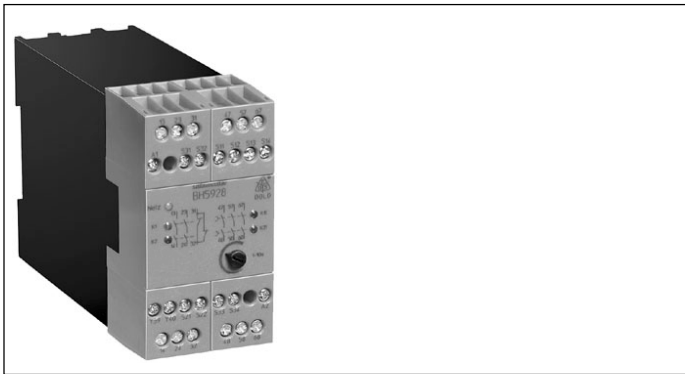
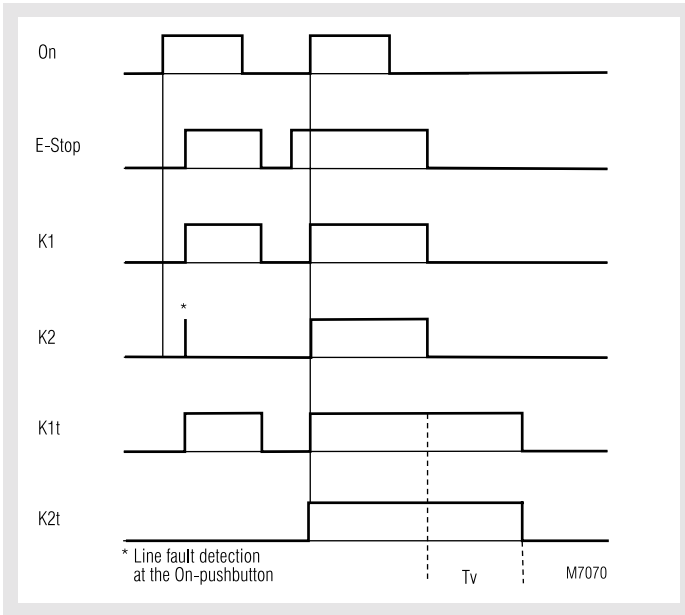


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- According to EU directive for machines 98/37/EG
- According to IEC 204, EN 60204, DIN VDE 0113-1, EN 954-1
- Safety category 4 according to DIN EN 954-1
- Output: 3 NO or 2 NO, 1 NC instantaneous contacts and 3 NO release delayed contacts
- Single and 2-channel operation
- Line fault detection on On-button, when On-button is connected to S33-S34
- Manual restart with button on S33-S34 or automatic restart with bridge between S13-S14
- With or without cross fault monitoring in the E-stop loop
- LED indication for supply, channel 1/2 and release delayed contacts
- Removable terminal strips
- Wire connection: also 2 x 1,5 mm<sup>2</sup> stranded ferruled (isolated), DIN 46 228-4 or 2 x 2,5 mm<sup>2</sup> stranded ferruled DIN 46 228-1/-2/-3
- Width  
BH 5928: 45 mm  
BI 5928: 67,5 mm

### Function diagram



### Approvals and marking



\* BH5928 approved  
BI 5928 pending

### Applications

- Protection of people and machines
- Emergency stop circuits on machines
  - Monitoring of safety gates
  - Stop category 1 can be realised

### Indication

upper LED: on, when supply connected  
lower LEDs: on, when relay K1 and K2 resp. K1t and K2t energized

### Notes

To select automatic restart terminals 13 - 14 must be bridged. Open terminals 13 - 14 select manual restart, the On-button must then be connected to S33 - S34.

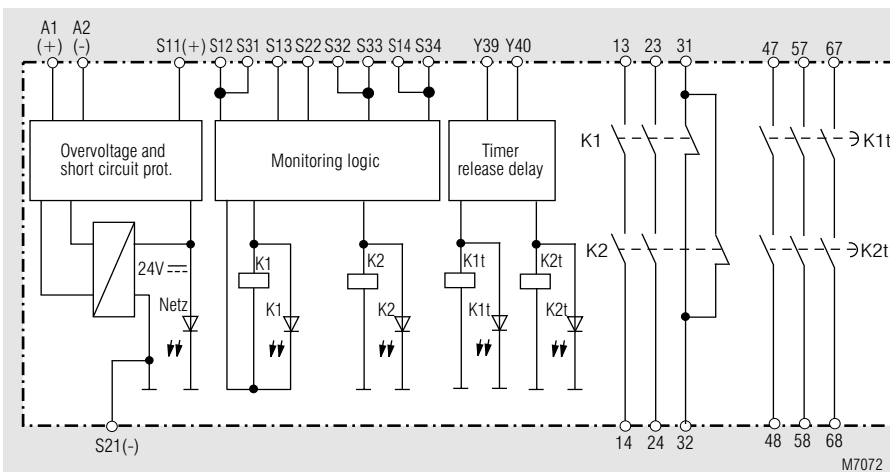
Line fault detection on On-button:

The line fault detection is only active when S12 and S22 are switched simultaneously. If the On-button is closed before S12, S31, S32 is connected to voltage (also when line fault across On-button), the output contacts will not close.

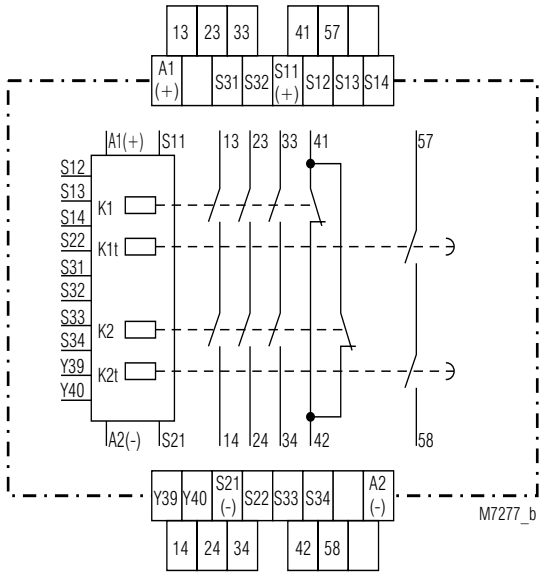
A line fault across the On-button which occurred after activation of the relay, will be detected with the next activation and the output contacts will not close. If a line fault occurs after the voltage has been connected to S12, S31, S32, the unit will be activated because this line fault is similar to the normal On-function.

The unit can be operated with single channel and 2-channel operation with cross fault monitoring. For connection please refer to application examples.

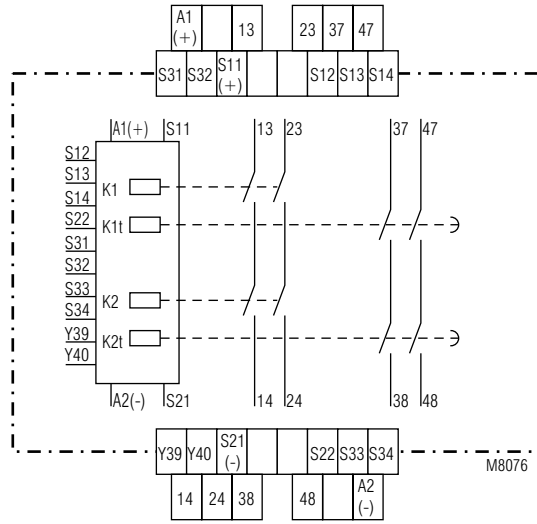
### Block diagram



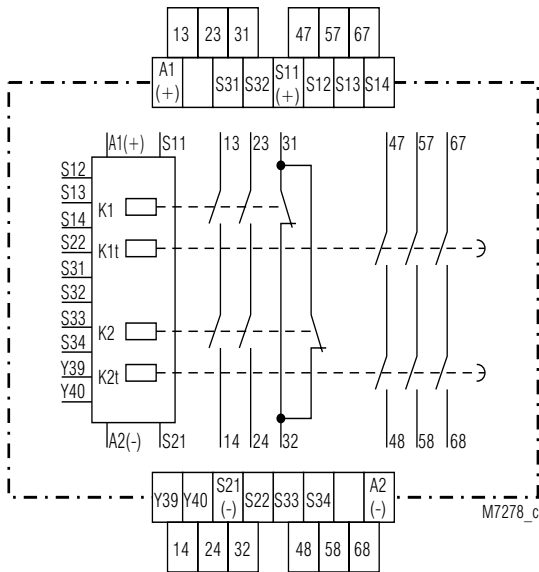
**Circuit diagrams**



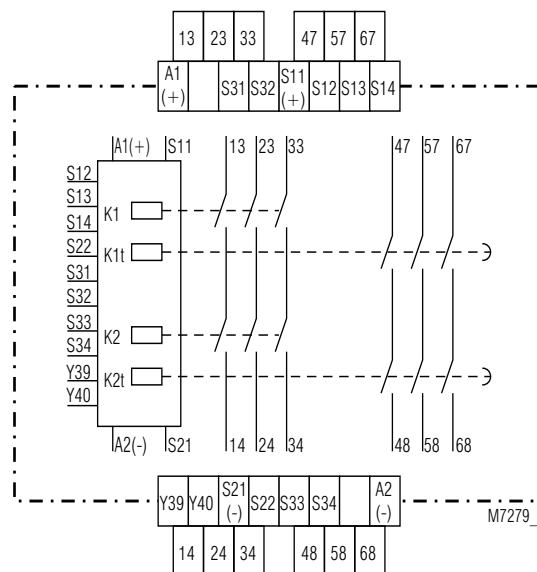
BH 5928.47



BH 5928.91

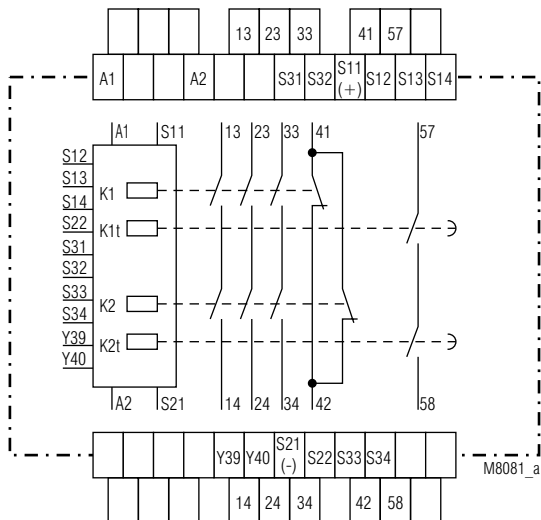


BH 5928.92

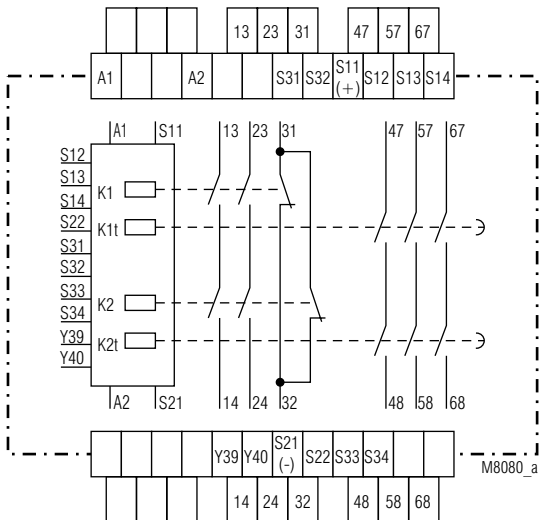


BH 5928.93

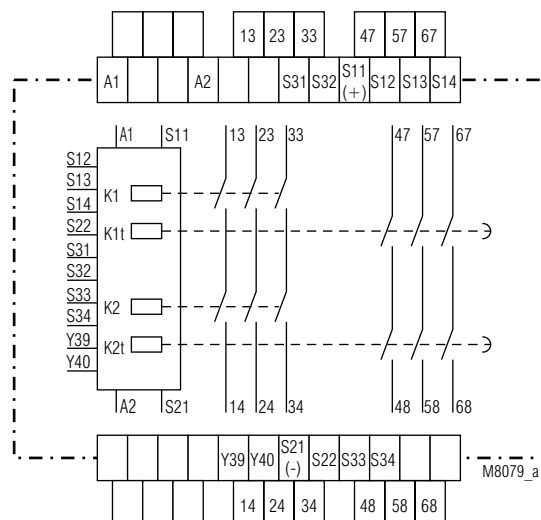
## Circuit diagrams



BI 5928.47



BI 5928.92



BI 5928.93

## Notes

The gold plated contacts of the BH 5928 mean that this module is also suitable for switching small loads of 1 mA - 7 VA, 1 mW - 7 W in the range 0,1 - 60 V, 1 - 300 mA. The contacts also permit the maximum switching current. However since the gold plating will be burnt off at this current level, the device is no longer suitable for switching small loads after this. The terminal S21 permits the operation of the device in IT-systems with insulation monitoring, serves as a reference point for testing the control voltage and is used to connect the E-stop loop when cross fault monitoring is selected.

Connecting the terminal S21 to the protective ground bridges the internal short-circuit protection of Line A2(-). The short-circuit protection of line A1(+) remains active.

Y39 - Y40 must be closed to have timed outputs. By opening the bridge between Y39 and Y40 the time delay can be interrupted immediately. Without bridge the contacts switch without delay.

The time setting has to be sealed by the user after test.

## Technical data

### Input

#### Nominal voltage $U_N$ :

BH 5928: DC 24 V, AC/DC 24 V  
BI 5928: AC 110 V, 230 V

#### Voltage range:

AC  
0,85 ... 1,1  $U_N$   
DC AC/DC

at 10% residual ripple:

0,9 ... 1,1  $U_N$  0,95 ... 1,1  $U_N$

at 48% residual ripple:

0,8 ... 1,1  $U_N$  0,8 ... 1,1  $U_N$

#### Nominal consumption:

AC approx. 6,0 VA  
DC approx. 3,5 W

#### Nominal frequency:

50 / 60 Hz

#### Min. Off-time:

1 s

#### Control voltage on S11:

DC 23 V at  $U_N$

#### Control current over

##### S12, S32:

40 mA at  $U_N$  each

#### Min. voltage on

##### S12, S32:

DC 21 V when relay activated

#### Short-circuit protection:

Internal PTC

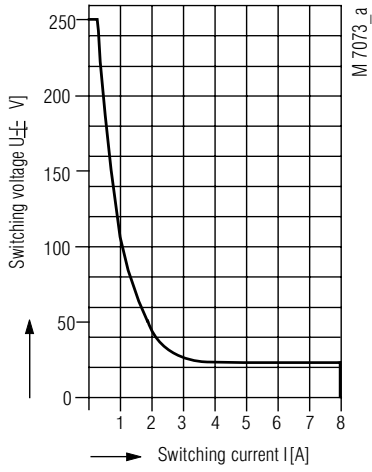
#### Overvoltage protection:

Internal VDR

Technical data	
<b>Output</b>	
<b>Contacts</b>	
BH 5928.47, BI 5928.47:	3 NO, 1 NC contacts instantaneous and 1 NO contact release delayed
BH 5928.91:	2 NO contacts instantaneous, and 2 NO contacts release delayed
BH 5928.92, BI 5928.92:	2 NO, 1 NC contacts instantaneous and 3 NO contacts release delayed
BH 5928.93, BI 5928.93:	3 NO contacts instantaneous and 3 NO contacts release delayed
<b>Operate delay typ. at U<sub>N</sub>:</b>	
Manual start:	40 ms
Automatic start:	500 ms
<b>Release delay typ. at U<sub>N</sub>:</b>	
Disconnecting the supply:	40 ms
Disconnecting S12, S22, S31 and S32:	15 ms
<b>Time delay tv</b> (release delayed):	Auxiliary supply must be connected for time delay Time ranges: 0,1 ... 1 s      3,0 ... 30 s 0,3 ... 3 s      6,0 ... 60 s 0,5 ... 5 s      30 ... 300 s 1,0 ... 10 s Other ranges or values on request Fixed values: 1 s, 3 s, 5 s, 10 s, 300 s ± 1 % of setting value
<b>Repeat accuracy:</b>	positive guided
<b>Contact type:</b>	positive guided
<b>Nominal output voltage:</b>	AC 250 V DC: see limit curve for arc-free operation
<b>Max switching current:</b>	DC: see limit curve for arc-free operation
<b>Switching of low loads:</b> (Contact 5 μ Au)	≥ 100 mV ≥ 1 mA
<b>Thermal current I<sub>th</sub>:</b> in 1 contact path:	max. 5 A
<b>Switching capacity</b> to AC 15	
NO contact:	AC 3 A / 230V      EN 69 947-5-1
NC contact	AC 2 A / 230 V      EN 60 947-5-1
to DC 13:	AC 8 A / 24 V      EN 60 947-5-1
<b>Electrical life</b> to AC 15 at 2 A, AC 230 V:	10 <sup>5</sup> switching cycles      EN 60 947-5-1
<b>Permissible operating frequency:</b>	max. 1200 switching cycles / h with manual restart and short release delay time
<b>Short circuit strength</b> max. fuse rating:	6 A gL      EN 60 947-5-1
line circuit breaker:	C 8 A
<b>Mechanical life:</b>	10 x 10 <sup>6</sup> switching cycles
<b>General data</b>	
<b>Operating mode:</b>	Continuous operation
<b>Temperature range:</b>	- 15 ... + 55 °C
<b>Clearance and creepage distances</b>	
overvoltage category / contamination level:	4 kV / 2      IEC 60 664-1
<b>EMC</b>	
Electrostatic discharge:	8 kV (air)      EN 61 000-4-2
HF irradiation:	10 V / m      EN 61 000-4-3
Fast transients:	2 kV      EN 61 000-4-4
Surge voltages between wires for power supply:	1 kV      EN 61 000-4-5
between wire and ground:	2 kV      EN 61 000-4-5
HF-line-conducted:	10 V      EN 61 000-4-6
Interference suppression:	Limit value class B      EN 55 011
<b>Degree of protection:</b>	Housing: IP 40      EN 60 529 Terminals: IP 20      EN 60 529
<b>Housing:</b>	Thermoplastic with V0 behaviour according to UL subject 94
<b>Vibration resistance:</b>	Amplitude 0,35 mm      EN 60 068-2-6 frequency 10 ... 55 Hz

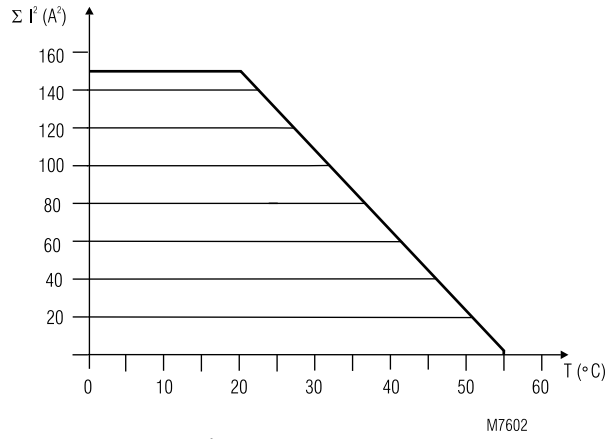
Technical data	
<b>Climate resistance:</b>	15 / 055 / 04      EN 60 068-1
<b>Terminal designation:</b>	EN 50 005
<b>Wire connection:</b>	1 x 4 mm <sup>2</sup> solid or 1 x 2,5 mm <sup>2</sup> stranded ferruled (isolated) or 2 x 1,5 mm <sup>2</sup> stranded ferruled (isolated) DIN 46 228-1/-2/-3/-4 or 2 x 2,5 mm <sup>2</sup> stranded ferruled DIN 46 228-1/-2/-3
<b>Wire fixing:</b>	Box terminal with wire protection, removable terminal strips
<b>Mounting:</b>	DIN rail      EN 50 022
<b>Weight:</b>	400 g
<b>Dimensions</b>	
<b>Width x height x depth:</b>	
BH 5928:	45 x 84 x 118 mm
BI 5928:	67,5 x 84 x 118 mm
<b>Standard type</b>	
BH 5928.93 DC 24 V 0,5 ... 5 s	
Article number:	0050369
• Output:	3 NO contacts instantaneous and 3 NO contacts release delayed
• Nominal voltage U <sub>N</sub> :	DC 24 V
• Time delay tv:	0,5 ... 5 s
• Width:	45 mm
<b>Variants</b>	
BH 5928._ _/001:	with fix time delay fixed times: 1 s, 3 s, 5 s, 10 s, 300s other times on request
BH 5928.91/002:	with absolute time scale time ranges: 0,3 ... 3 s, 3 ... 30 s contact fusing 6 A fast, 4 A slow for DC 24 V
<b>Ordering example for variants:</b>	
B_ 5928. _ _ / _ _ _ AC/DC 24 V 50/60 Hz 1... 10 s	
	0,1 ... 1 s 0,3 ... 3 s 0,5 ... 5 s 1 ... 10 s 30 ... 300 s for fixed time end of scale value, other ranges on request only for AC/DC at BH 5928: DC 24 V at BI 5928: AC 230 V /000 standard, not stated in type number (for settable time ranges) /001 fixed time .47 = 3 NO contacts, 1 NC contact instantaneous and 1 NO contact release delayed .91 = 2 NO contacts instantaneous and 2 NO contacts release delayed (only at BH 5928) .92 = 2 NO contacts, 1 NC contact instantaneous and 3 NO contacts release delayed .93 = 3 NO contacts instantaneous and 3 NO contacts release delayed H: width 45 mm I: width 67,5 mm

## Characteristics



safe breaking, no continuous arcing under the curve, max. 1 switching cycle/s

Arc limit curve for resistive load



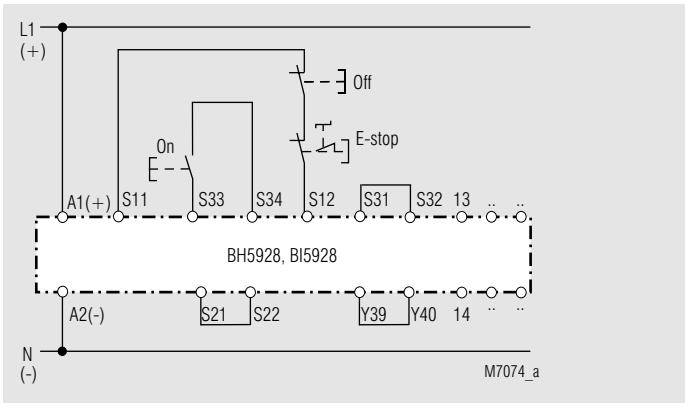
$$\Sigma I^2 = I_1^2 + I_2^2 + \dots + I_6^2$$

I<sub>i</sub> ÷ I<sub>6</sub> - Current in contact paths

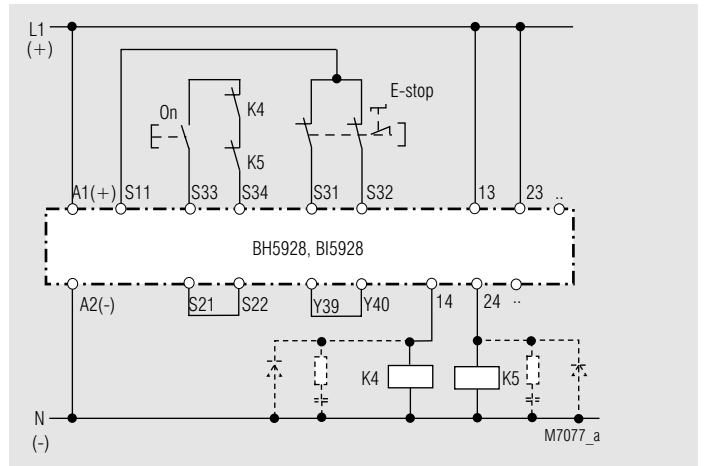
Max. current at 55°C over 3 contact paths = 0,5 A  $\hat{=}$  0,5<sup>2</sup> x 6 = 1,5 A<sup>2</sup>

Quadratic total current limit curve

## Application examples

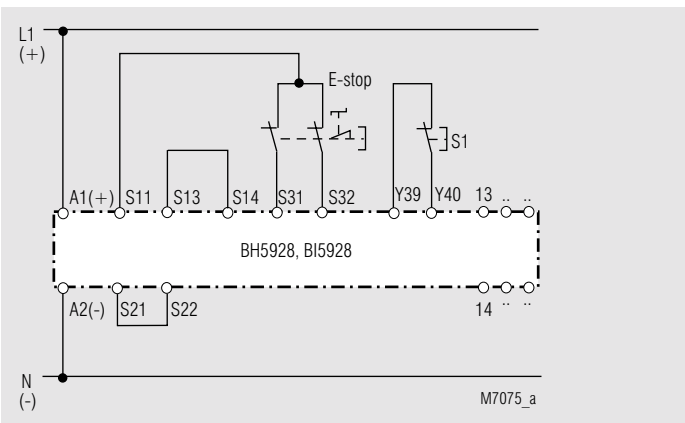


Single channel emergency stop circuit. This circuit does not have any redundancy in the emergency-stop control circuit

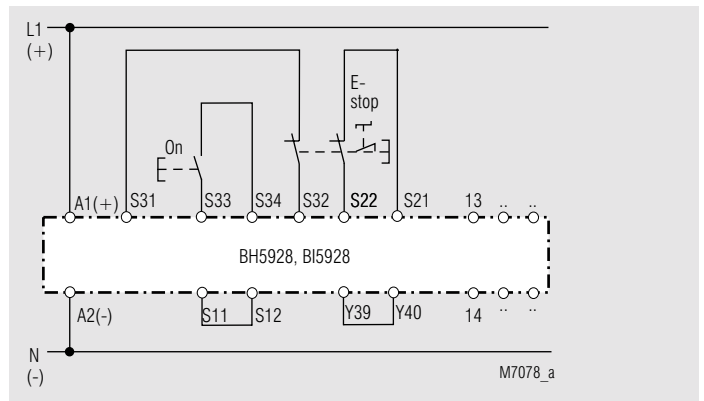


Contact reinforcement by external contactors, 2-channel controlled. The output contacts can be reinforced by external contactors with positive guided contacts for switching currents > 5 A.

Functioning of the external contactors is monitored by looping the NC contacts into the closing circuit (terminals S13-S14 or S33-S34)

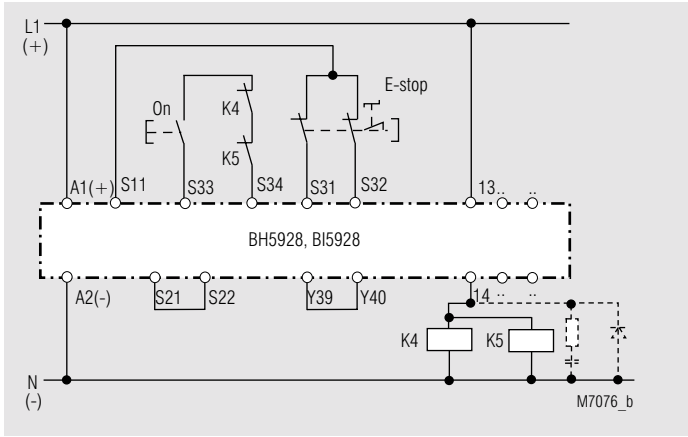


2-channel emergency stop circuit without cross fault monitoring autostart and interruption of time by S1

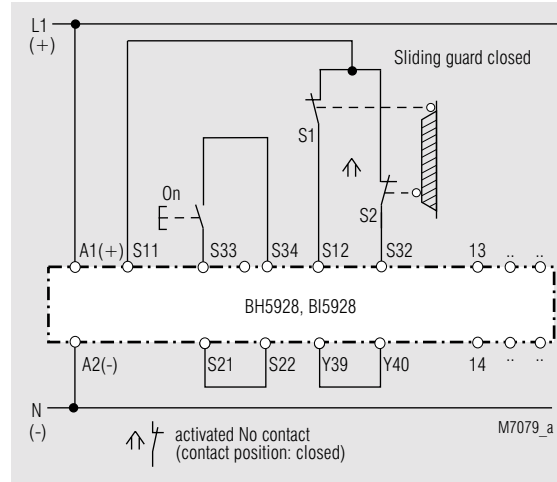


2-channel emergency stop circuit with cross fault detection

## Application examples



Contact reinforcement by external contactors controlled by one contact path.



2-channel safety gate monitoring

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