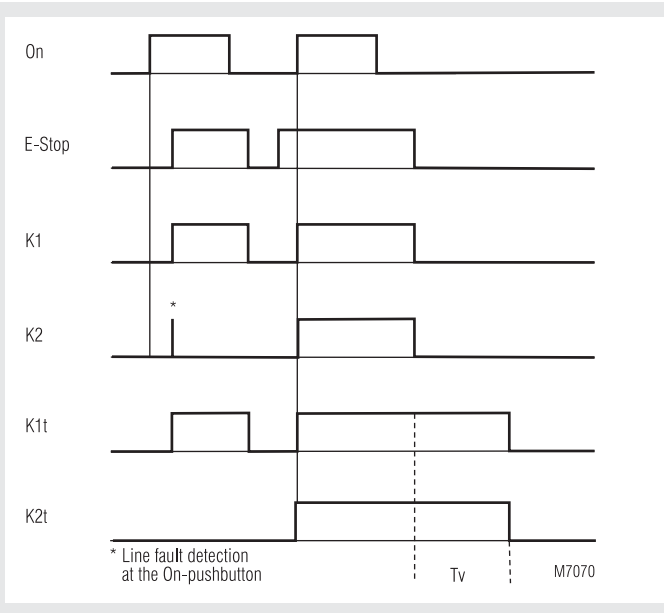


- According to EU directive for machines 98/37/EG
- According to IEC/EN 60 204, EN 954-1
- Safety category 4 according to EN 954-1
- Output: 3 NO or 2 NO, 1 NC instantaneous contacts and 3 NO release delayed contacts
- Single and 2-channel operation
- Line fault detection on On-button, when On-button 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 mm² stranded ferruled (isolated), DIN 46 228-1/-2/-3/-4 or 2 x 2,5 mm² stranded ferruled DIN 46 228-1/-2/-3
- BI 5928.50 with 2 separate time adjustments for nominal voltage AC/DC 24 V
- Width
BH 5928: 45 mm
BI 5928: 67,5 mm

Function diagram



Approvals and marking



* see variants

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. K1 _t and K2 _t energized

Notes

To select automatic restart terminals S13 - S14 must be bridged, S33 - S34 must be opened. Open terminals S13 - S14 select manual restart, the On-button must then be connected to S33 - S34.

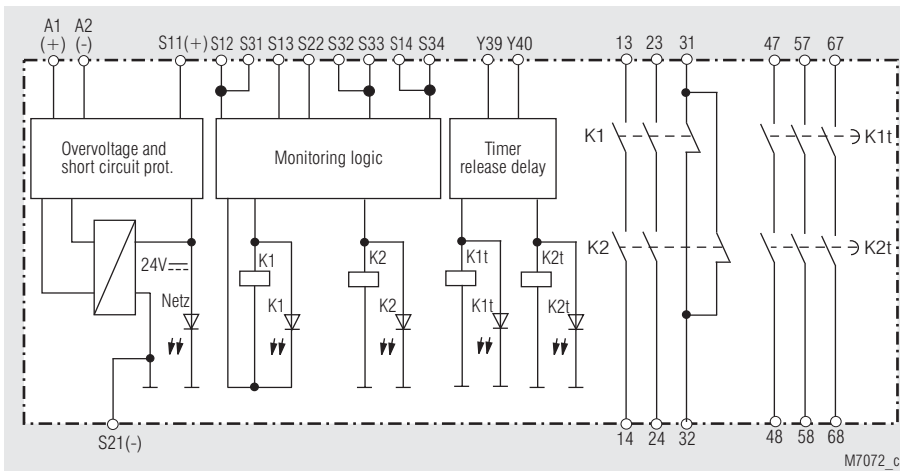
Line fault detection on On-button:

The line fault detection is only active when the time delayed relays K1, and K2_t have released and then S12 (channel A) and S32 (channel B) 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. The unit will not restart before the time delay is finished.

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.

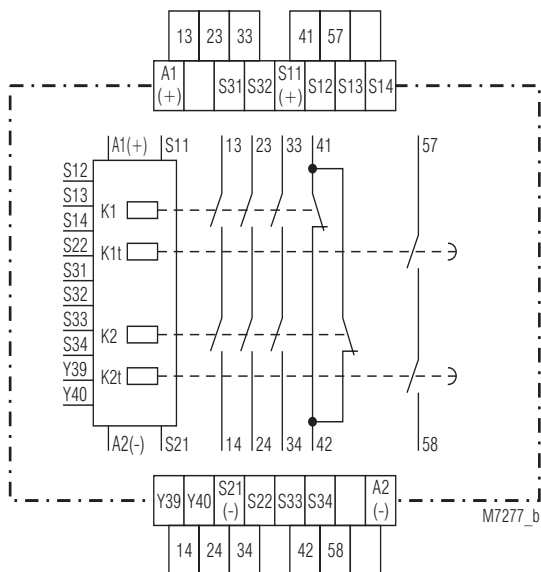
The unit can be operated with single channel and 2-channel operation with cross fault monitoring. For connection please refer to application examples.

Block diagram

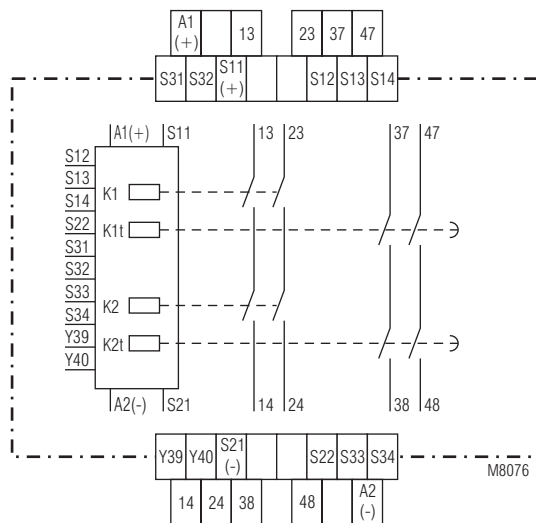


M7072_c

Circuit diagrams

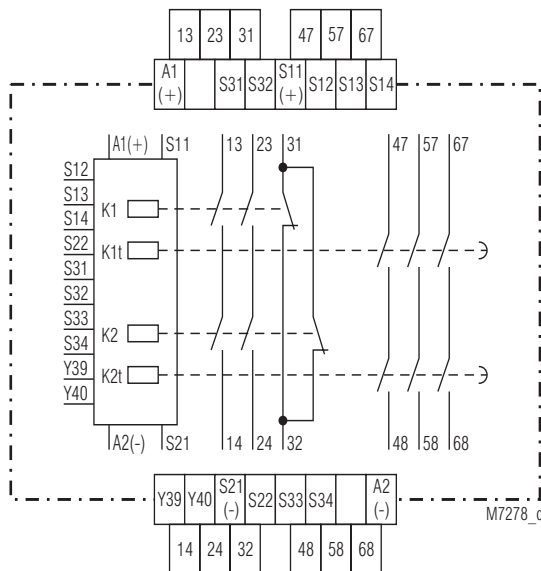


M7277_b



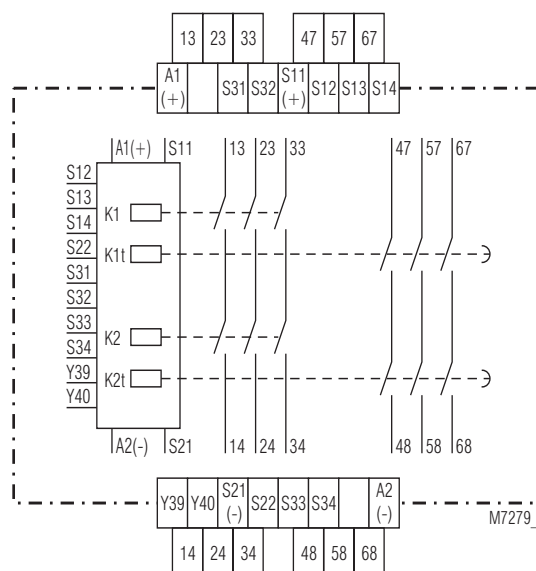
M8076

BH 5928.47



M7278_b

BH 5928.91

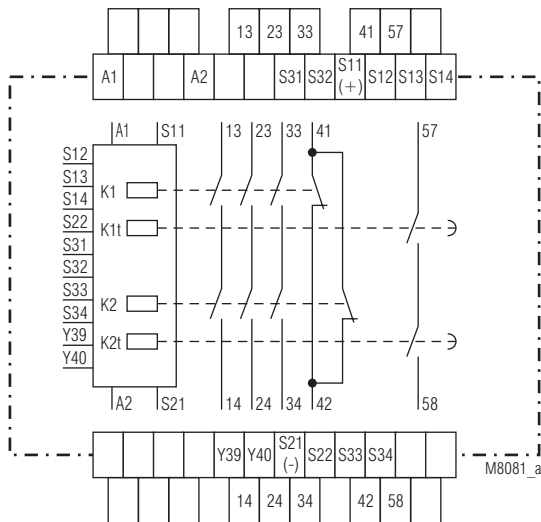


M7279_c

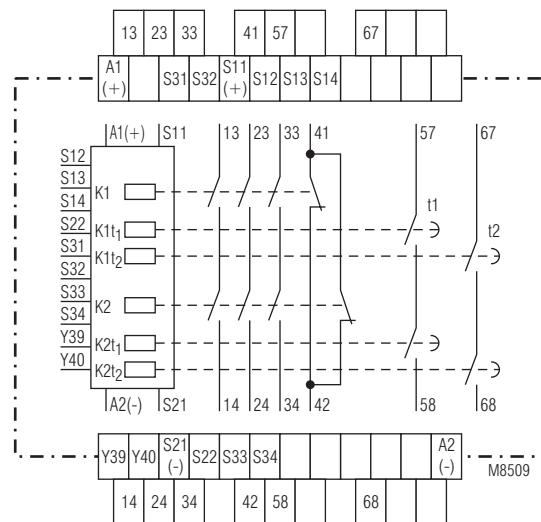
BH 5928.92

BH 5928.93

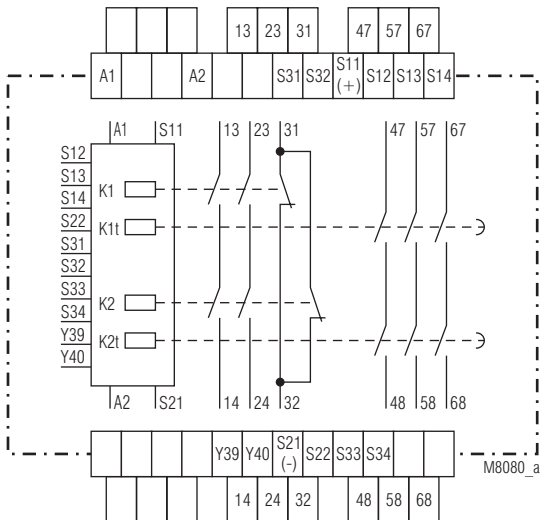
Circuit diagrams



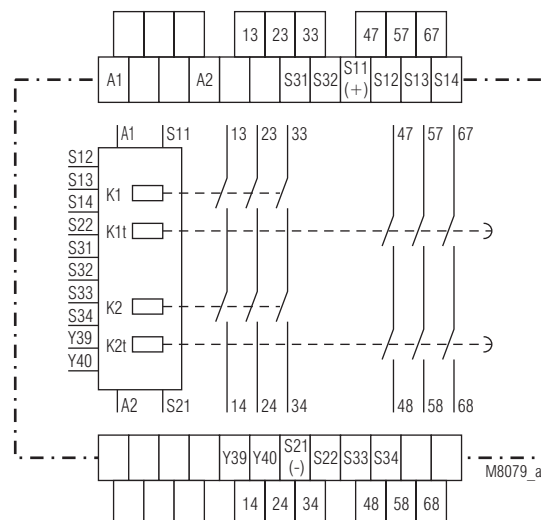
BI 5928.47



BI 5928.50



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 mVA - 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.

ATTENTION - AUTOMATIC START!



According to IEC/EN 60 204-1 part 9.2.5.4.2 it is not allowed to restart automatically after emergency stop.

Therefore the machine control has to disable the automatic start after emergency stop.

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, BI 5928.50:

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

Output

Contacts

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

Technical data

BI 5928.50: 3 NO, 1 NO contacts instantaneous and 2 NO contacts release delayed **with separate time adjustment**
The not delayed NO contacts are safety contacts.
ATTENTION! The NC contacts 31-32 or 41-42 can only be used for monitoring.

Operate delay typ. at U_N :

Manual start: 40 ms
Automatic start: 500 ms

Release delay typ. at U_N :

Disconnecting the supply: 40 ms
Disconnecting
S12, S22, S31 and S32: 15 ms

Time delay tv

(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

Repeat accuracy:

Contact type:

Nominal output voltage:

positive guided

AC 250 V

DC: see limit curve for arc-free operation

DC: see limit curve for arc-free operation

≥ 100 mV

≥ 1 mA

Max switching current:

Switching of low loads:

(Contact 5 μ Au)

Thermal current I_{th} :

in 1 contact path:

max. 5 A

Switching capacity

to AC 15

NO contact: AC 3 A / 230 V IEC/EN 60 947-5-1

NC contact: AC 2 A / 230 V IEC/EN 60 947-5-1

to DC 13

NO contact: AC 2 A IEC/EN 60 947-5-1

NC contact: AC 2 A IEC/EN 60 947-5-1

to DC 13

NO contacts:

DC 8 A / 24 V

ON: 0,4 s, OFF: 9,6 s

Electrical life

to AC 15 at 2 A, AC 230 V: 10⁵ switching cycles IEC/EN 60 947-5-1

Permissible operating

frequency:

max. 1200 switching cycles / h
with manual restart and short
release delay time

Short circuit strength

max. fuse rating:

6 A gL

IEC/EN 60 947-5-1

line circuit breaker:

C 8 A

Mechanical life:

10 x 10⁶ switching cycles

General data

Operating mode:

Continuous operation

Temperature range:

- 15 ... + 55 °C

Clearance and creepage distances

overvoltage category /

contamination level:

4 kV / 2

IEC 60 664-1

EMC

Electrostatic discharge:

8 kV (air)

IEC/EN 61 000-4-2

HF irradiation:

10 V / m

IEC/EN 61 000-4-3

Fast transients:

2 kV

IEC/EN 61 000-4-4

Surge voltages
between

wires for power supply:

1 kV

IEC/EN 61 000-4-5

between wire and ground:

2 kV

IEC/EN 61 000-4-5

HF-line-conducted:

10 V

IEC/EN 61 000-4-6

Interference suppression:

Limit value class B

EN 55 011

Degree of protection:

Housing: IP 40

IEC/EN 60 529

Terminals: IP 20

IEC/EN 60 529

Housing:

Thermoplastic with V0 behaviour
according to UL subject 94

Vibration resistance:

Amplitude 0,35 mm IEC/EN 60 068-2-6
frequency 10 ... 55 Hz

Technical data

Climate resistance:

15 / 055 / 04

IEC/EN 60 068-1

Terminal designation:

EN 50 005

Wire connection:

1 x 4 mm² solid or

1 x 2,5 mm² stranded ferruled (isolated)
or

2 x 1,5 mm² stranded ferruled (isolated)

DIN 46 228-1/-2/-3/-4 or

2 x 2,5 mm² stranded ferruled

DIN 46 228-1/-2/-3

Wire fixing:

Box terminal with wire protection,

removable terminal strips

Mounting:

DIN rail

IEC/EN 60 715

Weight:

400 g

Dimensions

Width x height x depth:

BH 5928: 45 x 84 x 121 mm

BI 5928: 67,5 x 84 x 121 mm

Standard type

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_N :

DC 24 V

• Time delay tv:

0,5 ... 5 s

• Width:

45 mm

Variants

BH 5928.47/61:

with UL approval

BH 5928.92/61:

with UL approval

BH 5928.93/61:

with UL approval

BH 5928.___/001:

with fix time delay

fixed times: 1 s, 3 s, 5 s, 10 s, 300 s

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

Ordering example for variants:

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

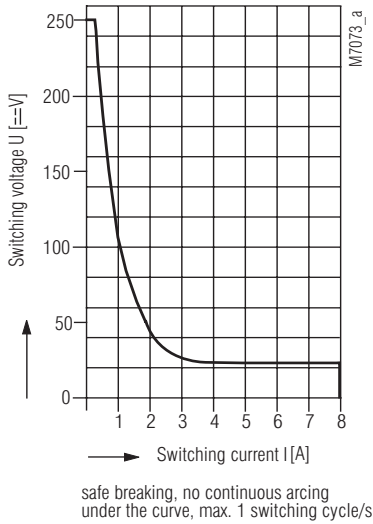
.93 = 3 NO contacts instantaneous and

3 NO contacts release delayed

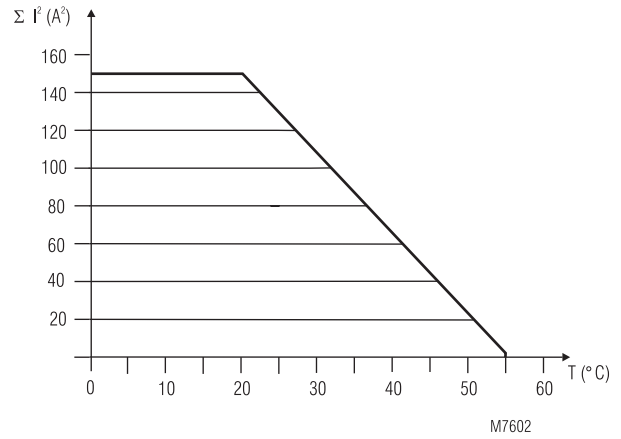
H: width 45 mm

I: width 67,5 mm

Characteristics



Arc limit curve for resistive load



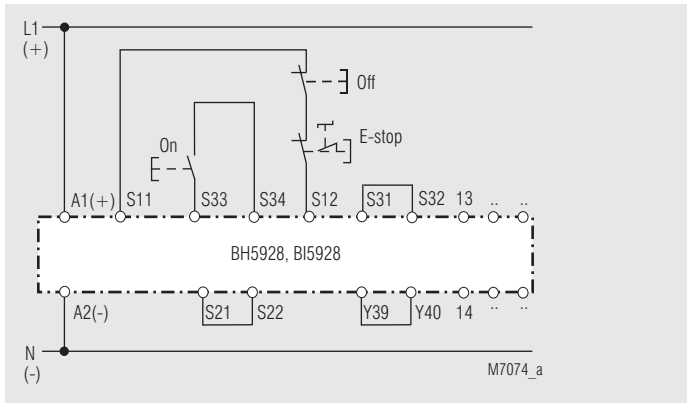
$$\Sigma I^2 = I_1^2 + I_{2...}^2 + I_6^2$$

$I_1 \div I_6$ - Current in contact paths

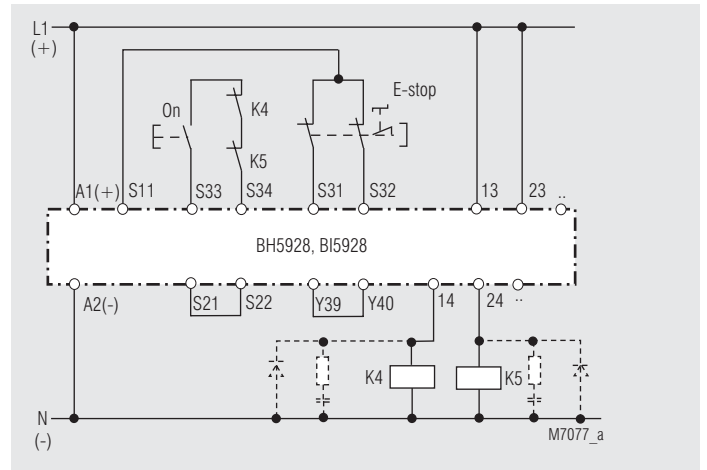
Max. current at 55°C over 3 contact paths = 0,5 A $\hat{=} 0,5^2 \times 6 = 1,5$ A²

Quadratic total current limit curve

Application examples

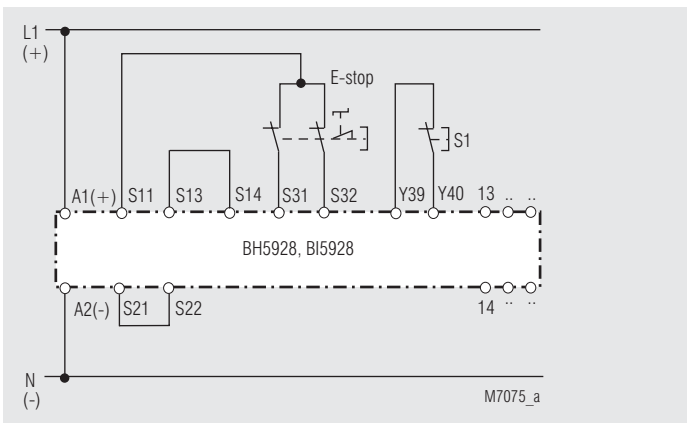


Single channel emergency stop circuit. This circuit does not have any redundancy in the emergency-stop control circuit

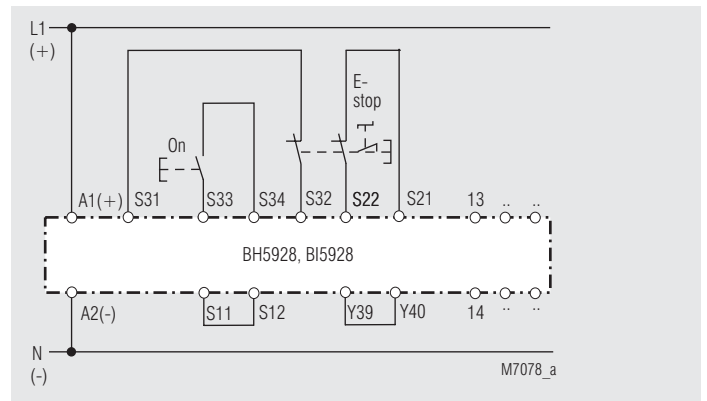


Contact reinforcement by external contactors, 2-channel controlled. The output contacts can be reinforced by external contactors with positive guided contacts for switching currents > 5 A.

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

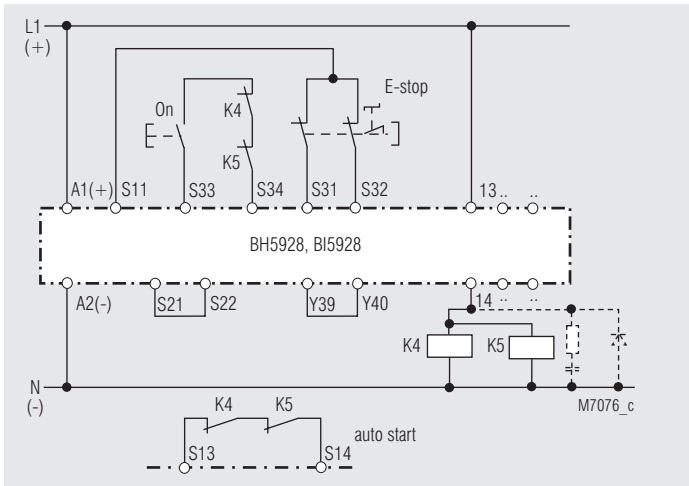


2-channel emergency stop circuit without cross fault monitoring autostart and interruption of time by S1

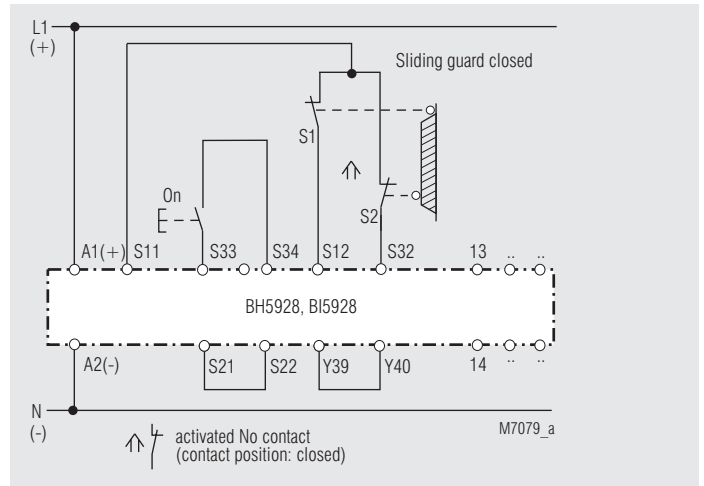


2-channel emergency stop circuit with cross fault detection

Application examples



Contact reinforcement by external contactors controlled by one contact path. S33 - S34 must be opened.



2-channel safety gate monitoring