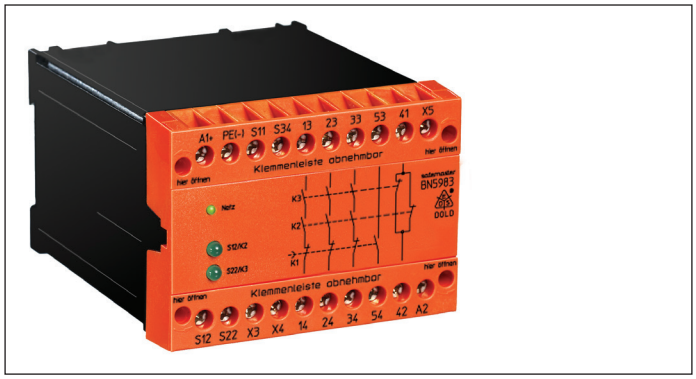
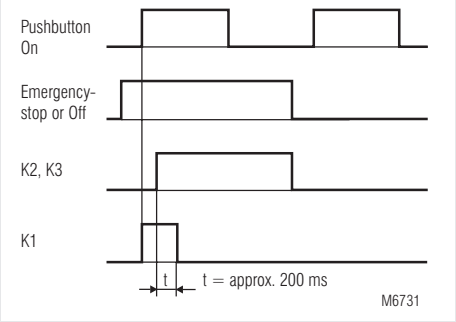
SAFEMASTER
Emergency Stop Module
BN 5983

0221560

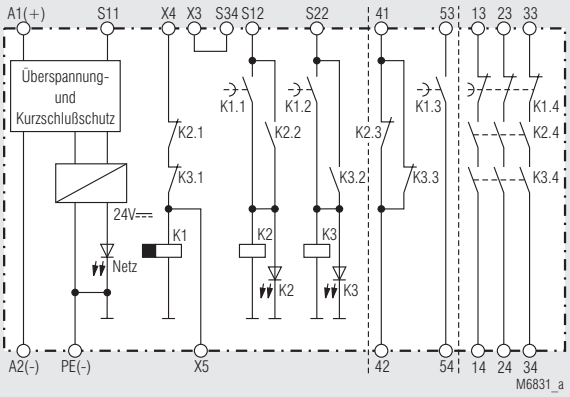


- **According to**
  - **Performance Level (PL) e and category 4 to EN ISO 13849-1: 2008**
  - **SIL Claimed Level (SIL CL) 3 to IEC/EN 62061**
  - **Safety Integrity Level (SIL) 3 to IEC/EN 61508**
- Output: 3 NO, 1 NC contacts for AC 400 V
- Optionally gold-plated contacts to switch small loads (input for PLC)
- 1-channel or 2-channel connection
- LED displays for channels 1 and 2
- Feedback circuit X3 - X4 for monitoring external contactors
- Removable terminal strips
- Overvoltage and short circuit protection
- Width 100 mm

Function Diagram

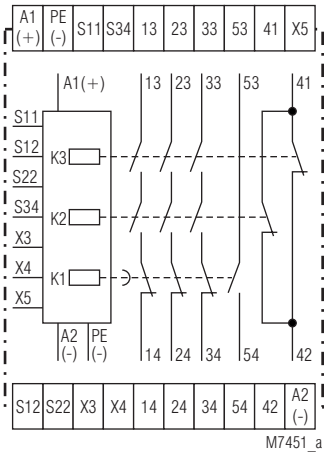


Block Diagram



BN 5983.53

Circuit Diagram



BN 5983.53, _/104, _/110, _/200

Approvals and Marking

Functional Safety Type Approved

* see variants

Application

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

Indication

LED power supply:	on when operating voltage present
LED S12 / K2:	on when supply on relay K2
LED S22 / K3:	on when supply on relay K3

Notes

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 3081 or external contactors with forcibly guided contacts may be used to multiply the number of contacts of the emergency-stop module BN 5983.

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.

Connection Terminals

Terminal designation	Signal designation
A1 (+)	+ / L
A2 (-)	- / N
S12, S22, S34, X3, X4, X5	Inputs
S11, PE(-)	Outputs
13, 14, 23, 24, 33, 34	Forcibly guided NO contacts for release circuit
41, 42, 53, 54	Forcibly guided indicator output

Technical Data

Input

Nominal voltage U_N:	AC 24, 42, 48, 110, 127, 230, 240 V DC 24, 48, 110 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:	5 VA ± 30 %
Nominal frequency:	50 / 60 Hz
Control voltage S11:	DC 24 V
Control current:	max. DC 100 mA
Minimum voltage at terminals S12, S22:	DC 21 V with activated device

Output

Contacts

BN 5983.53:	3 NO, 1 NC contacts 1 delay-release NO contact (K1.3)

The NO contacts 13...33 / 14...34 are safety contacts.
ATTENTION! The NC contact 41-42 and the NO contact 53-54 can only be used for monitoring.

Operate time:	35 ms	
Release time		
opening in secondary circuit (S12-S22):	30 ms ± 25 %	
opening in supply circuit:	100 ms ± 50 %	
Release delay of K1:	approx. 200 ms	
Contact type:	Relay, forcibly guided	
Nominal output voltage:	AC 400 V / DC 230 V	
Thermal current I_{th}:	see continuous current limit curve (max. 10 A in one contact path)	
Switching capacity		
to AC 15:		
NO contacts :	5 A / AC 230 V	IEC/EN 60 947-5-1
NC contacts:	2 A / AC 230 V	IEC/EN 60 947-5-1
to DC 13:		
NO contacts :	4 A / DC 24 V	IEC/EN 60 947-5-1
NC contacts:	4 A / DC 24 V	IEC/EN 60 947-5-1
Electrical life		
to AC 15 at 2 A, AC 230 V:	10^5 switching cycles	IEC/EN 60 947-5-1
to DC 13 at 2 A, DC 24 V:	> 240 x 10^3 switching cycles	
Permissible operating frequency:	6 000 switching cycles / h	
Short circuit strength		
max. fuse rating		
NO contact:	10 A gL	IEC/EN 60 947-5-1
NC contact:	6 A gL	IEC/EN 60 947-5-1
Mechanical life:	10 x 10^6 switching cycles	

General Data

Operating mode:	Continuous operation	
Temperature range		
operation:	- 15 ... + 55°C at max. 90 % humidity	
storage :	- 25 ... + 85 °C	
altitude:	< 2.000 m	
Clearance and creepage distances		
rated impuls voltage / pollution degree:	4 kV / 2 (basis insulation)	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:	4 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 frequency: 10 ... 55 Hz	IEC/EN 60 068-2-6

Technical Data

Climate resistance:	15 / 055 / 04	IEC/EN 60 068-1
Terminal designation:	EN 50 005	
Wire connection:	2 x 2.5 mm² solid or 2 x 1.5 mm² stranded ferruled DIN 46 228-1/-2/-3/-4	
Wire fixing:	Flat terminals with self-lifting clamping piece Removable terminal strip	IEC/EN 60 999-1
Mounting:	DIN rail	IEC/EN 60 715
Weight:	840 g	

Dimensions

Width x height x depth:	100 x 74 x 121 mm

Safety Related Data

Values according to EN ISO 13849-1:

Category:	4	
PL:	e	
$MTTF_d$:	236.1	a
DC / DC_{avg}:	97.2	%
d_{op}:	365	d/a (days/year)
h_{op}:	24	h/d (hours/day)
t_{cycle}:	3600	s/cycle
	≙ 1	/h (hour)

Values according to IEC/EN 62061 / IEC/EN 61508:

SIL CL:	3	IEC/EN 62061
SIL	3	IEC/EN 61508
HFT:	1	
DC / DC_{avg}:	97.2	%
SFF	99.8	%
PFH_D:	2.05E-10	h^{-1}
T_1:	20	a (year)

*) HFT = Hardware-Failure Tolerance

The values stated above are valid for the standard type.
Safety data for other variants are available on request.
The safety relevant data of the complete system has to be determined by the manufacturer of the system.

CCC-Data

Nominal voltage U_N:	AC 24, 42, 48, 110, 127, 230 V DC 24, 48, 110 V	
Thermal current I_{th}:	see continuous current limit curve (max. 5 A in one contact path)	

Technical data that is not stated in the CCC-Data, can be found in the technical data section.

Standard type

BN 5983.53 DC 24 V

Article number:	0032155	stock item
• Output:	3 NO, 1 NC contacts	
• Nominal voltage U_N:	DC 24 V	
• Width:	100 mm	

Variants

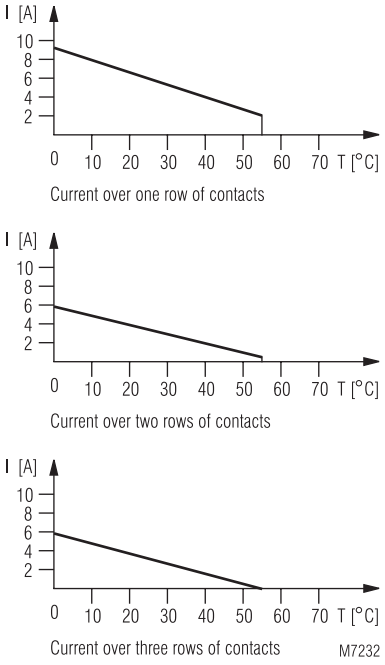
BN 5983.53/104:
For switching small loads of 1 mVA ... 7 VA or 1 mW ... 7 W in the ranges 0.1 ... 60 V and 1 ... 300 mA.
The device is also suitable for switching the maximum switching current. However, this will burn off the gold plating of the contacts, so that switching of small loads is no longer possible afterwards.
BN 5983.53/110:
To avoid latching problems in the case of short voltage drops K2 and K3 are switched definitely off before reset.
BN 5983.53/200:
Redundant switching off with device diversity. Device diversity means that safety relays from different production batches or from different manufacturers are used.

Ordering example for Variants

BN 5983 .53 /_ _ _ AC 230 V 50/60 Hz

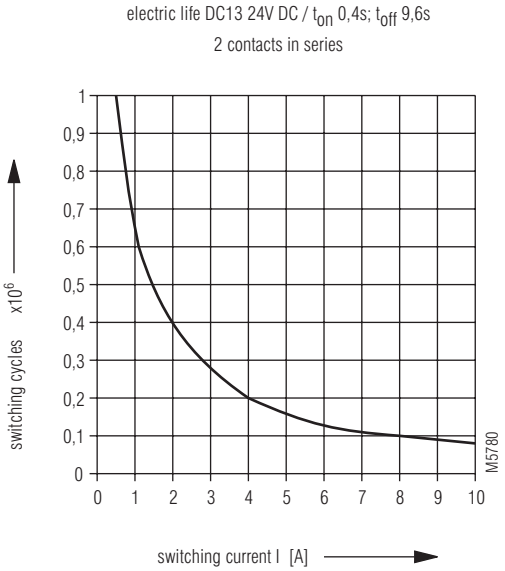
- Nominal frequency
- Nominal voltage
- Variant, if required
- Contacts
- Type

Characteristics

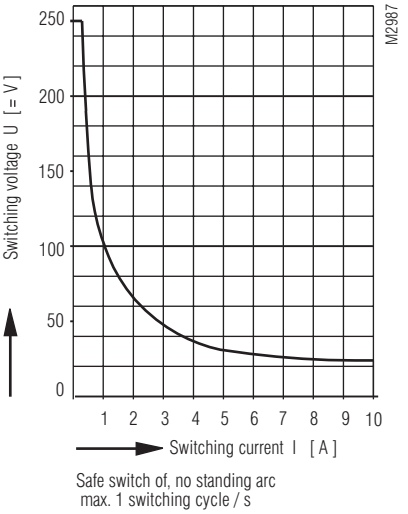


Continuous current limit curves
as a function of ambient temperature

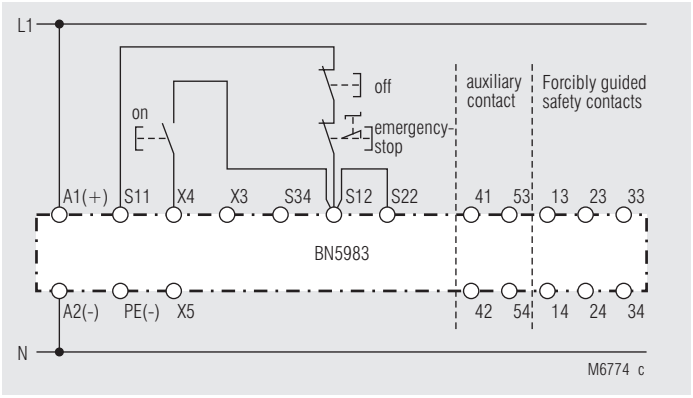
Characteristics



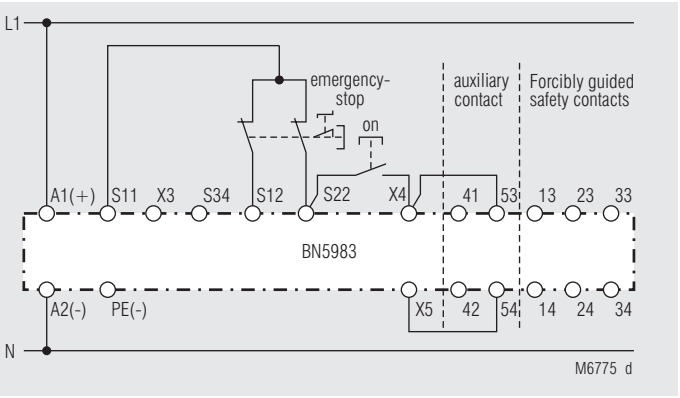
Contact service life



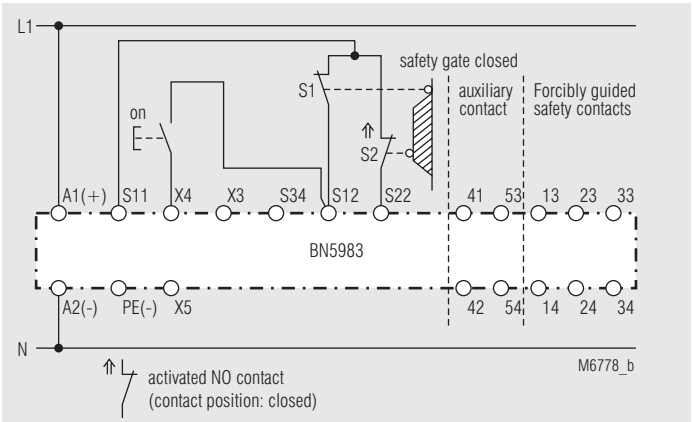
Limit curve for arc-free operation with resistive load



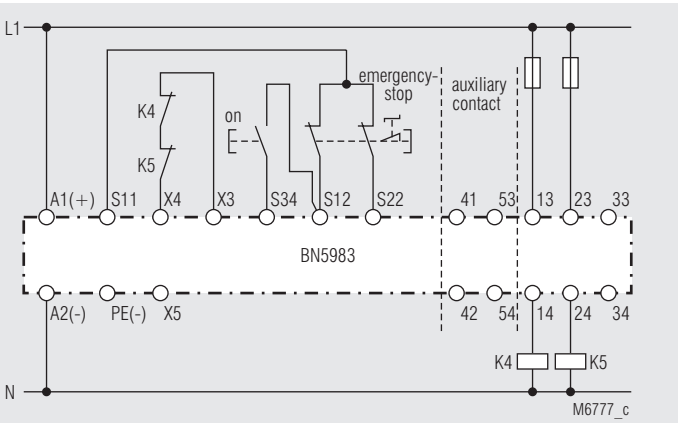
One-channel emergency-stop circuit. This circuit does not have any redundancy in the emergency-stop control circuit.
Suited up to SIL2, Performance Level d, Cat. 3



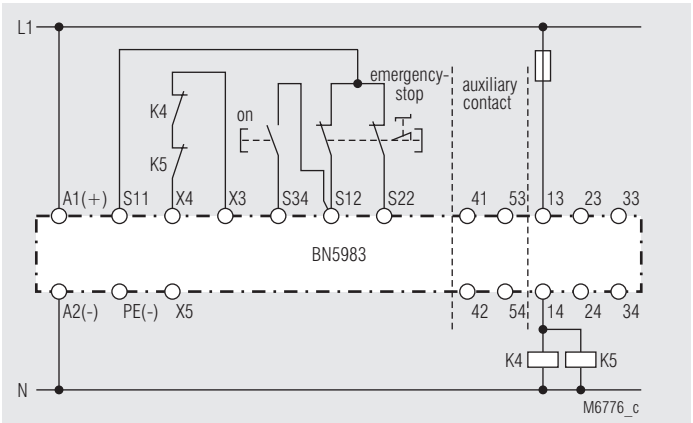
Two-channel emergency stop circuit with line fault detection on start button. The unit starts with the negative edge of the start signal (contrary to the function diagram).
If line fault detection is not necessary the links X4-53 and X5-54 can be removed.
Suited up to SIL3, Performance Level e, Cat. 4



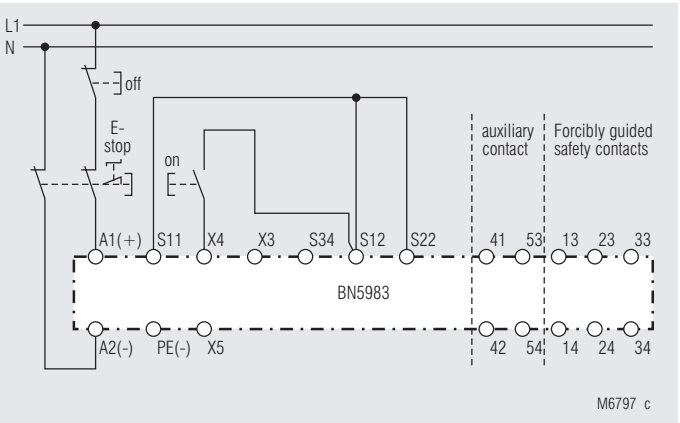
Two-channel monitoring of a safety gate.
Suited up to SIL3, Performance Level e, Cat. 4



Contact reinforcement by external contactors, 2-channel.
The output contacts can be reinforced by external contactors with forcibly guided contacts for switching currents > 10 A. Functioning of the external contactors is monitored by looping the NC contacts into the closing circuit (terminals X3 - X4).
Suited up to SIL3, Performance Level e, Cat. 4



Contact reinforcement by external contactors with reduced safety level.
Suited up to SIL3, Performance Level e, Cat. 4



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.
Suited up to SIL3, Performance Level e, Cat. 4