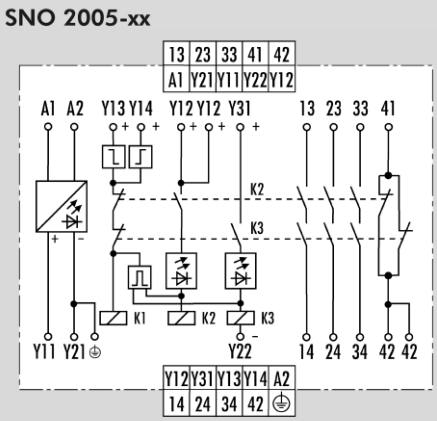
SNO 2005

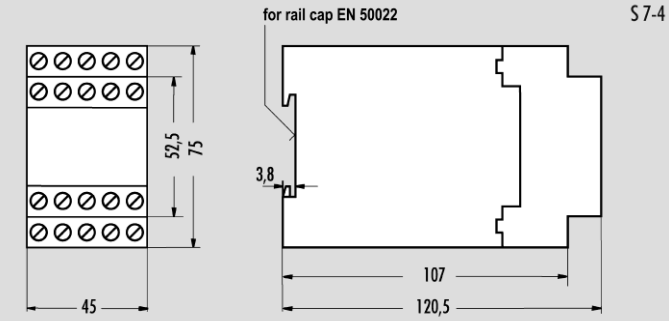
Basic unit for emergency stop and guard door applications

- Basi unit as per DIN EN 60204-1 and EN ISO 13849-1
- PL e / category 4 as per EN ISO 13849-1
- Stop category 0 as per DIN EN 60204-1
- SILCL 3 as per DIN EN 62061
- Cross-over detection with feedback circuit for monitoring external contactors
- One or twin channel emergency stop or guard door monitoring
- 3 enable circuits
- 1 signal circuit

Circuit diagram



Dimension diagram



Notes

- The performance level (PL) and the category as per EN ISO 13849-1 and SILCL as per EN 62061 depend on all external circuits, the application, the selection of command generator and their local arrangement on the machine.
- The emergency stop relay can be wired either cross-circuit-detecting or non-cross-circuit-detecting, depending on the level of safety required.
- The user must carry out a risk assessment as per DIN EN ISO 12100.
- On this basis you must carry out validation of the entire installation in accordance with the applicable standards.
- The quoted performance level is only reached if an average number of switching cycles is not exceeded, depending on the loading of the unit (see EN ISO 13849-1, Table C.1) and the specific application (see EN ISO 13849-1, C.2.4 and Table K.1). Using an assumed B_{10d} value for

Notes (continuation)

maximum load of 400,000 we get, for example, a maximum cycle number of 400,000 / 0.1 x 30 = 133,333 switching cycles/year

- To duplicate the enable circuits you can use the extension units or external contactors with positively guided contacts.
- The unit and the contacts must be protected with a max. I 6 A fuse operating class gG.
- Before the reset button is activated the emergency stop chain must be closed.

Also, please observe the information provided by your professional association!

Function

The unit is a twin-channel safety switch unit that is self-monitoring at every ON-OFF cycle, for emergency stop devices as per DIN EN 60204-1, which is fitted with a positively guided relay.
After application of power supply to terminals A1/A2 and if the emergency stop button is not actuated, relay K1 is excited using the reset button. The control logic of relay K1 actuates relays K2 and K3. Internal contacts produce self-holding. After this switch-on phase, the three enable circuits allocated to the output are closed (unit connection 13/14, 23/24, 33/34) and the signal circuit opened (unit connection 41/42). The display is provided by three LEDs which correspond to the safety channels and the supply voltage.
If the emergency stop button is actuated the power supply to the relays K2 and K3 is interrupted. The enable circuits at the output are opened and the signal circuit is closed.
With twin-channel wiring of the emergency stop button (see Installation 2) and cross-circuit detecting wiring of the emergency stop button circuit we also detect additional faults such as cross and chassis short-circuits.
An electronic fuse system protects the emergency stop relay from damage. After elimination of the cause of the fault, the unit will be ready for operation after approx. 2 seconds.
The emergency stop relay can be operated with/without reset button monitoring (unit connection Y13/Y14). With the reset button monitoring system the enable for the unit only takes place with the falling flank of the reset signal. In order to start, you will always need to actuate and release the reset button. An automatic start by bridging the reset button is not possible.

Applications

- Protection of people and machinery
- Monitoring of safety gates
- Protection measures in partial safety areas
- In association with automation systems

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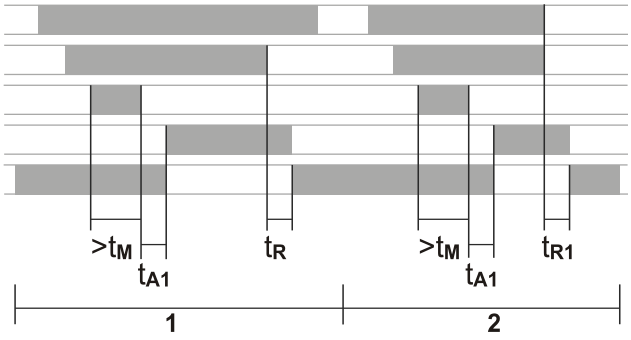
Function diagram

SNO 2005-xx
(1) Emergency stop via Y12, Y31
(2) interruption of the supply voltage

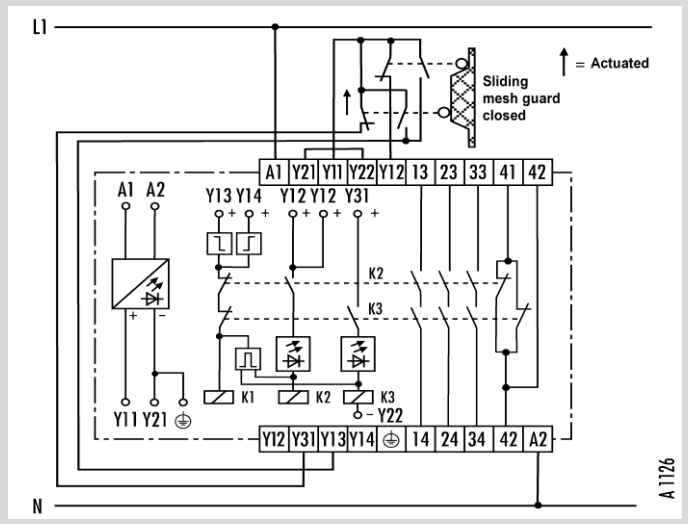


A1 / A2 supply voltage, LED Power
Y12, Y31 emergency - stop
Y13 reset (with reset button monitoring system)
K2, K3, 13/14, 23/24, 33/34, LED K2, LED K3
41/42

t_M = Minimum switch-on duration,
t_{A1} = response time (with reset button monitoring),
t_R = fall-back time with emergency - stop,
t_{R1} = fall-back time when power supply A1/A2 interrupted

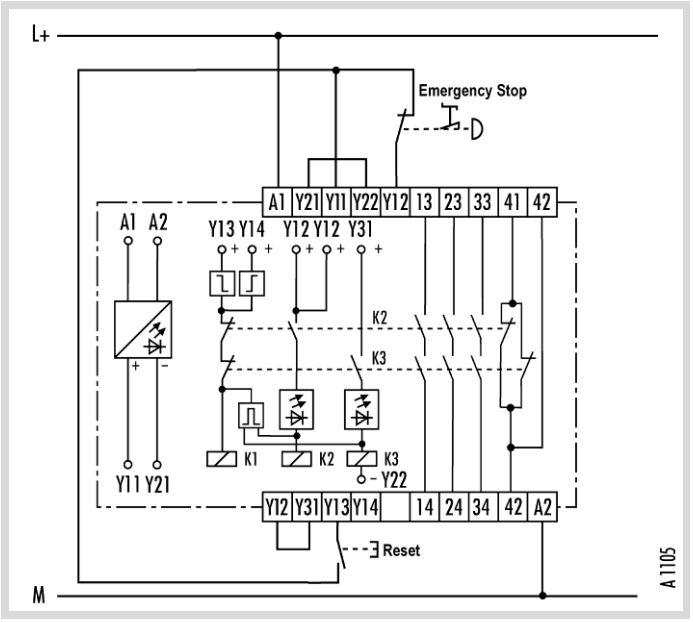
Application example

Dual channel sliding grate monitoring with automatic start (without cross-circuiting recognition)
In this application example, there is no simultaneity monitoring ($t_S = \infty$).

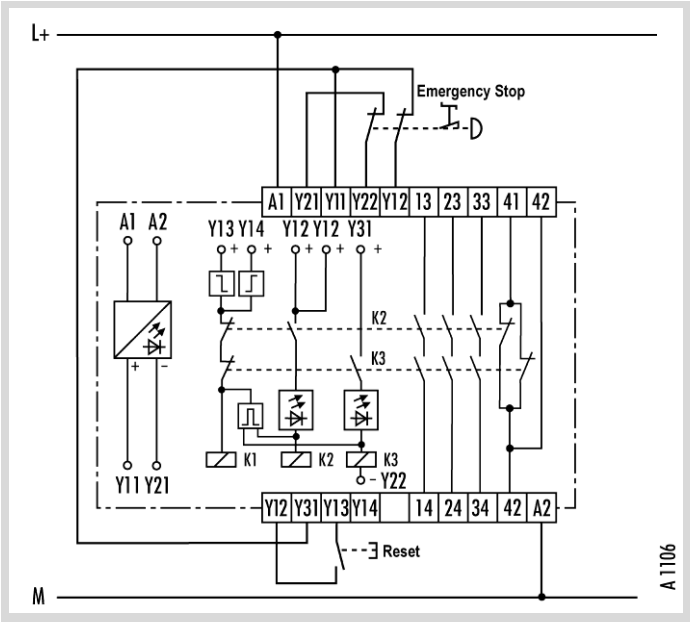


Application example

Single channel emergency stop control with manual start and feedback loop for monitoring external contactors
From Relay K3, both actuation connectors (Y31, Y22) are guided to terminals. With that, the connector to be toggled is freely selectable. The opposing side must be firmly positioned to Plus (Y11) or Minus (Y21) by a wire bridge. If the terminal (Y22) is firmly connected to Minus (Y21), an emergency stop button with only a single contact can be used.



Dual channel emergency stop toggle with feedback loop for monitoring external contactors (detects cross-current)
The dual channel emergency stop toggle also powers off if one of the two contacts on the emergency stop button does not open. If a fault occurs (one of the emergency stop contacts connected to Y12 fails to open), the safety toggle is activated by the second (redundant) contact Y22. Open the enabling current paths 13/14, 23/24 and 33/34. When the lines leading to the emergency stop button are closed, the voltage applied to Y11, Y21 is shorted (cross-current recognition). The relays K2, K3 re-toggle to the default position and the electronic fuse triggers. A line closure above the Reset button which has occurred after the activation of the relay is recognized via cyclical self-tests in the next power-on cycle, and an interconnection of the enabling current paths is prevented.



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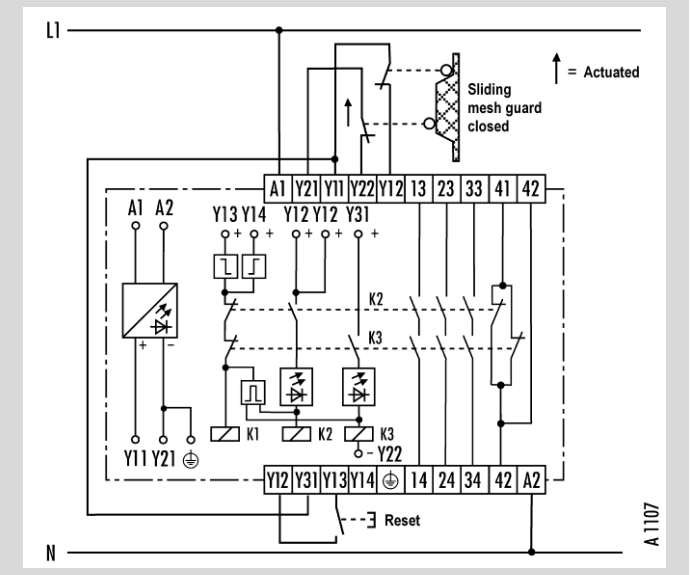
Application example

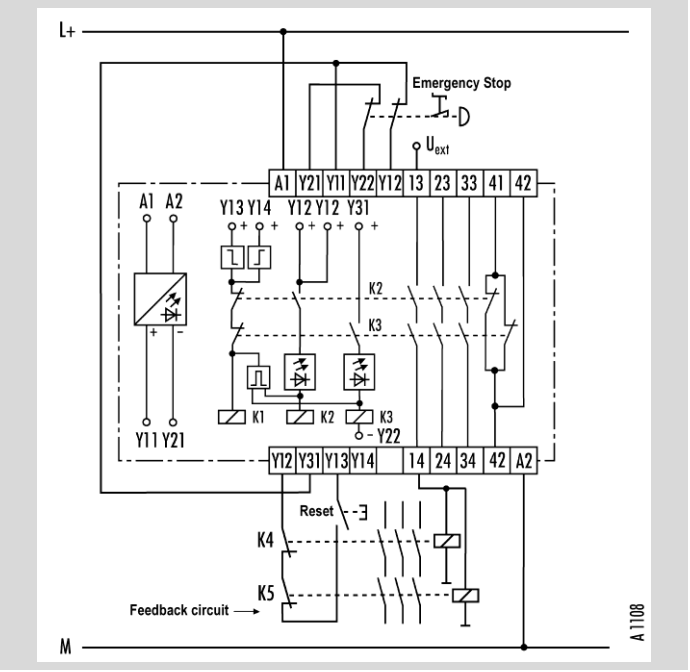
Dual channel sliding grate monitoring (with cross-current detection), with manual start and feedback loop for monitoring external contactors

The position of the sliding grate is monitored via Channel 1 (Y12) and Channel 2 (Y22). The SNO 2005-xx is activated via the Reset button. When the sliding grate opens, the emergency stop relay re-toggles to the Standby position (enabling current paths 13/14, 23/24, 33/34 open). When the safety gate is re-closed, the emergency stop relay can be reactivated via the Reset button.



External contact expansion

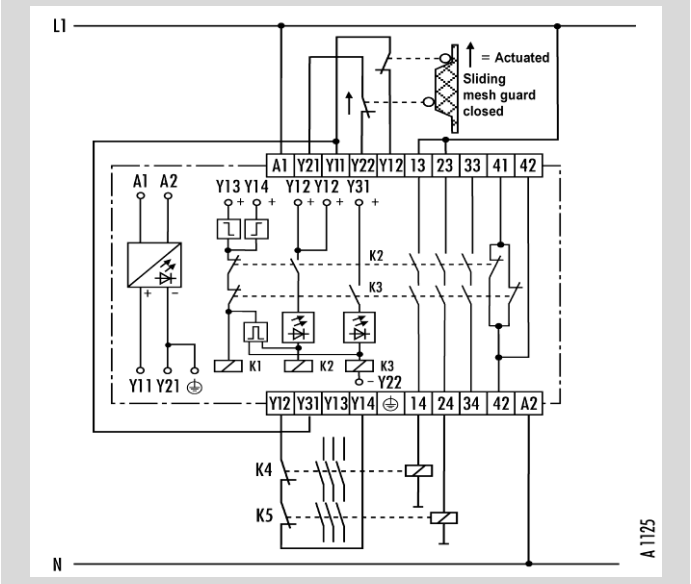
If the quantity of enabling current paths is insufficient, then two external contactors can be used for expansion. The activation occurs via one of the enabling current paths of the SNO 2005-xx. The function of the external contactors is monitored by its own "b" contact. The "b" contacts are toggled serially to the relay K1 (Y13). The contactors K4 and K5 must have positively driven contacts.



Application example

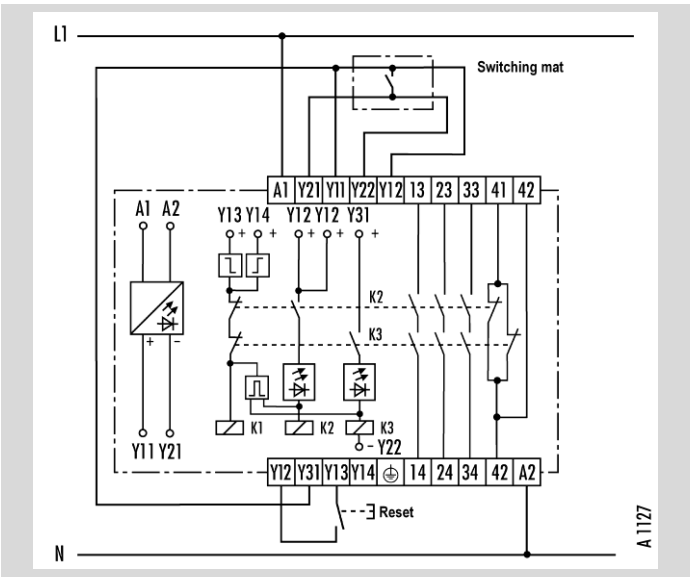
Dual channel sliding grate monitoring (with cross-current detection) with automatic start

The position of the sliding grate is monitored via Channel 1 (Y12) and Channel 2 (Y22). When operating Channel 1 (Y12) in front of Channel 2 (Y22) when closing, simultaneity Monitoring of approx. 0.5 s occurs. When Channel 2 (Y22) is activated in front of Channel 1 (Y12) when closing, the simultaneity monitoring (t = ∞) is powered off. When the sliding grate opens, the emergency stop relay re-toggles to the Standby position (enabling current paths 13/14, 23/24, 33/34 open). When the sliding grate is closed once again the activation of the emergency stop relay recurs via the die "b" contacts K4 and K5 (automatic start).



Dual channel toggle mat monitoring (cross-current detection) with manual start and feedback loop for monitoring external contactors

The function corresponds to that in the application example A 1106. In addition, all short-forming safety toggle mats, safety connecting blocks or safety toggle edges with positively drivenen, potential-free contacts can be connected. The toggle mat, connecting block and switching edges effectuate a short between two conductors. At a toggle mat, connecting block-, or switching edges resistance < 50 Ω / Channel and a short between the channels (Terminals Y11/Y12 and Y21/Y22), the device is powered off. The cross-current detecting version of the device enables this analysis and requires dual channel activation.



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Technical data	SNO 2005-xx				
Power supply circuit					
Nominal voltage U_N	24 V DC	24 V AC	115 V AC	120 V AC	230 V AC
Ripple in DC operation	2.4 V_{pp}	----	----	----	----
Power consumption DC	1 W	----	----	----	----
Power consumption AC	----	3.2 VA	3.2 VA	3.2 VA	3.2 VA
Operating voltage range	0.8 to 1.1 x U_N				
Nominal frequency in AC mode	50 Hz to 60 Hz				
Control circuit					
Galvanic separation supply circuit/control circuit	no	yes	yes	yes	yes
Nominal output voltage for supply to the inputs Y12, Y13, Y14, Y31	DC 24 V				
Max. open-circuit voltage	DC ≤ 40 V				
Fuse	short-circuit-proof transformer				
Response time t_{A1} K2, K3 (with reset button monitoring system Y13)	150 ms				
Response time t_{A2} K2, K3 (without reset button monitoring system Y14)	500 ms				
Fall-back time t_R K2, K3 with emergency stop	50 ms				
Fall-back time t_{R1} with interruption in power supply	100 ms				
Minimum switch-on duration t_M on Y13/Y14	50 ms				
Output circuit					
Contact allocation	3 Enable circuits (NO, positively guided); B300; R300 1 signal circuit (NC)				
Nominal switching voltage U_n	AC/DC 230 V				
Limit continuous current per circuit	240 V AC / 6 A; 24 V DC / 5 A				
Max. total current of all circuits	18 A				
Use category as per DIN EN 60947-5-1	AC 15: U_e AC 230 V, I_e 6 A (3600 Swi/h)				
	DC 13: U_e DC 24 V, I_e 6 A (360 Swi/h)				
Fused short-circuit current as per DIN EN 60947-5-1	1000 A				
Short-circuit protection	Safety insert max. 6 A Class gG				
General data					
Rated voltage	300 V				
Rated surge voltage	4 kV				
Protection rating housing/terminals as per DIN EN 60529	IP 40 / IP 20				
Insulation	Air and creepage distances between the circuits as per DIN EN 60664-1				
Contamination level	3 external, 2 internal				
Ambient/storage temperature	-25 … +55 °C / -25 … +70 °C				
Weight	0.36 kg				
Connection data					
Connection cross-sections	2 x 0.75 mm2 to 2.5 mm2 single wire or 2 x 0.5 mm2 to 1.5 mm2 fine wire with core ferules or 1 x 0.75 mm2 to 2.5 mm2 single wire together with 1 x 0.5 mm2 to 1.5 mm2 fine wire with core ferules				
Maximum tightening torque	0.8 to 1 Nm				
For UL and CSA Approvals					
Connection cross-sections	AWG 26 - 14 use copper conductors only; 60 °C / 75 °C (140 °F / 167 °F)				
Maximum tightening torque	5 – 7 in-lbs (0,56 – 0,79 Nm)				

Overview of devices / Part numbers

Type	Rated voltage	Terminals	Part no.
SNO 2005-17	DC 24 V	screw terminals, fixed	R1.188.0359.1
SNO 2005-24	AC 24 V 50-60 Hz	screw terminals, fixed	R1.188.0399.1
SNO 2005-115	AC 115 V 50-60 Hz	screw terminals, fixed	R1.188.0379.1
SNO 2005-120	AC 120 V 50-60 Hz	screw terminals, fixed	R1.188.0369.1
SNO 2005-230	AC 230 V 50-60 Hz	screw terminals, fixed	R1.188.0389.1

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