MINOS SD1K

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Product Information



Safe Coupling Relay MINOS SD1K

1. Features

- Use up to PL e, Cat. 4, SILCL 3
- Certified for operation in furnaces and vessels according to EN 50156-1 / EN 746-2
- Stop Category 0 according to EN 60204-1
- 1 safe relay contact
- 1 auxiliary output (PNP)
- Feedback circuit
- 6.8 mm width
- Extensive monitoring via front LED‘s

2. Function

Feedback Circuit S21

If a feedback loop is necessary, e.g for the monitoring of contactors, it has to be wired via terminal S21. See details in chapter 15 "Wiring / Applications - Feedback Circuit SD1K.

Safe relay contact 13-14

By applying the control line at A1/A2, the safe relay contact will close immediately.
Turning of the power supply leads to an open relay contact.

Auxiliary output C1

The auxiliary output C1 switches inverted to the safe relay contacts.

Hint:

The auxiliary contact can be used for the failure monitoring of the SD1K. A non switching of the relay contacts with present control line will be detected.

Behaviour in case of a fault

It is ensured that one single fault does not lead to loss of the safety function and that every fault is detected latest when the system is switched off and switched on again through cyclic self-monitoring.

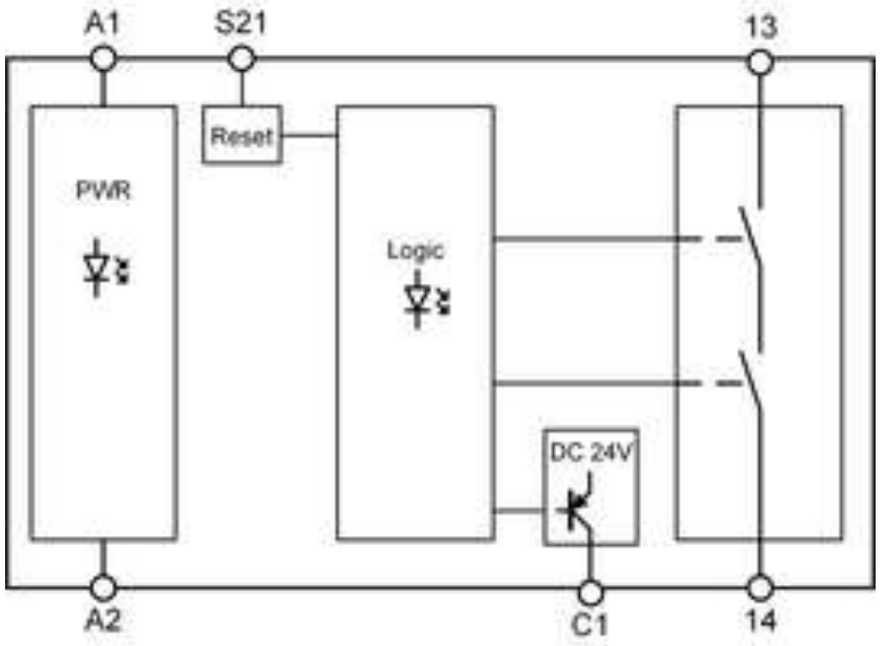


Fig. 1 Block diagram SD1K

3. Application example

Application example

SD1K as contact reinforcement and test pulse filtering for safe PLC output up to PL e/ SILCL 3

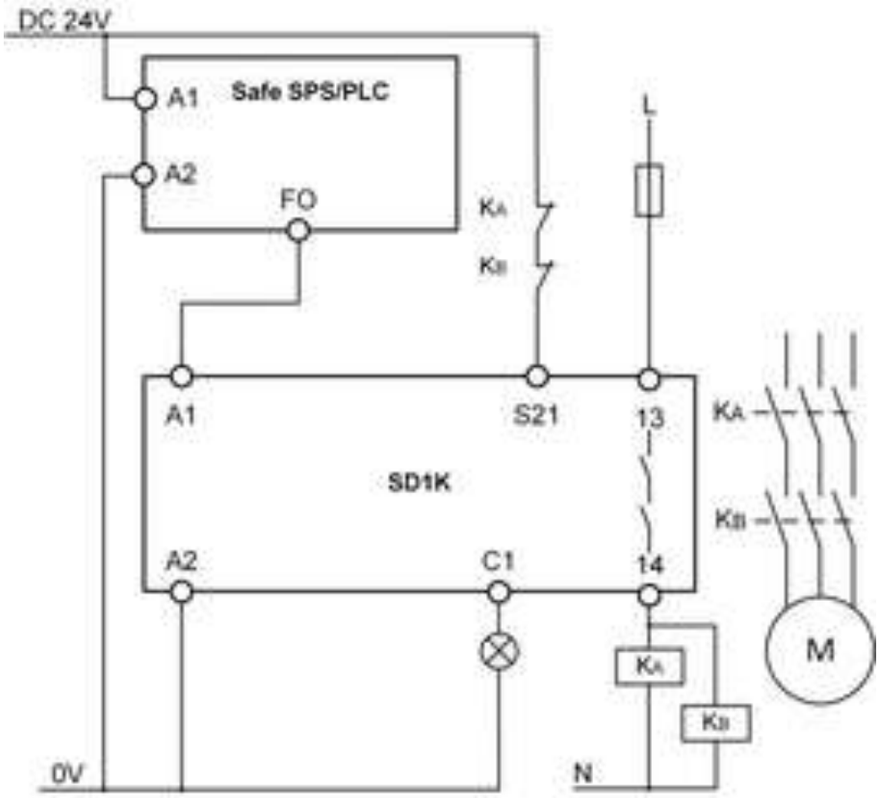


Fig. 2 Contact reinforcement and test pulse filtering for safe PLC outputs

Prerequisite: Safe PLC output meets the required safety level and short circuit between PLC output and SD1K can be excluded (e.g. wiring inside an electrical installation space - see EN ISO 13849-2:2013:02, Tab D4 / D5).

Legend

KA/KB: Positively driven contactors;

Monitoring via feedback circuit

PL and SILCL: According to EN ISO 13849-1 and IEC 62061.

Specified safety level, considering a fault exclusion in the wiring between SD1K and the connected contactors KA and KB. See details in chapter 15 "Wiring / Applications - Safe relay contact":

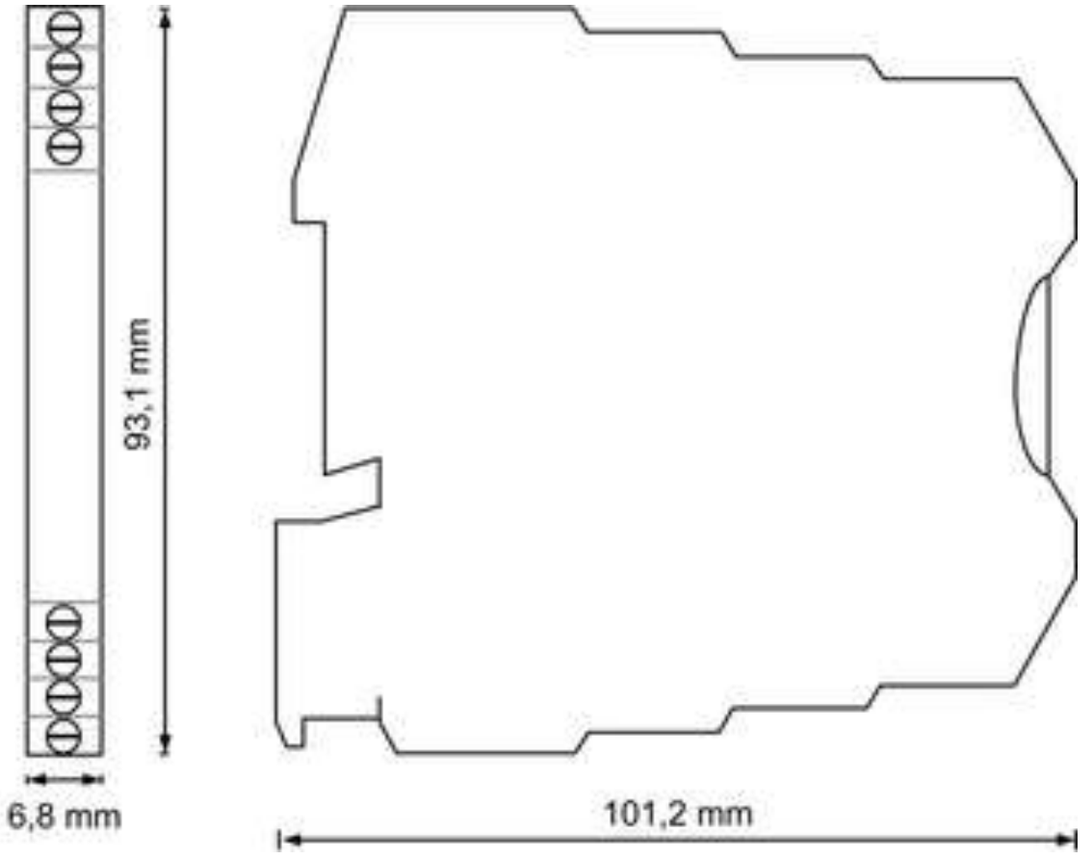
4. Terminal assignment and LED display



A1:	Control Line + DC 24 V
A2:	Control Line 0 V
S21:	Control line feedback circuit
N.C.:	Not Connected - No function
SD1K:	Variant label
Label - Upper terminal block	
Label - Lower terminal block	
Monitoring LEDs: UB, K1/2 (see monitoring table)	
N.C.:	Not Connected - No function
13:	Safe Relay Contact
14:	Safe Relay Contact
C1:	Auxilliary Output

Fig. 4 Front View SD1K

5. Dimensions



6. Safety parameters

ATTENTION:

According to CNB / M / 11.050, a request for the safety function is recommended at the following intervals:

- Once a month for applications up to PL e with Cat. 3 or Cat. 4 or SIL CL3, SIL 3 with HFT = 1
- Once a year for applications up to PL d with Cat. 3 or SIL CL 2, SIL 2 with HFT = 1

The following table shows the safety parameters for the different wirings of the safety circuit according to chapter 15 "Wiring / Applications".

Safety parameters according to EN ISO 13849-1

Conditions:
AC-15: 5 A; Max. 10.000 Switching-Cycles / Year
DC-13: 4 A; Max. 15.000 Switching-Cycles / Year

Max. duration of use [Years]	20
Category	4
PL	e
PFHd [1/h]	1.2E-08

Safety parameters according to IEC 61508 - High-Demand, Request Rate < 1 Year

Conditions:
AC-15: 5 A; Max. 10.000 Switching-Cycles / Year
DC-13: 4 A; Max. 15.000 Switching-Cycles / Year

Max. duration of use [Years]	20
Proof-Test-Intervall [Years]	20
PFH [1/h]	1.2E-10
SIL	3

Safety parameters according to IEC 61508 - Low-Demand, Request Rate ≥ 1 Year

Conditions:
AC-15: 5 A
DC-13: 4 A

Max. duration of use [Years]	20
Proof-Test-Intervall [Years]	9
PFD_{AVG}	9.87E-05
SIL	3

7. Technical data

Standards	
Meets the following standards	EN ISO 13849-1; IEC 62061; IEC 61508; EN 50156-1; EN 746-2IEC 61511-1; EN 60204-1
Electrical data	
Operating voltage	U_B: DC 24 V ± 10 %
Power consumption at U_B = 24 V	1.5 W
Filter time at A1, U_B= 2kV Dark test pulse Light test pulse	 Max. 2 ms pulse width at 200 ms pulse rate Max. 1 ms pulse width at 200 ms pulse rate Note: It must be ensured that any switch-on pulses (light test) sent by the signal generator do not lead to a short activation of the safety relay and should therefore basically be deactivated.
Feedback circuit S21	
Input current at high level	max. 7 mA
Galvanic isolation	no
Low level	0 V to 5 V
High level	21.6 to 26.4 V

Safe relay contact 13-14	
Structure	Redundant relay contact
Max. Contact rating (6 switching cycles/ min)	AC-15: 5 A, AC 230 V DC-13: 4 A, DC 24 V See derating characteristics in chapter 21.
Min. switching voltage / current	AC/DC 12 V / 3 mA
Min. switching power	60 mW
External fuses	6 A gG Factor 0.6 for applications acc. to EN 50156-1, chapter 10.5.5.3.4
Mech. Service life	approx. $1x10^7$ cycles
Contact material	$AgSnO_2$
Auxiliary output C1	
Structure	PNP output, single channel
Maximum switching capacity	100 mA
Galvanic isolation	no
Short-circuit-proof	yes
Output voltage at "1" (max. load) / "0"	U_B - 2 V / 0 V
Timings	
Time till module is ready for operation after power-on	< 50 ms
Max. switch-on delay	< 20 ms
Off-delay	< 20 ms
Recovery time	< 50 ms

Environmental data	
Ambient temperature	-15 °C to 55 °C - See chapter 21 “Derating”
Storage temperature	-15 °C to 80 °C
Humidity rating	93 % relative humidity at + 40 °C, non-condensing
Vibration / Shocks	10 Hz to 150 Hz, 2g / 15 g
EMC	in accordance with EN 61326-3-1
Maximum altitude	≤ 2000 m (Above sea level)
General data	
Clearance and creepage distances in accordance with EN 60664-1	According EN 60664-1
Overvoltage category	III (in accordance with DIN VDE 0110-1)
Pollution degree	2 (in accordance with DIN VDE 0110-1)
Rated insulation voltage	50 V (For SELV/PELV circuit) 250 V (Between relay circuit and SELV/PELV circuit)
Rated surge voltage strength	800 V - Basic insulation for SELV/PELV circuit 6 kV - Safe insulation, reinforced insulation between relay circuit and SELV/PELV circuit
Degree of protection	IP20
Minimum degree of protection of installation space	IP54
Mounting	DIN rail
Installation position	vertical, horizontal
Dimensions (W x H x D)	6.8 x 93.1 x 102.5 mm
Weight	50 g (module without packaging)
Housing material	PBT, blue
Cross section of conductor - Rigid / flexible - AWG min/max	 0.2 mm² to 2.5 mm² 16/14

8. Derating

Maximum current at safe relay contact 13-14 depending at on the ambient temperature.

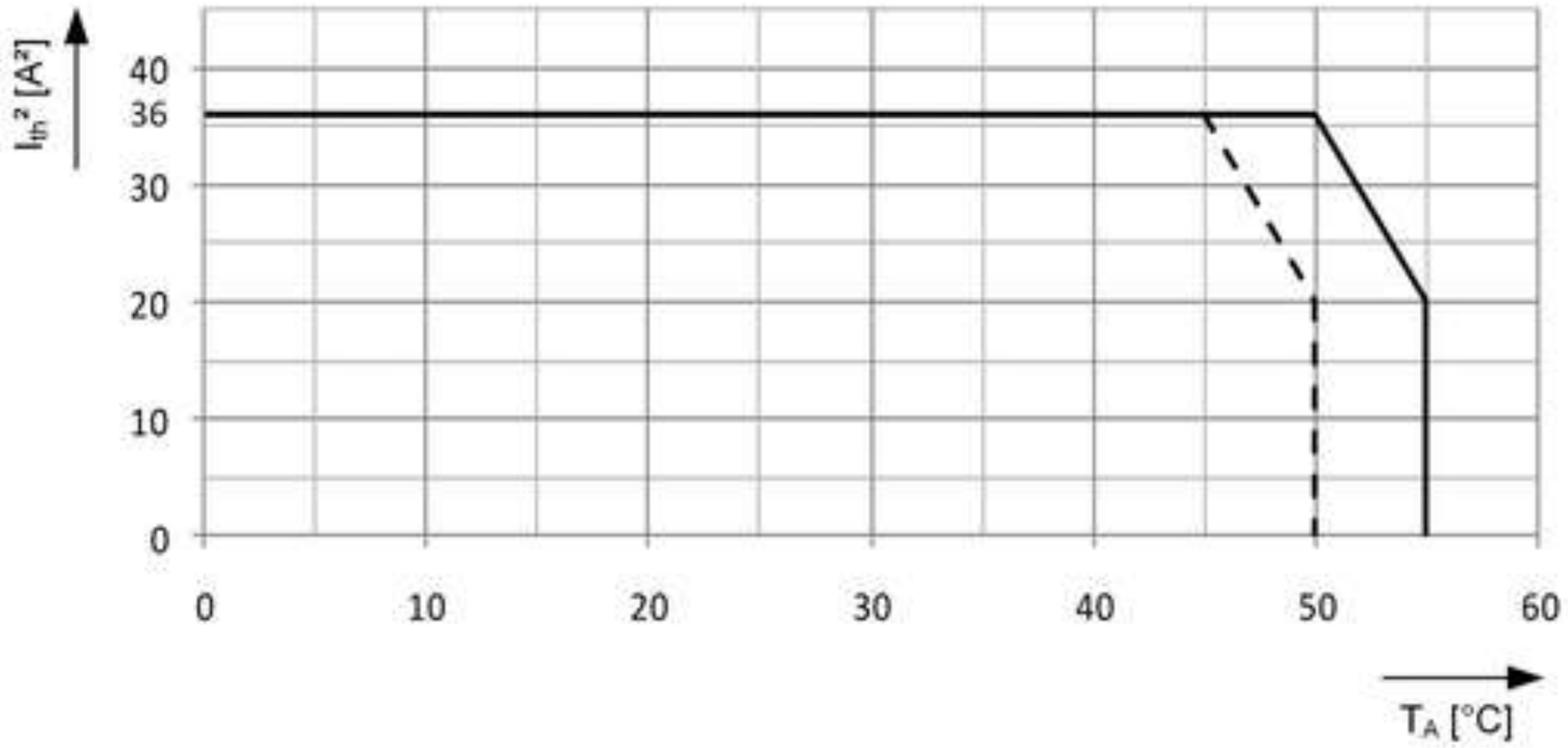


Fig. 5 Derating curve

——— U_B = DC 24 V and 0 mm clearance to adjacent devices with same load

– – – – U_B = DC 26,4 V and 0 mm clearance to adjacent devices with same load

9. Variants / Order No.

MINOS SD1K

Order No.	Type	Application
472851	SD1K	Safe couple relays for galvanic separated contact reinforcement at machines and plants.

10. Contact / Service

For service requirements, contact
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