

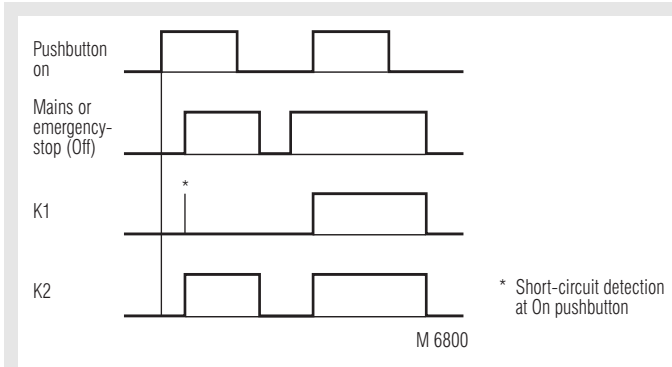
## Emergency stop module BL 5931 safemaster

B 0221556



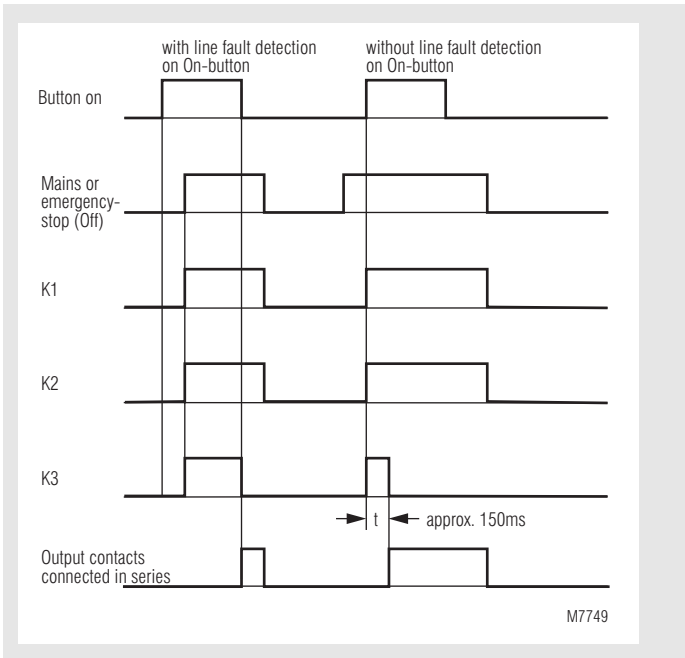
- According to EU directive for machines 98/37/EG
- According to IEC/EN 60204-1
- Safety category 4 for E-stop circuit according to EN 954-1
- Output: max. 7 NO, 1 NC contacts for AC 250 V
- 1- or 2-channel connection
- Line fault detection at the On pushbutton
- Optionally automatic on feature when operating voltage applied or activation via the On pushbutton
- Optionally cross fault detection in the emergency stop circuit
- Feedback circuit  $Y_1$ - $Y_2$  for monitoring external contactors
- Integrated short circuit and overvoltage protection
- LED indicators
- Optionally with phase failure bridging BI 5931.64/003
- Removable terminal blocks
- Width 90 mm

### Function diagrams



In the case of a line fault across the On-button the relays K1 and K2 will not be energised in the model BI 5931.64/002.

BL 5931. \_\_ \_



BL 5931.64/003

### Approvals and marking



\* see variants

For the existing BG certificate DOLD has not demanded for an extension. There has not been made any changes on the product since then.

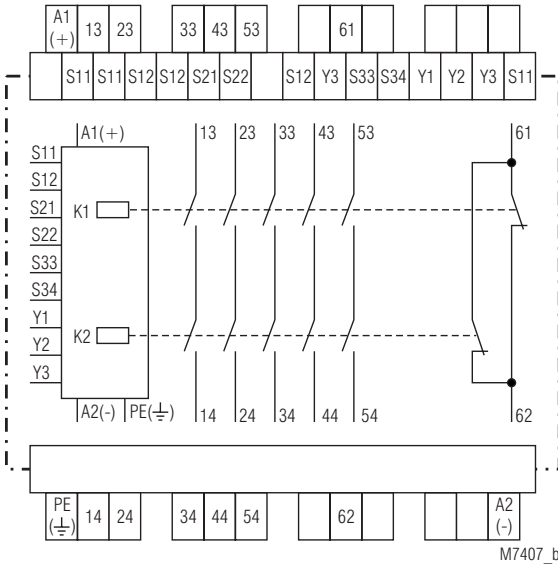
### Applications

- Protection of persons and machines
- Emergency stop circuits of machines
  - Monitoring safety gates

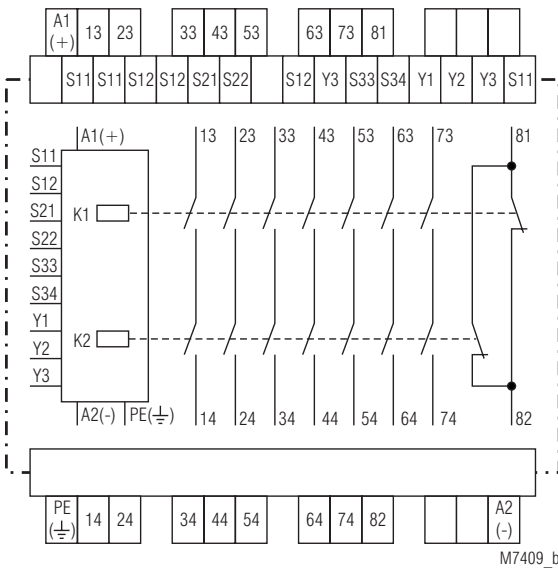
### Indication

- LED power supply: on when operating voltage present
- LED K1: on when current flows through relay K1
- LED K2: on when current flows through relay K2
- In addition to BL 5931.64/003
- LED Input 1: on when current flows through channel 1
- LED Input 2: on when current flows through channel 2
- LED K3: on when current flows through relay K3

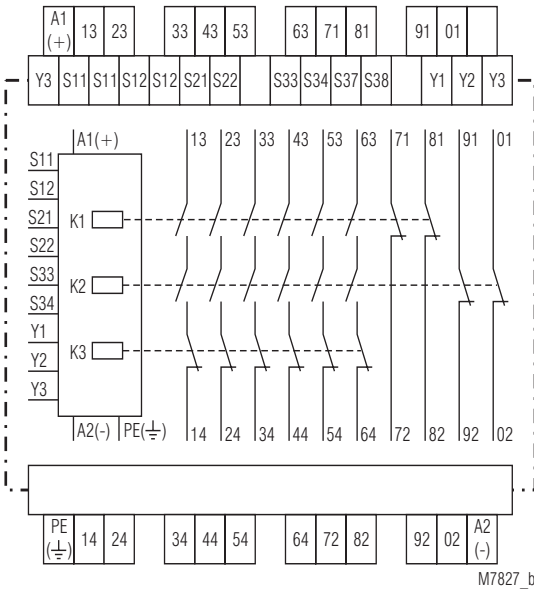
### Circuit diagrams



BL 5931.60

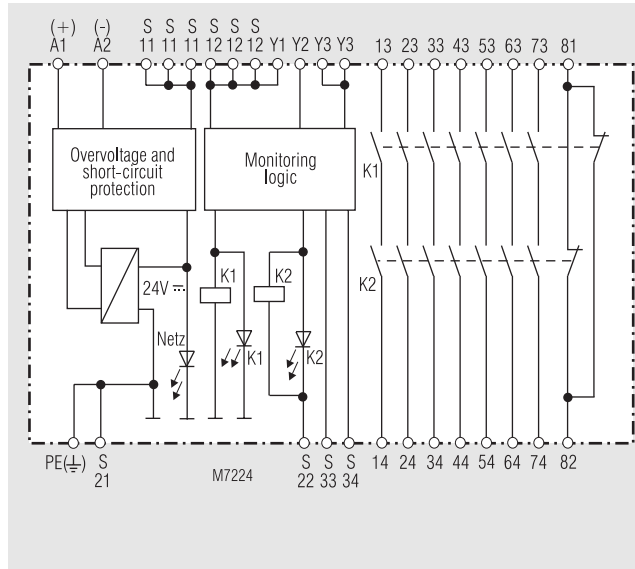


BL 5931.63

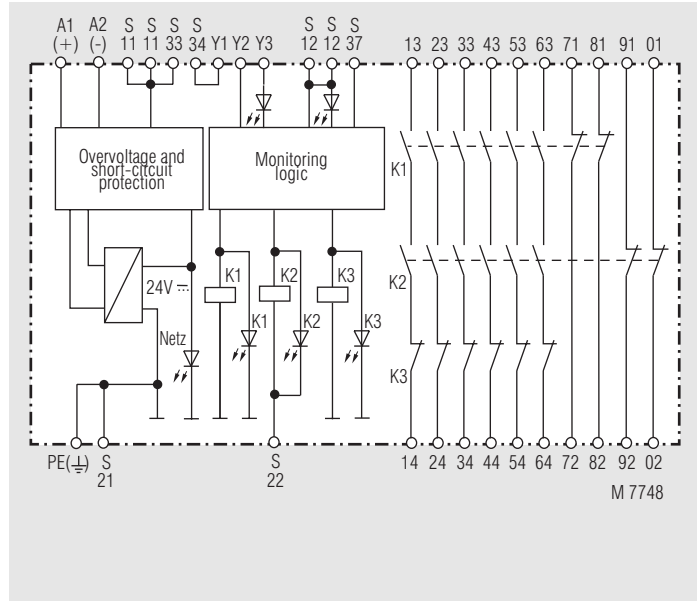


BL 5931.64/003

### Block diagrams



BL 5931.63



BL 5931.64/003

## Notes

Line fault detection at the ON pushbutton:

If the ON pushbutton was already closed before the voltage was applied at S12, Y3 (also in the case of line fault via the ON pushbutton), the output contact cannot be switched on.

A line fault at the ON pushbutton which occurred after activation of the unit is recognized when switching-on takes place again and switching-on of the output contacts is prevented. If a line fault occurs at the ON pushbutton after the voltage has already been applied at S12 and Y3, unwanted activation occurs because this line fault can not be distinguished from the regular switching-on function.

### BL 5931.60 and BL 5931.63:

On these models the line fault detection across the ON-button is activated by switch S1. The switch is located under the removable front plate. The default setting of S1 is "AUS" (Off).

The setting of switch S1 and the corresponding start function is described in the table below. See also picture 1 to 7.

The line fault detection on the ON-button is only active if both channels of a 2 channel e-stop loop are operated at the same time and a min ON-time of 5 sec is provided.

### BL 5931.64/003:

On these models the line fault detection across the ON-button is activated by linking terminals S37-Y2. The default setting is with link on S37-Y2. The setting of link S37-Y2 and the corresponding start function is described in the table below. See also picture 7 to 9.

The goldplated monitoring contacts 71/72, 81/82, 91/92 and 01/02 are suitable to switch low loads of 0.1 ... 60 V and 1 ... 300 mA. The contacts also allow to switch the max. current. As the goldplating then is damaged, low loads cannot be switched anymore.

	1) BL 5931.60 BL 5931.63	2) BL 5931.64/003	
Terminals 1) S33-S34 2) S12-S34	Switch S1	Terminals S37-Y2	Function
	On		- after pressing the On button the outputs are switched - recovery time 1 s - no line short-circuit detection at the on switch
	On		- automatic On function when operating voltage On / Off or when emergency stop released - recovery time 1 s
	Off		- after pressing the On button the outputs are switched - line short-circuit detection at the on switch
	Off		This configuration is not permitted. The output contacts do not switch.

### 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.

### General:

The connection terminal PE is used for operating the unit even in IT systems with insulation monitoring, and also as a reference point for testing the control voltage. With DC units, connecting the protective conductor to connection terminal PE jumpers out internal short-circuit protection.

The terminal blocks are provided with markings as identification aids for placing. Not for BL 5931.64/003.

## Technical data

### Input

<b>Nominal voltage <math>U_N</math>:</b>	DC 24 V AC 230 V
<b>Voltage range:</b>	AC 0,85 ... 1,1 $U_N$ DC 0,90 ... 1,2 $U_N$
at 10 % residual ripple:	DC 0,85 ... 1,1 $U_N$
at 48 % residual ripple:	DC 0,85 ... 1,1 $U_N$
<b>Nominal frequency:</b>	50 / 60 Hz
<b>Phase failure bridging</b>	
<b>BL 5931.64/003:</b>	approx. 150 ms
<b>Control voltage</b>	
at S11:	typ. DC 24 V
at S21:	0 V
<b>Minimum voltage</b>	
at terminals S12, Y3:	DC 21 V when unit activated
<b>Current in S12, Y3:</b>	typ. 55 mA
<b>Recovery time:</b>	1 s

### Output

#### Contacts

BL 5931.60:	5 NO, 1 NC contacts (on request)
BL 5931.63:	7 NO, 1 NC contacts
BL 5931.64:	8 NO, 4 NC contacts not redundant (redundancy can be achieved by external wiring). The NO contacts are safety contacts. <b>ATTENTION! The NC contacts 61-62 up to 01-02 can only be used for monitoring.</b>

#### Contact type:

Relay, positively driven

#### Output voltage:

AC: 250 V

DC: see limit curve for arc-free operation  
see Continuous current limit curve  
(max. 5 A in one contact path)

#### Thermal current $I_{th}$ :

#### Switching capacity

to AC 15

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

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

IEC/EN 60 947-5-1

#### Electrical life

to AC 15 at 2 A, AC 230 V: 10<sup>5</sup> switching cycles

#### Permissible switching frequency:

600 switching cycles / h

#### Short circuit strength

max. fuse rating:

6 A gL IEC/EN 60 947-5-1

max. line circuit breaker:

C 10 A

#### Mechanical life:

30 x 10<sup>6</sup> switching cycles

### General data

#### Operating mode:

Continuous operation

#### Temperature range:

- 15 ... + 55°C

at max. 90 % air humidity

#### 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

Fast transients:

2 kV

IEC/EN 61 000-4-4

Surge voltages

between

1 kV

IEC/EN 61 000-4-5

wires for power supply:

2 kV

IEC/EN 61 000-4-5

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

#### Climate resistance:

15 / 055 / 04

IEC/EN 60 068-1

#### Terminal designation:

EN 50 005

## Technical data

<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/-4
<b>Wire fixing:</b>	Plus-minus terminal screws M3.5 box terminals with wire protection
<b>Mounting:</b>	DIN rail IEC/EN 60 715
<b>Weight</b>	
DC-version:	760 g
AC-version:	890 g

## Dimensions

**Width x height x depth:** 90 x 84 x 121 mm

## Standard type

BL 5931.63 DC 24 V		
Article number:	0046160	stock item
• Output:	7 NO, 1 NC contacts	
• Nominal voltage $U_N$ :	DC 24 V	
• Width:	90 mm	

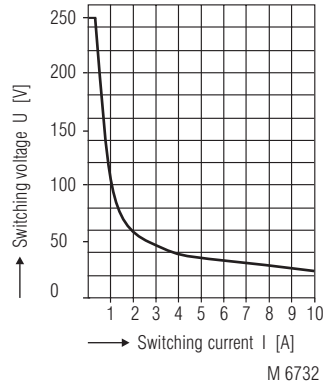
## Variants

BL 5931. __ /61:	with UL approval (Canada/USA)
BL 5931.64/003:	with line fault detection on On-button via bridge S37-Y2, 6 NO contacts, 4 NC contacts not redundant. Redundancy can be achieved by external wiring.
	- phase failure bridging
	- to be used as gate monitor (according to picture 6 and 9)
	- 6 LEDs
	- Switching capacity according to AC 15, 5 A / 230 V
	- Contact fusing 10 A rapid / 6 A slow
	- 4 monitoring contacts, suitable to switch low loads

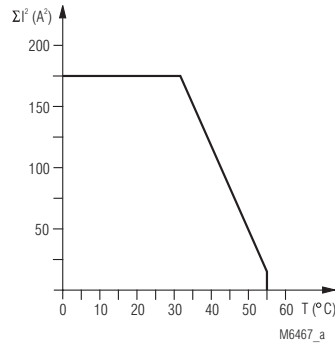
## Ordering example for Variants

BL 5931 .63 / _ _ _ AC 230 V 50 / 60 Hz	
	Nominal frequency
	Nominal voltage
	Variant, if required
	Contacts
	Type

## Characteristics

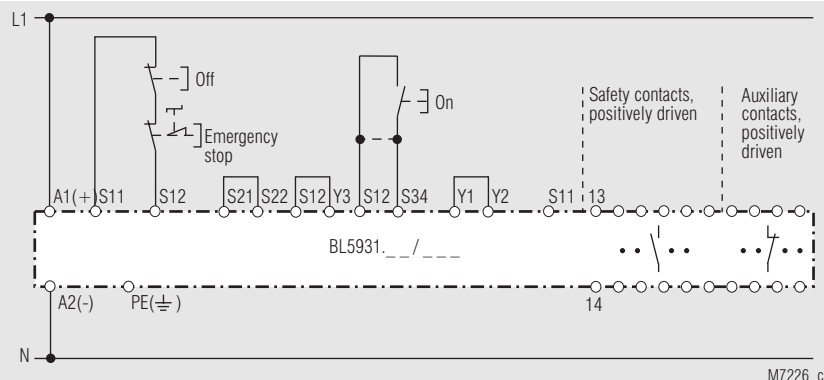


Limit curve for arc-free operation under ohmic load



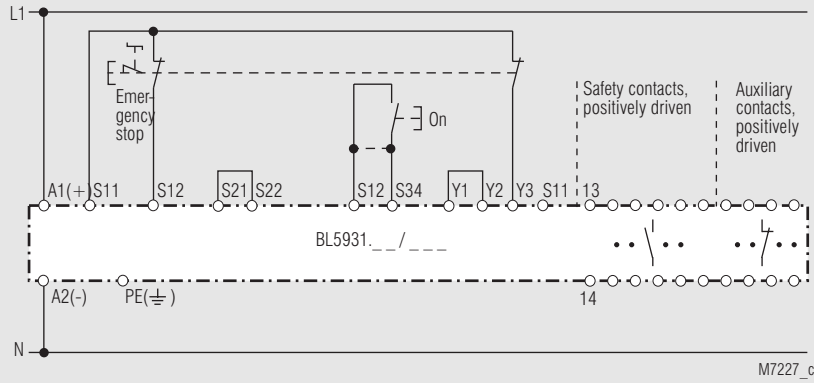
Continuous current limit curve  
Total of currents<sup>2</sup> per safety contact = value on scale  $\Sigma I^2 (A^2)$

## Application example

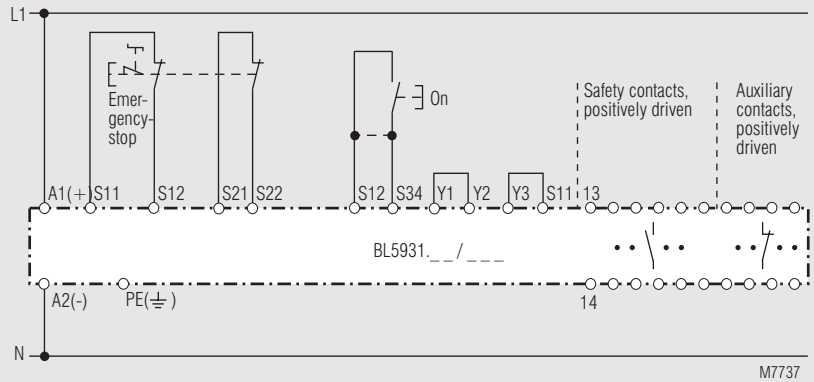


Picture 1: Single-channel emergency stop circuit, activated with On-button.

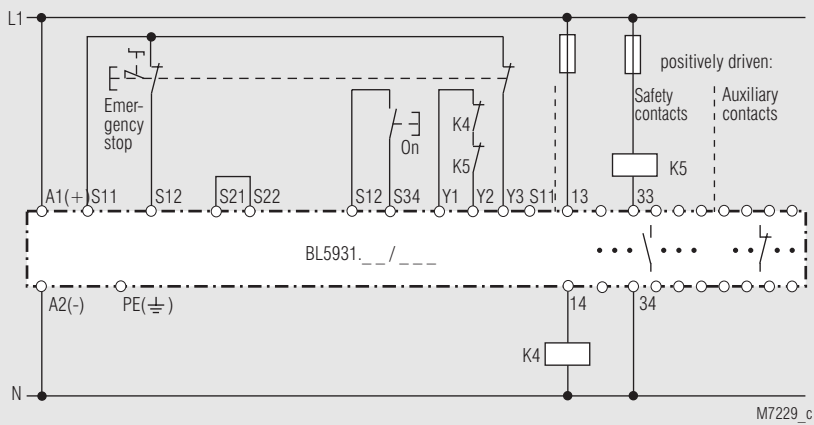
For automatic restart at the BL 5931.64/003 terminals S12-S34 and at the BL 5931.60 and BL 5931.63 terminals S33-S34 have to be linked, the push button is left away.



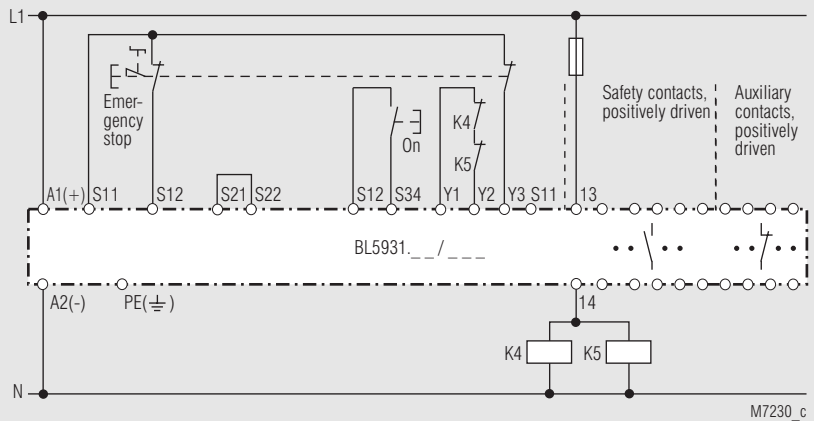
Picture 2: Two-channel emergency stop circuit without cross fault detection, activated with On-button. For automatic restart at the BL 5931.64/003 terminals S12-S34 and at the BL 5931.60 and BL 5931.63 terminals S33-S34 have to be linked, the push button is left away.



Picture 3: Two-channel emergency stop circuit with cross fault detection. For automatic restart at the BL5931.64/003 terminals S12-S34 and at the BL 5931.60 and BL 5931.63 terminals S33-S34 have to be linked. No On-button.

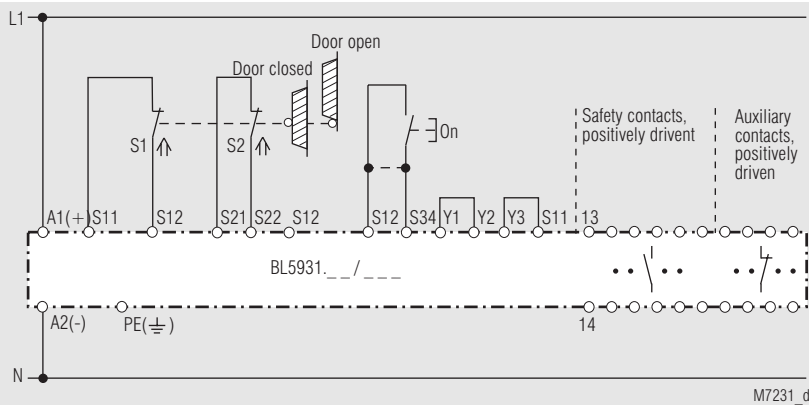


Picture 4: Contact reinforcement with external contactors, 2-channel connection, without cross fault detection. For current > 5 A the output contacts can be reinforced by external contactors with positive guided contacts. The function of the contactors is monitored by connecting the NC-contacts to the feed-back circuit (terminals Y1-Y2).

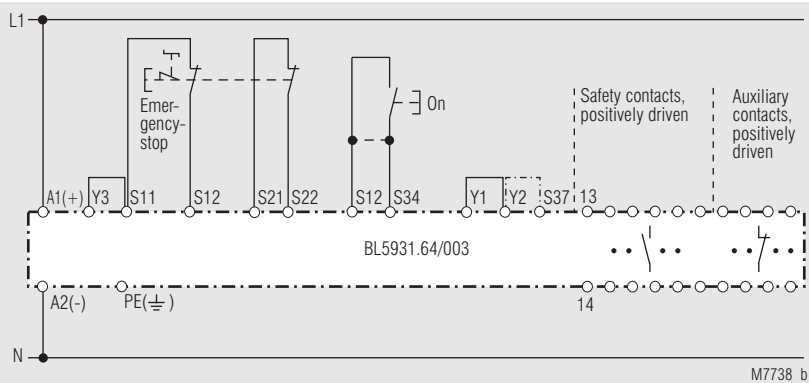


Picture 5: Contact reinforcement with external contactors with reduced redundancy.

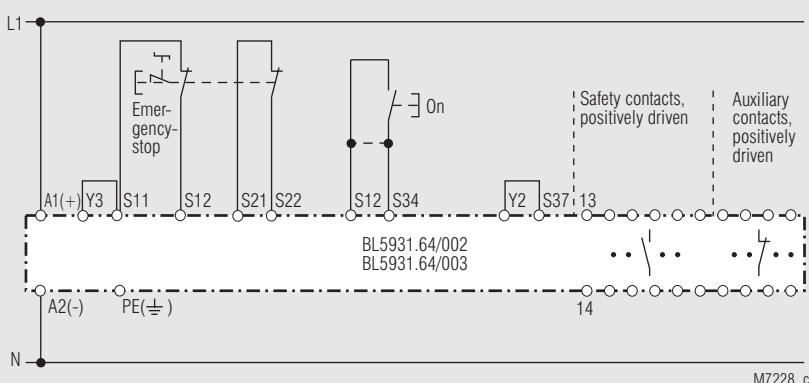
BL 5931. \_\_ / \_\_ for all variants



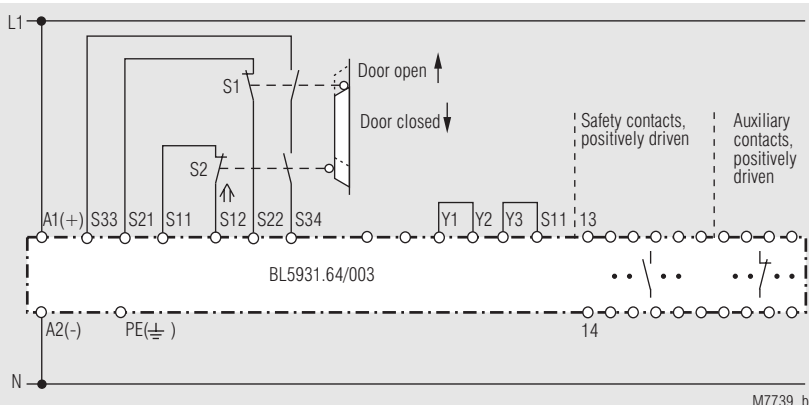
Picture 6: Two-channel monitoring of a safety gate. With manual restart S1 and S2 can be switched without observing a certain sequence. Activated with On-button. For automatic restart at the BL 5931.64/003 the terminals S12-S34 and at the BL 5931.60 and BL 5931.63 terminals S33-S34 have to be linked, the push button is left away.



Picture 7: Two-channel emergency stop circuit with cross fault detection and automatic restart



Picture 8: Two-channel emergency stop circuit with cross fault detection, activated with On-button without line fault detection on On-button. With link on S37-Y2 line fault detection is activated.



Picture 9: Monitoring of a safety gate by limit switches with 1 NO and 1 NC contact and automatic restart

BL 5931.64/003 for all variants