

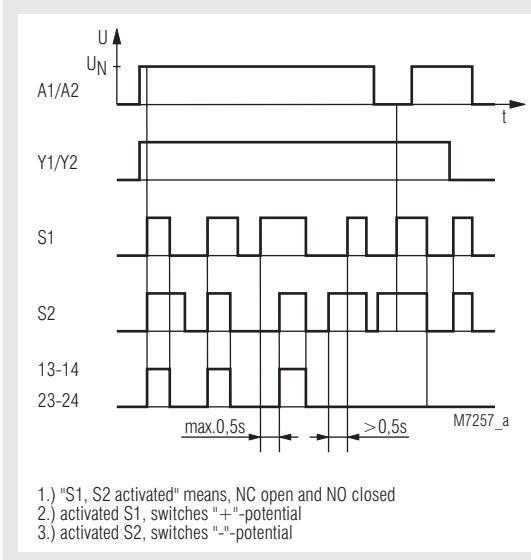
SAFEMASTER Two-Hand Safety Relay LG 5933

0249758



- 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
 - Safety level Type III-C to EN 574
- Inputs for 2 push buttons with 1 NC and 1 NO contact
- Output: 3 NO contacts, 1 NC contact
- Feedback circuit Y1 - Y2 to monitor external contactors used for reinforcement of contacts
- Overvoltage and short circuit protection
- Wire connection: also 2 x 1.5 mm² stranded ferruled, or 2 x 2.5 mm² solid DIN 46 228-1/-2/-3/-4
- as option with pluggable terminal blocks for easy exchange of devices
 - with screw terminals
 - or with cage clamp terminals
- Width 22.5 mm

Function Diagramm



Approvals and Marking



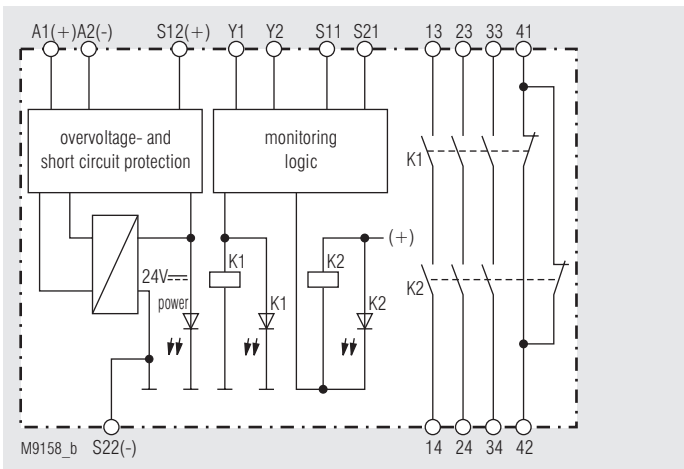
Applications

Designed for press controls in metalworking as well as in other working machines with dangerous closing movements.

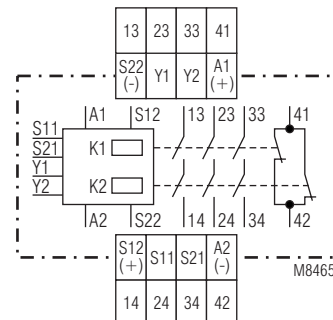
Indication

LED power-supply: on, when operating voltage applied
 LED K1: on, when relay K1 active
 LED K2: on, when relay K2 active

Block Diagram



Circuit Diagram



Connection Terminals	
Terminal designation	Signal designation
A1 (+)	+ / L
A2 (-)	- / N
S11, S21, Y1, Y2	Inputs
S12(+), S22(-)	Outputs
13, 14, 23, 24, 33, 34	Forcibly guided NO contacts for release circuit
41, 42	Forcibly guided indicator output

Notes

If both buttons are pressed while switching on the operating voltage (e.g. after voltage failure) the output contacts do not energize. The terminal S22 also serves as reference point for checking the control voltage. On LG 5933 there is only one terminal S12 and S22.

Set-Up Instructions

The device has to be connected as shown in the application examples. When connecting the push-buttons in parallel or in series the safe function of the relay is disabled. Connected contactors (relays) must have forcibly guided contacts and have to be monitored in the feedback circuit.

To start a dangerous movement, 2 push buttons are used, each equipped with 1 NO and 1 NC contact. The output contacts will be switched if both push buttons are operated within $\leq 0,5$ s. The buttons must be designed and installed in a way, that it is not possible to manipulate or to operate them without intention.

The distance between push buttons and dangerous area must be chosen in a way that it is not possible to reach the dangerous area after release of one button before the dangerous movement comes to standstill.

The safety distance "s" is calculated with the following formula:
 $s = v \times t + C$

- a) moving speed of person $v = 1\ 600$ mm/s
- b) stopping time of the machine t (s)
- c) Additional safety distance $C = 250$ mm

If the risk of accessing the dangerous area is prohibited while the push buttons are pressed e.g. by covering the buttons, C can be 0. The minimum distance has to be in this case 100 mm. See also EN 574.

Technical Data

Input

Nominal voltage U_N:	AC 24 V, DC 24 V
Voltage range	
at 10 % residual ripple:	AC / DC 0.9 ... 1,1 U_N
Nominal consumption:	AC approx. 4 VA DC approx. 2.3 W
Nominal frequency:	50 / 60 Hz
Delay time for simultaneity demand:	max. 0.5 s
Recovery time:	1 s
Control contacts:	2 x (1 NO, 1 NC contacts)
Current via control contacts with DC 24 V:	
NO contact:	typ. 50 mA
NC contact:	typ. 20 mA
Fuse protection:	internal with PTC
Overvoltage protection:	by MOV

Output

Contacts:	3 NO, 1 NC contacts
The NO contacts are safety contacts.	
ATTENTION! The NC contact 41-42 can only be used for monitoring.	
Operate time:	typ. 30 ms
Release time:	typ. 25 ms
Contact type:	forcibly guided
Nominal output voltage:	AC 250 V DC: see continuous current limit curve
Switching of low loads:	≥ 100 mV
(contacts with 5 μ Au)	≥ 1 mA
Thermal current I_{th}:	see continuous current limit curve
Switching capacity	(max. 5 A in a contact)
to AC 15:	
NO contacts:	AC 3 A / 230 V IEC/EN 60 947-5-1
NC contacts:	AC 2 A / 230 V IEC/EN 60 947-5-1
to DC 13	
NO contacts:	2 A / DC 24 V IEC/EN 60 947-5-1
NC contacts:	2 A / DC 24 V IEC/EN 60 947-5-1
Electrical contact life	
at 5 A, AC 230 V $\cos \varphi = 1$:	$> 2.2 \times 10^5$ switch.cycles
Permissible switching capacity:	max. 1 800 switching cycles / h
Short circuit strength	
max. fuse rating:	10 A gL IEC/EN 60 947-5-1
Line circuit breaker:	B 6 A
Mechanical life:	10×10^6 switching cycles

General Data

Nominal operating mode:	continuous operation
Temperature range	
operation:	- 15 ... + 55°C
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
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-wire guided:	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:	Thermoplast 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		DIN 46 228-1/-2/-3/-4
Screw terminals (integrated):	1 x 4 mm ² solid or 1 x 2.5 mm ² stranded ferruled (isolated) or 2 x 1.5 mm ² stranded ferruled (isolated) or 2 x 2.5 mm ² solid	
Insulation of wires or sleeve length:	8 mm	
Plug in with screw terminals		
max. cross section for connection:	1 x 2.5 mm ² solid or 1 x 2.5 mm ² stranded ferruled (isolated)	
Insulation of wires or sleeve length:	8 mm	
Plug in with cage clamp terminals		
max. cross section for connection:	1 x 4 mm ² solid or 1 x 2.5 mm ² stranded ferruled (isolated)	
min. cross section for connection:	0.5 mm ²	
Insulation of wires or sleeve length:	12 ±0.5 mm	
Wire fixing:	Plus-minus terminal screws M 3.5 box terminals with wire protection or cage clamp terminals	
Mounting:	DIN rail	IEC/EN 60 715
Weight:	220 g	

Dimensions

Width x height x depth

LG 5933:	22.5 x 90 x 121 mm
LG 5933 PC:	22.5 x 111 x 121 mm
LG 5933 PS:	22.5 x 104 x 121 mm

Safety Related Data

Values according to EN ISO 13849-1:

Category:	4	
PL:	e	
MTTF _d :	30.7	a (year)
DC _{avg} :	99.0	%
d _{op} :	220	d/a (days/year)
h _{op} :	12	h/d (hours/day)
t _{Zyklus} :	1.40E+02	s/Zyklus

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

SIL CL:	3	IEC/EN 62061
SIL	3	IEC/EN 61508
HFT ¹⁾ :	1	
DC _{avg} :	99.0	%
SFF	99.7	%
PFH _D :	7.51E-09	h ⁻¹
T _r :	20	a (year)

¹⁾ HFT = Hardware-Failure Tolerance



The values stated above are valid for the standard type.

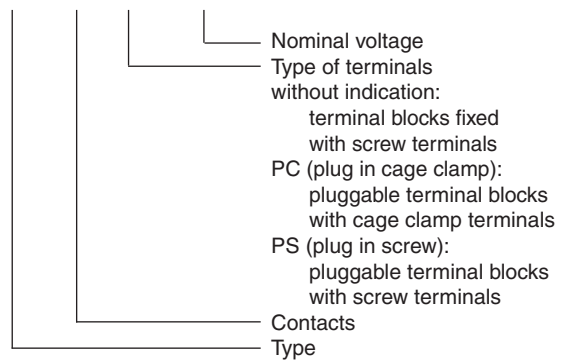
Safety data for other variants are available on request.

The safety relevant data of the complete system has to be determined by the manufacturer of the system.

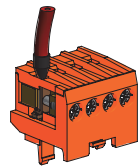
Standard Type	
LG 5933.48 DC 24 V	
Article number:	004958247
• Output:	3 NO contacts, 1 NC contact
• Nominal voltage U _N :	DC 24 V
• Width:	22.5 mm

Ordering Example

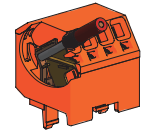
LG 5933 .48 PS DC 24 V



Options with Pluggable Terminal Blocks



Screw terminal
(PS/plugin screw)

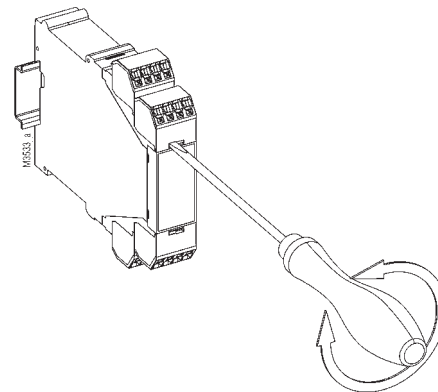


Cage clamp terminal
(PC/plugin cage clamp)

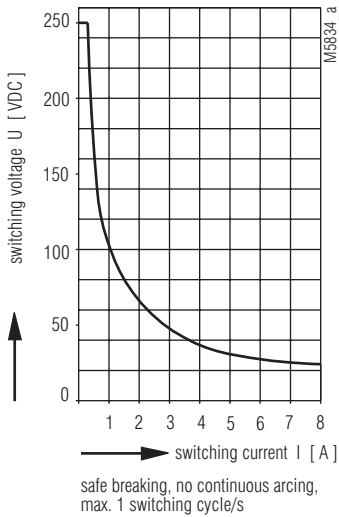
Notes

Removing the terminal blocks with cage clamp terminals

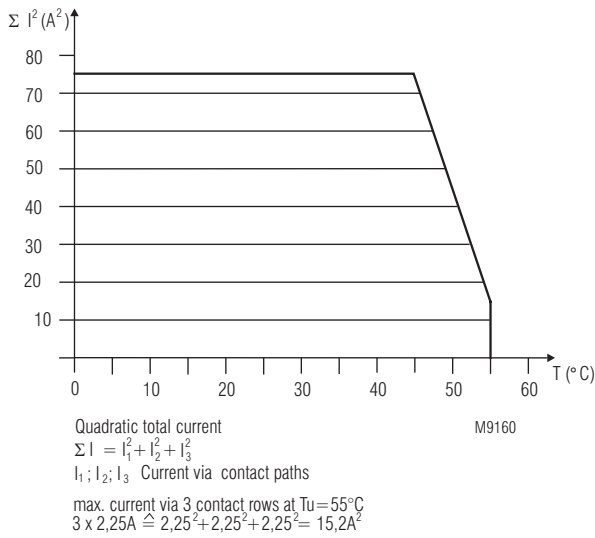
1. The unit has to be disconnected.
2. Insert a screwdriver in the side recess of the front plate.
3. Turn the screwdriver to the right and left.
4. Please note that the terminal blocks have to be mounted on the belonging plug in terminations.



Characteristics

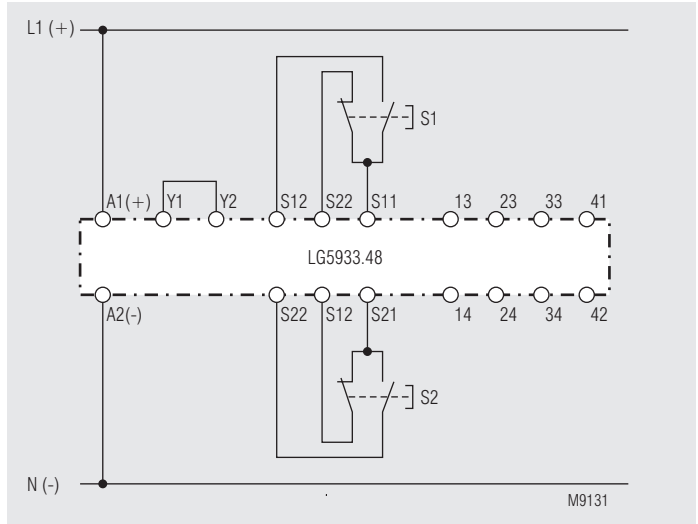


Arc limit curve under resistive load

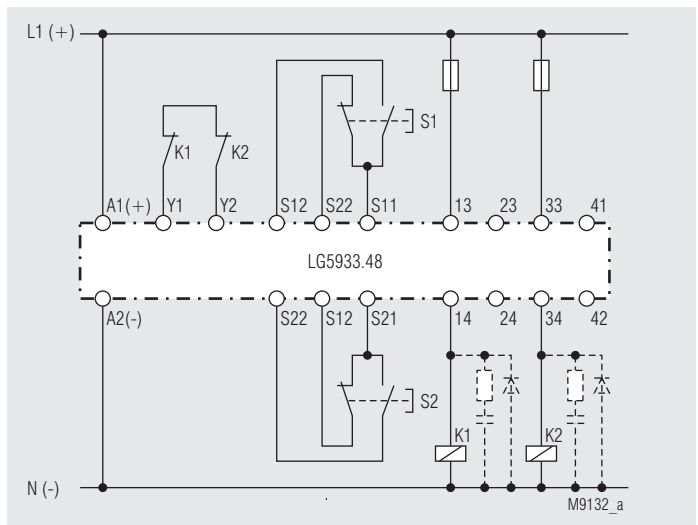


Total current limit curve

Application Examples



Two-hand control
Suited up to SIL3, Performance Level e, Cat. 4



Two-hand control with contact reinforcement via external forcibly guided contactors. When switching inductive loads spark absorbers are recommended.
Suited up to SIL3, Performance Level e, Cat. 4