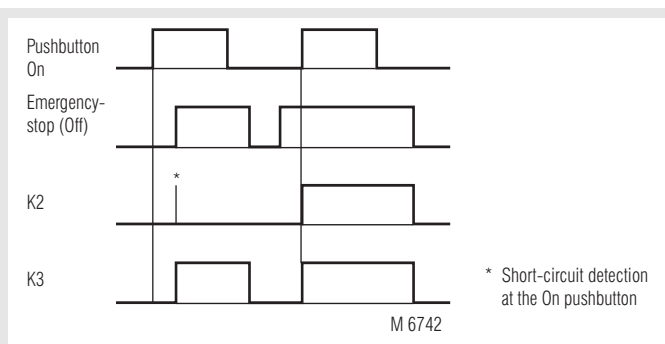


0221553

**BD 5987.02:**

- According to EC Directive for machines 98/37/EG
- According to IEC/EN 60204-1
- Safety category 4 according to EN 954-1
- Output: 2 NO contacts for AC 250 V
- Gold-plated contacts to switch small loads (input for PLC)
- 1-channel or 2-channel connection
- Line fault detection at On pushbutton
- Operating state display
- LED displays for channels 1 and 2
- Overvoltage and short circuit protection
- Wire connection: also 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
- Width 45 mm

**Function diagram**



**BD 5987.--/001: as BD 5987.02 but**

- Optionally automatic On function when operating voltage is applied or after activation by the On pushbutton
- Optionally cross fault detection in emergency stop circuit

**Approvals and marking**



\* see variants

**Applications**

- Protection of people and machines
- Emergency stop circuits on machines
  - Monitoring of safety gates

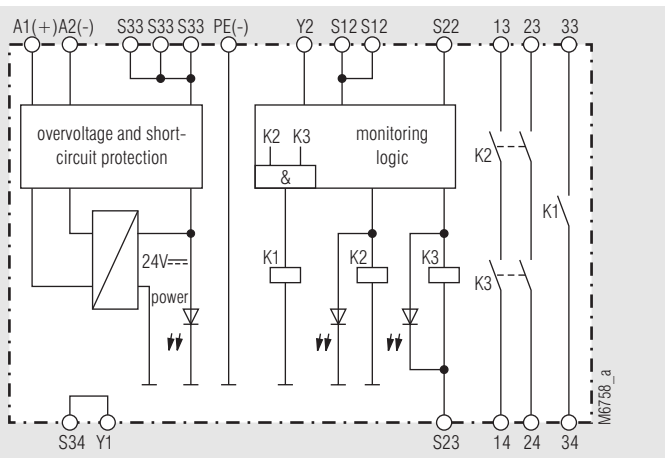
**Indication**

- LED power supply: on when operating voltage present  
LED K2: on when supply on K2  
LED K3: on when supply on K3

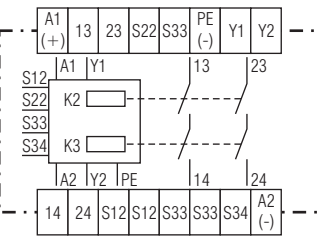
**Notes**

Line fault detection at the On pushbutton:  
The output contacts cannot be closed if the On pushbutton is already closed before the voltage is applied to S12, S22 (also in the event of a line fault at the On pushbutton).  
A line fault at the On pushbutton which occurs after activation of the device is recognized when switching- on takes place again and closing of the output contacts is then prevented.  
If a line fault occurs at the On pushbutton after the voltage is already present at S12, S22 undesired activation will take place, because this line fault does not differ from the normal closing function.

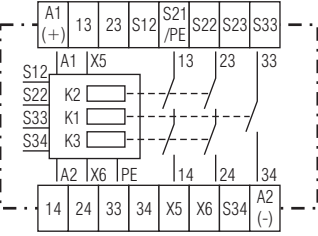
**Block diagram**



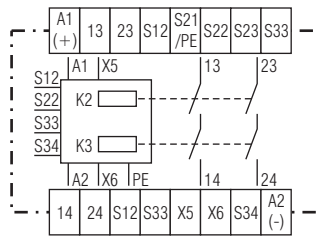
**Circuit diagrams**



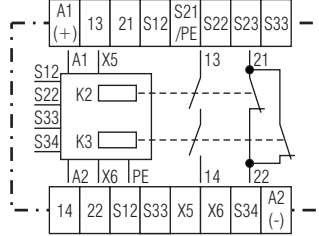
**BD 5987.02** M7375\_b



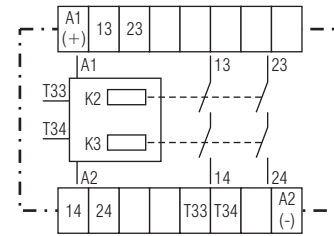
**BD 5987.03/001** M7378\_b



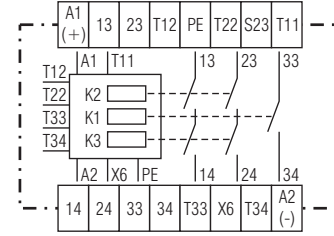
**BD 5987.02/001** M7376\_b



**BD 5987.16/001** M7380\_b



**BD 5987.02/101** M7377\_b



**BD 5987.03/021** M7379\_c

## Notes

The gold-plated contacts of the BD 5987 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 PE terminal permits operation of the device in IT systems with insulation monitoring and also serves as a reference point for testing the control voltage. The internal short-circuit protection will be bridged on DC devices, if the protective ground is connected to terminal PE.

One or more extension modules BN 5989 or external contactors with positively-driven contacts may be used to multiply the number of contacts of the emergency stop module BD 5987.

For automatic restart:

S22 must be connected before S12. S12 initiates the automatic restart. With manual restart it is not necessary to follow this order.

### 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.

## Technical data

### Input

**Nominal voltage  $U_N$ :** AC 24, 48, 110, 127, 230, 240 V  
DC 24 V

**Voltage range:** AC 0,8 ... 1,1  $U_N$   
at 10% residual ripple: DC 0,9 ... 1,2  $U_N$   
at 48% residual ripple: DC 0,8 ... 1,1  $U_N$

**Nominal consumption:** approx. 5,5 VA

**Nominal frequency:** 50 / 60 Hz

**Control voltage at S33:** DC 24 V

### Control current

BD 5987.02: typ. DC 55 mA

BD 5987.02/001: typ. DC 45 mA

### Minimum voltage at terminals S12, S22:

DC 21 V with activated device

**Recovery time:** 0,5 s after release of the emergency stop pushbutton

### Output

#### Contacts

BD 5987.02: 2 NO contacts

BD 5987.16: 1 NO contact, 1 NC contact

The NO contacts are safety contacts.  
**ATTENTION! The NC contacts 21-22 and the NO contact 33-34 can only be used for monitoring.**

**Operate time:** max. 100 ms

BD 5987.02/001: with automatic restart approx. 1 s

#### Release time

Opening in secondary circuit (S12-S22): 50 ms  $\pm$  25 %

Opening in supply circuit

BD 5987.02: 350 ms  $\pm$  50 %

BD 5987.02/001: 120 ms  $\pm$  50 %

**Contact type:** relay, positively-driven

**Nominal output voltage:** AC 250 V  
DC: see limit curve for arc-free operation

**Thermal current  $I_{th}$ :** see continuous current limit curve (max. 10 A in one contact path)

#### Switching capacity

to AC 15: 5 A / AC 230 V IEC/EN 60 947-5-1  
for NO contact  
2 A / AC 230 V IEC/EN 60 947-5-1  
for NC contact

#### Electrical life:

to AC 15 at 2 A, AC 230 V:  $10^5$  switching cycles IEC/EN 60 947-5-1

#### Permissible operating frequency:

600 switching cycles / h

#### Short circuit strength

**max. fuse rating:** 6 A gL IEC/EN 60 947-5-1

## Technical data

**Mechanical life:** 10 x  $10^6$  switching cycles

### General data

**Operating mode:** Continuous operation  
**Temperature range:** - 15 ... + 55°C  
at max. 90 % 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

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

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

**Wire connection:** 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

**Wire fixing:** Plus-minus terminal screws

M3.5 box terminal with wire protection

**Mounting:** DIN rail IEC/EN 60 715

**Weight:** 450 g

### Dimensions

**Width x height x depth:** 45 x 74 x 121 mm

### Standard type

BD 5987.02/001 DC 24 V

Article number: 0040954 stock item

- Output: 2 NO contacts
- Optionally automatic On function when operating voltage is applied or after activation by the On pushbutton
- Nominal voltage  $U_N$ : DC 24 V
- Width 45 mm

## Variants

- BD 5987.02/60:** with CSA approval  
**BD 5987.02/61:** with UL approval (Canada/USA)  
**BD 5987.02/001:** Optionally cross fault monitoring on the emergency stop loop (see application M6749)

Jumper assignment for functions:

Activation via On pushbutton / or automatic On function

On pushbutton S12-S34 or S33-S34	Jumper X5 - X6	Function
		The output contacts are switched only after operation of the On pushbutton. Line fault monitoring at the On pushbutton.
		Automatic On function for operating voltage Off/On or after emergency-stop release

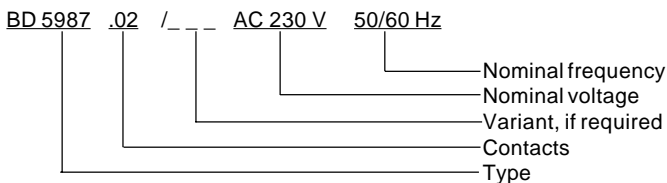
- BD 5987.03/001:** with 2 NO contacts,  
1 signalling contact AC/DC 0,1 ... 1 A / 10 ...120 V  
**BD 5987.16/001:** with 1 NO contact, 1 NC contact  
**BD 5987.02/101:** see BD 5987.02/001,  
but with special terminal arrangement  
**BD 5987.03/201:** see BD 5987.03/001,  
but with special terminal designation

Jumper assignment for functions:

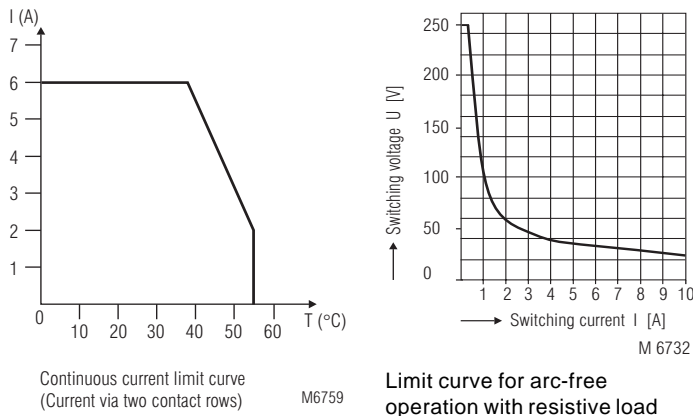
Activation via On pushbutton / or automatic On function

On pushbutton T11-T34 or T12-T34	Jumper T33-X6	Function
		The output contacts are switched only after operation of the On pushbutton. Line fault monitoring at the On pushbutton.
		Automatic On function for operating voltage Off/On or after emergency-stop release

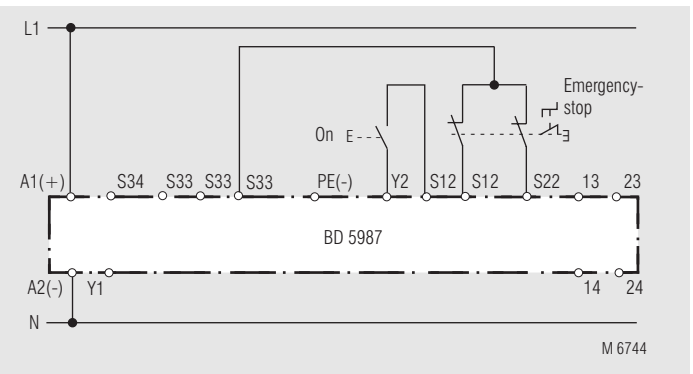
## Ordering example for Variants



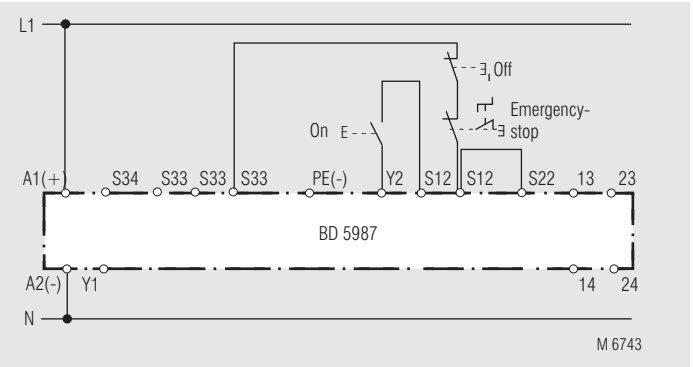
## Characteristics



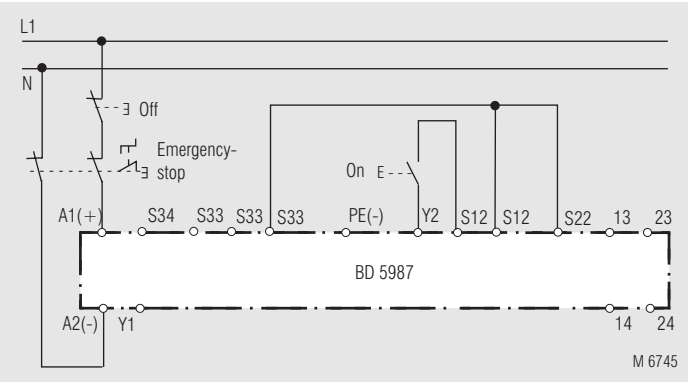
## Application examples



Two-channel emergency stop circuit



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

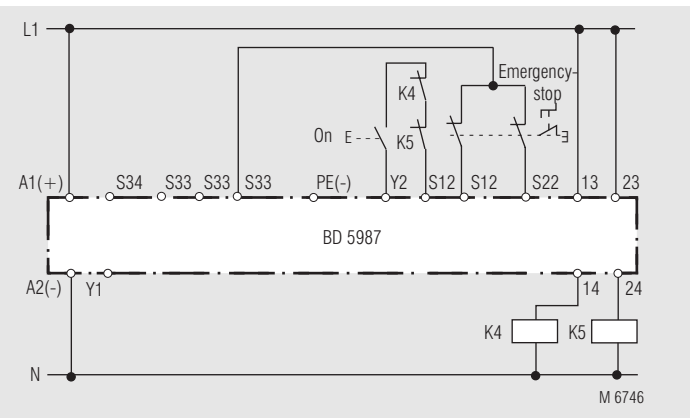


Two-pole emergency stop circuit with emergency stop control device in supply circuit.

Application for long emergency stop loops where the control voltage drops below the minimum voltage of 21 V.

### Attention:

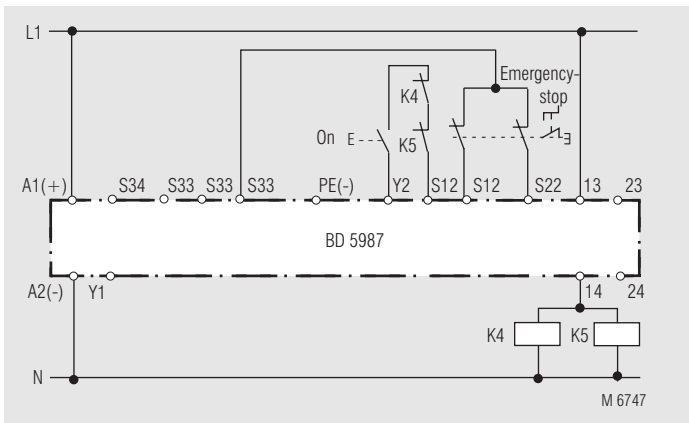
Single faults (e.g. line faults at the emergency stop control device) are not detected with this external circuit configuration



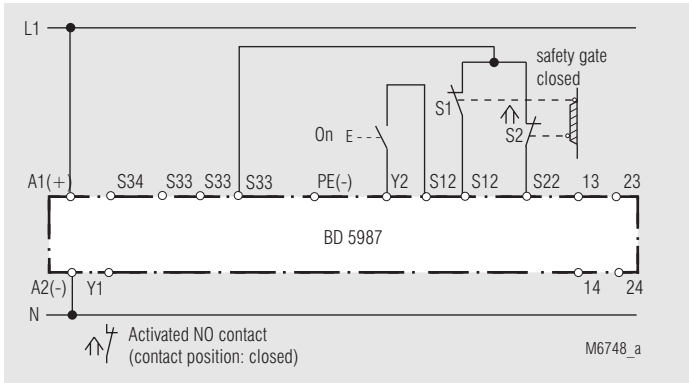
Contact reinforcement by external contactors, 2-channel.

The output contacts can be reinforced by external contactors with positively-driven contacts for switching currents > 10 A. Functioning of the external contactors is monitored by looping the NC contacts into the closing circuit (terminals Y2 - S12).

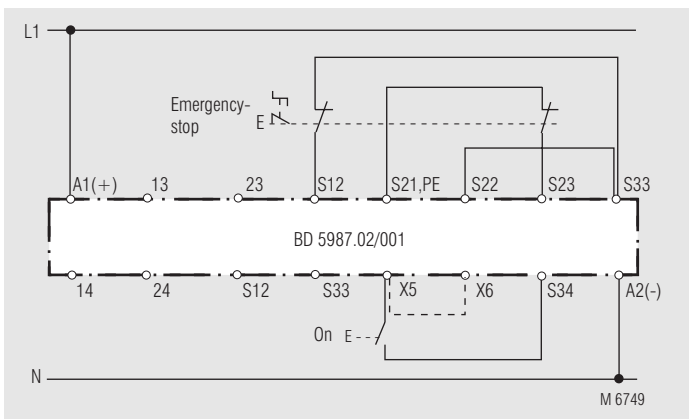
## Application examples



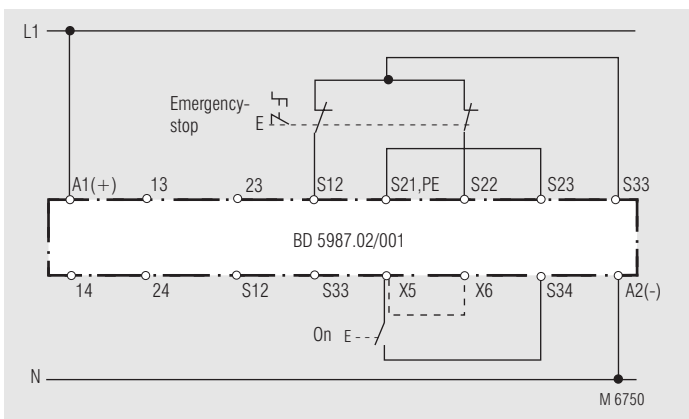
Contact reinforcement by external contactors with reduced safety level



Two-channel monitoring of a safety gate



Two-channel emergency stop circuit with cross fault detection.  
Activation via On pushbutton. ---- Jumper X5 -X6:  
Jumper X5 - X6 must be fitted for the automatic On function.  
The On pushbutton is not required



Two-channel emergency-stop circuit without cross fault detection.  
Activation via On pushbutton. ---- Jumper X5 - X6:  
Jumper X5 - X6 must be fitted for the automatic On function.  
The On pushbutton is not required