1 reversing combination with 3SK2 safety relay

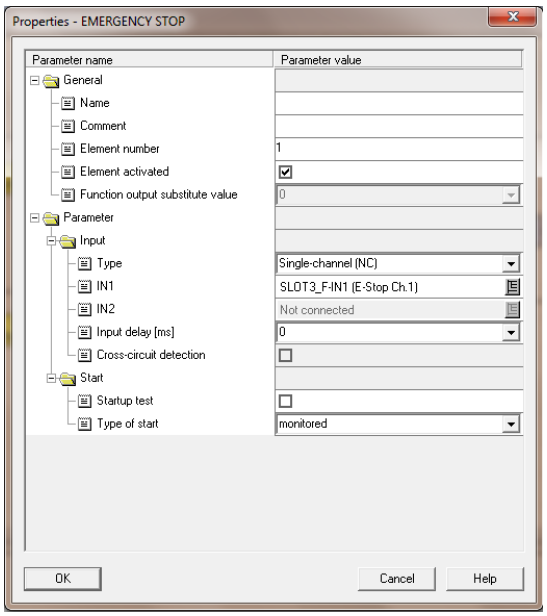


3.2.1 Logic diagram of the software SIRIUS Safety ES for the safety relay 3SK2

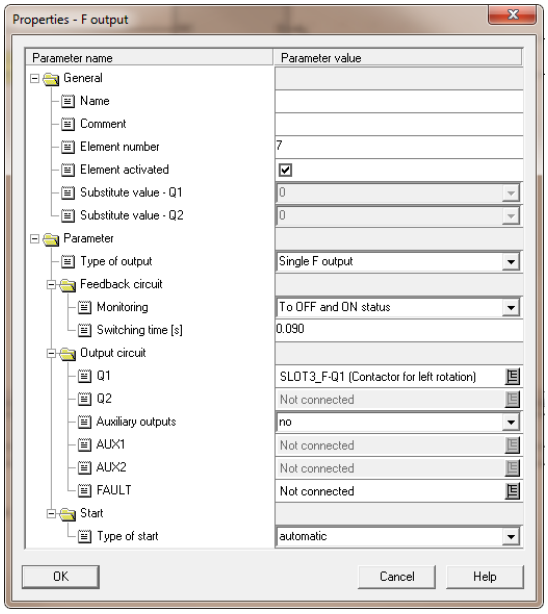


3.2.2 Adjustable parameter of the function elements in SIRIUS safety ES

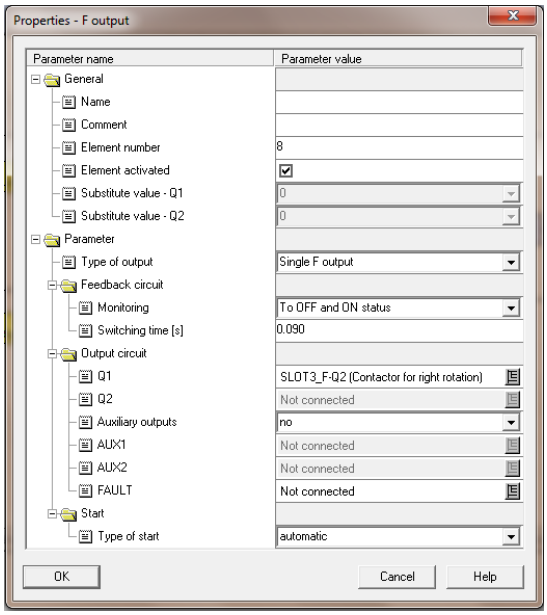
- Parameter of the software module: Emergency Stop



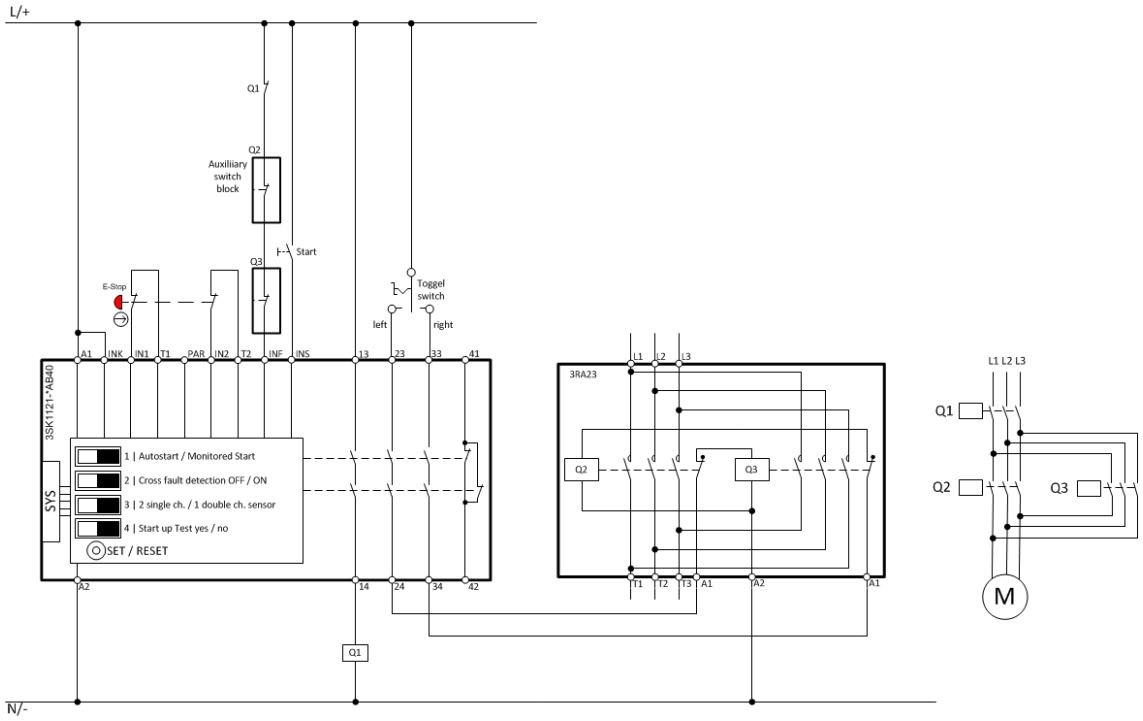
- Parameter of the software module: Single F-output Q1



- Parameter of the software module: Single F-output Q2



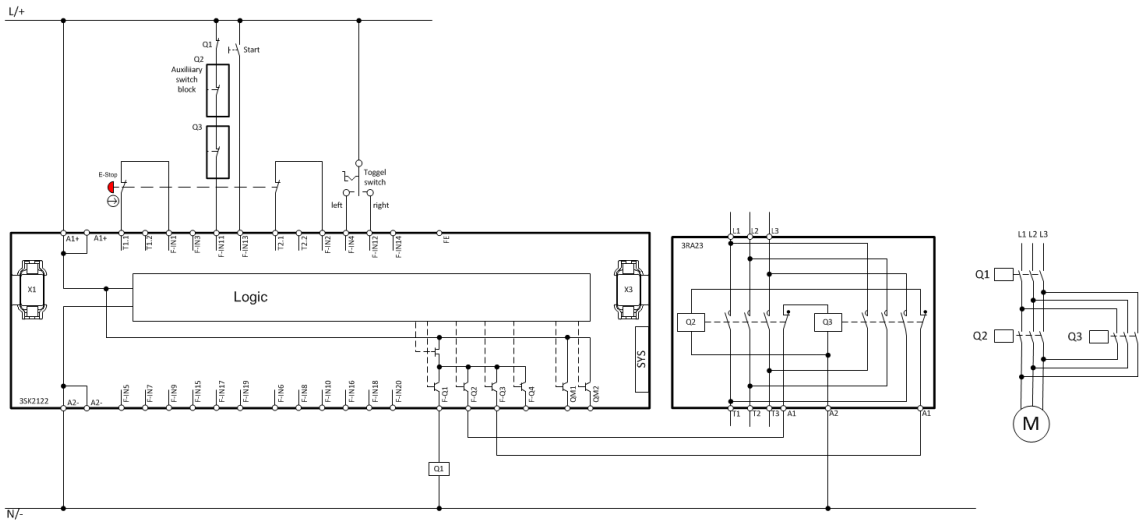
3.3 SIL 3 reversing combination with 3SK1 safety relay



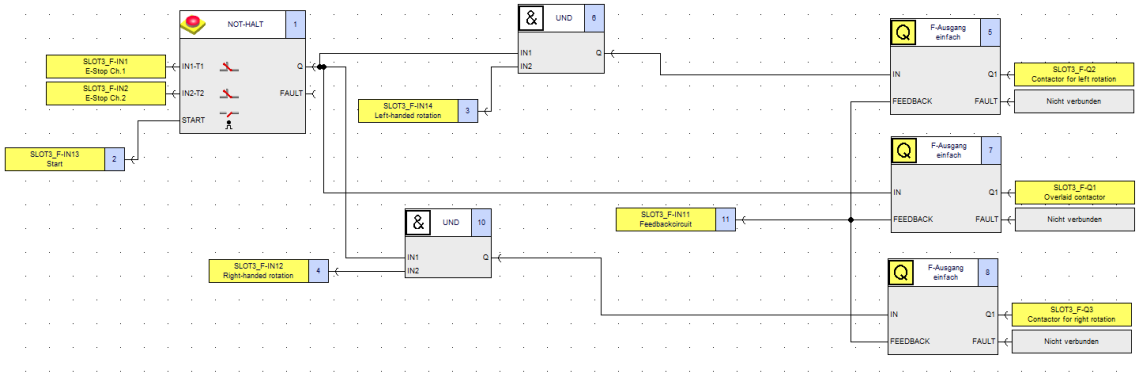
Note

The parameterization of 3SK1 devices are described in the circuit diagram with the position of the DIP switches. The specified position is represented by black marking.

3.4 SIL 3 reversing combination with 3SK2 safety relay

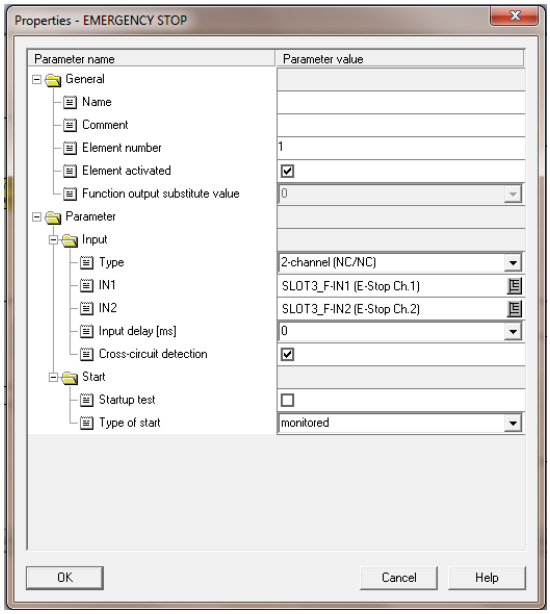


3.4.1 Logic diagram of the software SIRIUS Safety ES for the safety relay 3SK2

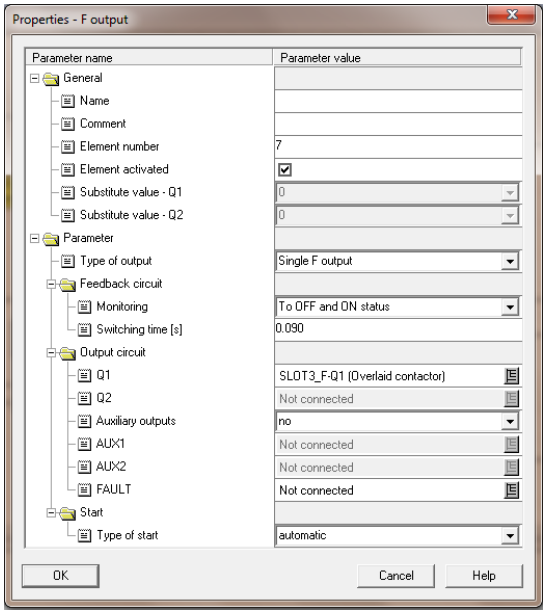


3.4.2 Adjustable parameter of the function elements in SIRIUS safety ES

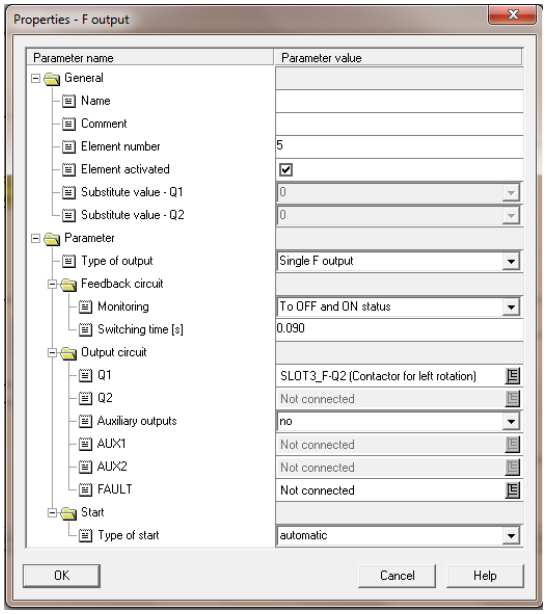
- Parameter of the software module: Emergency Stop



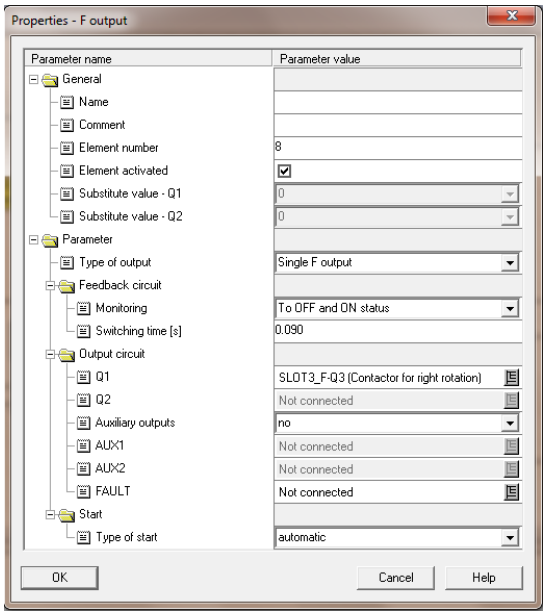
- Parameter of the software module: Single F-output Q1



- Parameter of the software module: Single F-output Q2



- Parameter of the software module: Single F-output Q3



4 Contact/Support

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