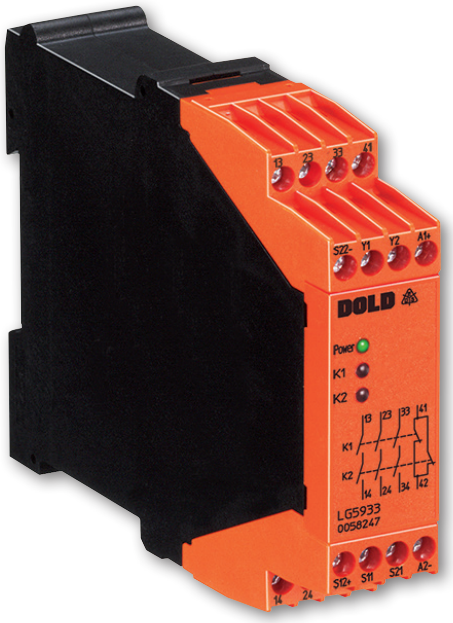

SAFEMASTER
Two-Hand Safety Relay
LG 5933

Translation
of the original instructions

DOLD

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dold-relays@dold.com • www.dold.com

0262947

Contents

Before installing, operating or maintaining this device, these instructions must be carefully read and understood.

The installation must only be done by a qualified electrican!

Do not dispose of household garbage!
The device must be disposed of in compliance with nationally applicable rules and requirements.

Storage for future reference

To help you understand and find specific text passages and notes in the operating instructions, we have important information and information marked with symbols.

Symbol and Notes Statement

DANGER:
Indicates that death or severe personal injury will result if proper precautions are not taken.

WARNING:
Indicates that death or severe personal injury can result if proper precautions are not taken.

CAUTION:
Indicates that a minor personal injury can result if proper precautions are not taken.

INFO:
Referred information to help you make best use of the product.

ATTENTION:
Warns against actions that can cause damage or malfunction of the device, the device environment or the hardware / software result.

General Notes

The product hereby described was developed to perform safety functions as a part of a whole installation or machine. A complete safety system normally includes sensors, evaluation units, signals and logical modules for safe disconnections. The manufacturer of the installation or machine is responsible for ensuring proper functioning of the whole system. DOLD cannot guarantee all the specifications of an installation or machine that was not designed by DOLD. The total concept of the control system into which the device is integrated must be validated by the user. DOLD also takes over no liability for recommendations which are given or implied in the following description. The following description implies no modification of the general DOLD terms of delivery, warranty or liability claims.

Designated Use

The LG 5933 enables and disables a safety circuit in a safe way. It is used to protect people and machines in applications with 2-hand buttons on presses for metal products as well as for other production machinery with dangerous closing movements.When used in accordance with its intended purpose and following these operating instructions, this device presents no known residual risks. Nonobservance may lead to personal injuries and damages to property.

Safety Notes

Risk of electrocution!
Danger to life or risk of serious injuries.

- Disconnect the system and device from the power supply and ensure they remain disconnected during electrical installation.
- The device may only be used for the applications described in the mutually applicable operating instructions / data sheet. The notes in the respective documentation must be heeded. The permissible ambient conditions must be observed.
- The contact protection of the elements connected and the insulation of the supply cables must be designed in accordance with the requirements in the operating instructions / data sheet.
- Note the VDE and local regulations, particularly those related to protective measures.

Risk of fire or other thermal hazards!
Danger to life, risk of serious injuries or property damage.

- The device may only be used for the applications described in the mutually applicable operating instructions / data sheet. The notes in the respective documentation must be heeded. The permissible ambient conditions must be observed. In particular, the current limit curve must be heeded.
- The device may only be installed and put into operation by experts who are familiar with this technical documentation and the applicable health and safety and accident prevention regulations.

Functional error!
Danger to life, risk of serious injuries or property damage.

- The device may only be used for the applications described in the mutually applicable operating instructions / data sheet. The notes in the respective documentation must be heeded. The permissible ambient conditions must be observed.
- The device may only be installed and put into operation by experts who are familiar with this technical documentation and the applicable health and safety and accident prevention regulations.
- The unit should be panel mounted in an enclosure rated at IP 54 or superior. Dust and dampness may lead to malfunction.

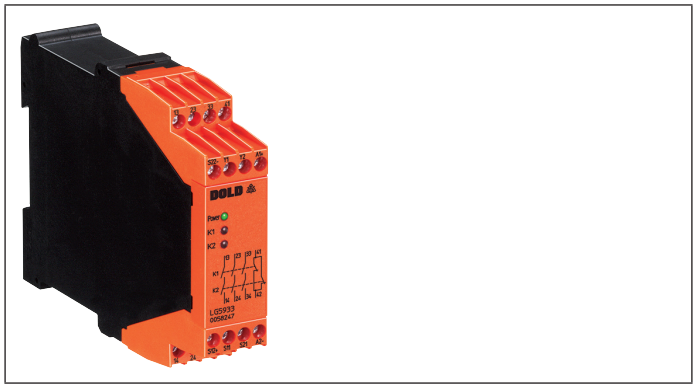
Installation fault!
Danger to life, risk of serious injuries or property damage.

- Make sure of sufficient protection circuitry at all output contacts for capacitive and inductive loads.

Attention!

- The safety function must be triggered during commissioning.
- Opening the device or implementing unauthorized changes voids any warranty

SAFEMASTER
Two-Hand Safety Relay
LG 5933



Your Advantage

- Compact, ready to connect 2-hand safety circuit
- Cost reduction by replacing conventional contactor circuits
- Feedback circuit Y1 - Y2 to monitor external contactors used for reinforcement of contacts
- EC-type examinated circuit according to the requirements of the health and safety authorities
- As option with pluggable terminal blocks for easy exchange of devices

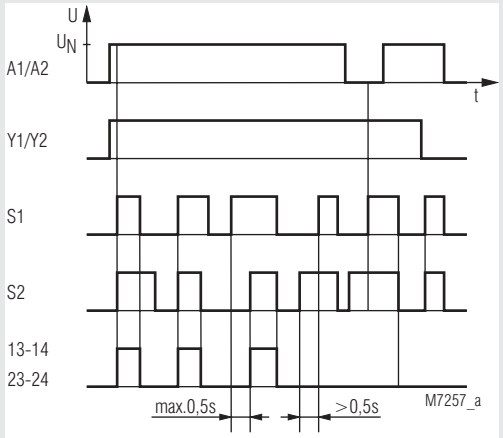
Features

- **According to**
  - **Performance Level (PL) e and category 4 to EN ISO 13849-1**
  - **SIL Claimed Level (maximum SIL) 3 to EN IEC 62061**
  - **Safety Integrity Level (SIL) 3 to EN 61508**
  - **Safety level Typ III C to EN ISO 13851**
- Inputs for 2 push buttons with 1 NC and 1 NO contact
- Output: 3 NO contacts, 1 NC contact
- 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
- Removable terminal strips
  - LG 5933: Fixed screw terminals
  - LG 5933 PS: Plug in screw terminals
  - LG 5933 PC: Plug in cage clamp terminals
- Width 22.5 mm

Product Description

The LG 5933 enables and disables a safety circuit in a safe way. It is used to protect people and machines in applications with 2-hand buttons on presses for metal products as well as for other production machinery with dangerous closing movements.

Function Diagram



1.) "S1, S2 activated" means, NC open and NO closed
2.) Activated S1, switches "+" -potential
3.) Activated S2, switches "-" -potential

Approvals and Markings

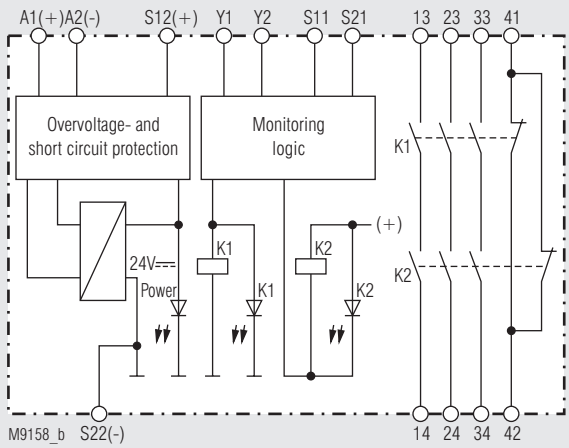
Applications

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

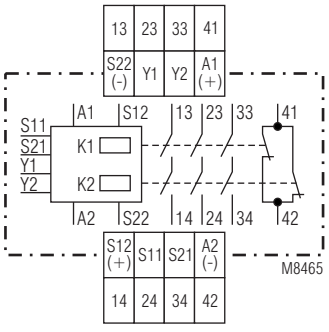
Indication

LED Power:	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 description
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 ≤ 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 x 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 risc 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 ISO 13851.

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.
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 arc limit curve
Switching of low loads: ≥ 100 mV
(contacts with 5 µ Au) ≥ 1 mA
Thermal current I_{th}: See quadratic total current limit curves
Switching capacity (max. 5 A in a contact)
to AC 15:
NO contacts: AC 3 A / 230 V IEC/EN 60947-5-1
NC contacts: AC 2 A / 230 V IEC/EN 60947-5-1
to DC 13
NO contacts: 2 A / DC 24 V IEC/EN 60947-5-1
NC contacts: 2 A / DC 24 V IEC/EN 60947-5-1
Electrical contact life
at 5 A, AC 230 V cos φ = 1: > 2.2 x 10^5 switch.cycles
Permissible switching capacity: Max. 1800 switching cycles / h
Short circuit strength
max. fuse rating: 10 A gG / gL IEC/EN 60947-5-1
Line circuit breaker: B 6 A
Mechanical life: 10 x 10^6 switching cycles

General Data

Nominal operating mode: Continuous operation
Temperature range
Operation: - 25 ... + 55°C
From an altitude of > 2000 m the curve is adjusted by -0.5° C / 100 m (see example for 4000 m).
Storage: - 25 ... + 85 °C
Altitude,
Clearance and creepage distances
Rated impuls voltage / pollution degree: IEC 60664-1

≤ 2000 m	> 2000 m up to ≤ 4000 m
4 kV / 2	2.5 kV / 2

EMC IEC/EN 61326-3-1
Interference suppression: Limit value class B EN 55011
Degree of protection
Housing: IP 40 IEC/EN 60529
Terminals: IP 20 IEC/EN 60529
Housing: Thermoplast with V0 behaviour according to UL subject 94

Technical Data

Vibration resistance:	Amplitude 0.35 mm, frequency 10 ... 55 Hz IEC/EN 60068-2-6
Climate resistance:	25 / 055 / 04 IEC/EN 60068-1
Terminal designation:	EN 50005
Wire connection	DIN 46228-1/-2/-3/-4
Screw terminals (integrated):	1 x 4 mm² solid or 1 x 2.5 mm² stranded ferruled (isolated) or 2 x 1.5 mm² stranded ferruled (isolated) or 2 x 2.5 mm² solid
Insulation of wires or sleeve length:	8 mm
Plug in with screw terminals	
max. cross section for connection:	1 x 2.5 mm² solid or 1 x 2.5 mm² 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 mm² solid or 1 x 2.5 mm² stranded ferruled (isolated)
min. cross section for connection:	0.5 mm²
Insulation of wires or sleeve length:	12 $^{\pm 0.5}$ mm
Wire fixing:	Plus-minus terminal screws M3.5 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

Standard Type

LG 5933.48 DC 24 V

Article number:	0058247
• 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

- DC 24 V: Nominal voltage
- PS: Type of terminals
  - Without indication: Terminal blocks fixed with screw terminals
  - PC (plug in cage clamp): Pluggable terminal blocks with cage clamp terminals
  - PS (plug in screw): Pluggable terminal blocks with screw terminals
- .48: Contacts
- LG 5933: Type

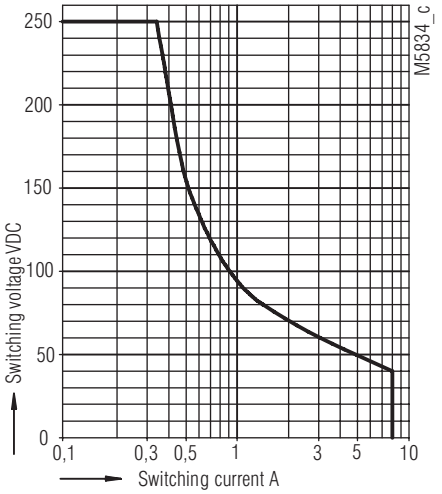
Troubleshooting

Failure	Potential cause
LED "Power" does not light up	Power supply not connected
LED "K1" lights up, but "K2" remains off or LED "K2" lights up, but "K1" remains off	- Safety relay K1 e.g. K2 is welded (replace device) - The 2-Hand-buttons have not been operated simultaneously within ≤ 0,5s
Device cannot be activated	- Safety relay is welded (replace device) - Feddback circuit Y1-Y2 not closed - The 2-Hand-buttons have not been operated simultaneously within ≤ 0,5s

Maintenance and repairs

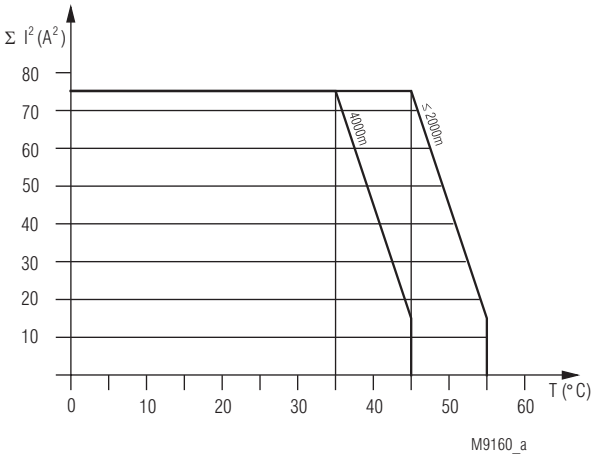
- The device contains no parts that require maintenance.
- In case of failure, do not open the device but send it to manufacturer for repair.

Characteristics



Safe breaking, no continuous arcing,
max. 1 switching cycle / s

Arc limit curve under resistive load

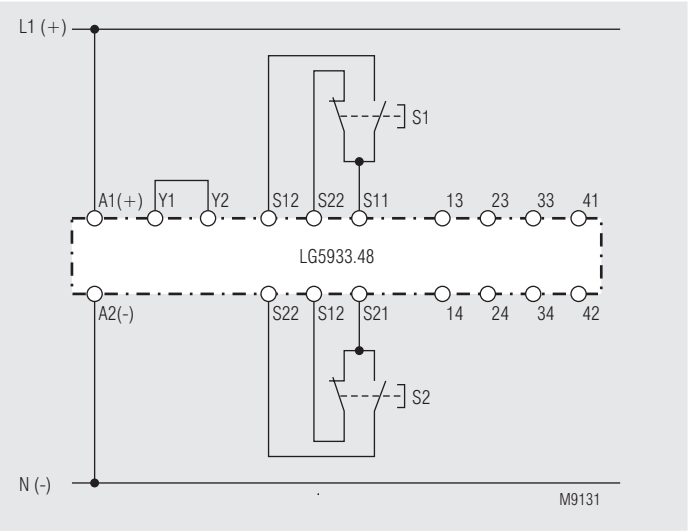


Max. current at 55°C (≤ 2000m) or 45°C (4000m) over
3 contact paths = 2,25A ≙ 3x2,25²A² = 15,2A²

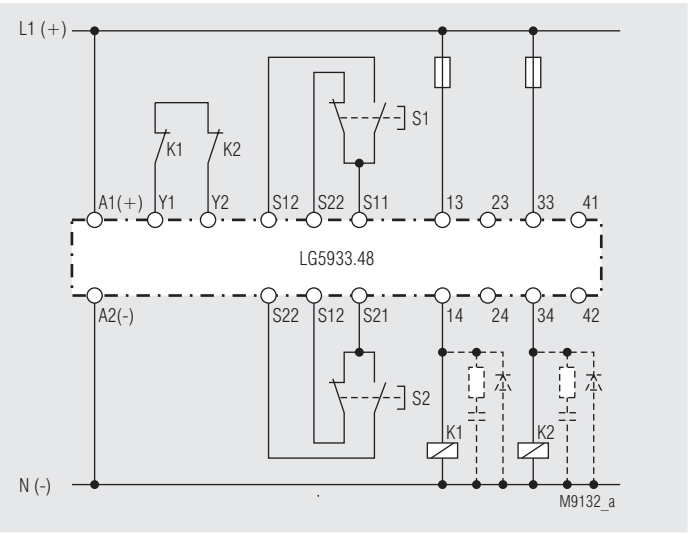
Quadratic total current
$\Sigma I^2 = I_1^2 + I_2^2 + I_3^2$
I_1, I_2, I_3 - Current in contact paths

Total current limit curve
From an altitude of > 2000 m the curve is adjusted by -0.5° C / 100 m (see example for 4000 m).

Application Examples

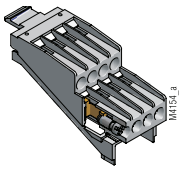
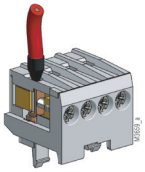
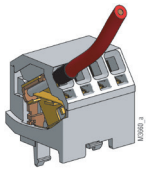
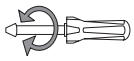
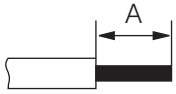
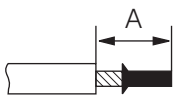
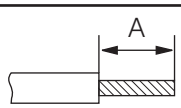


Two-hand control
Suited up to SIL3, Performance Level e, Cat. 4

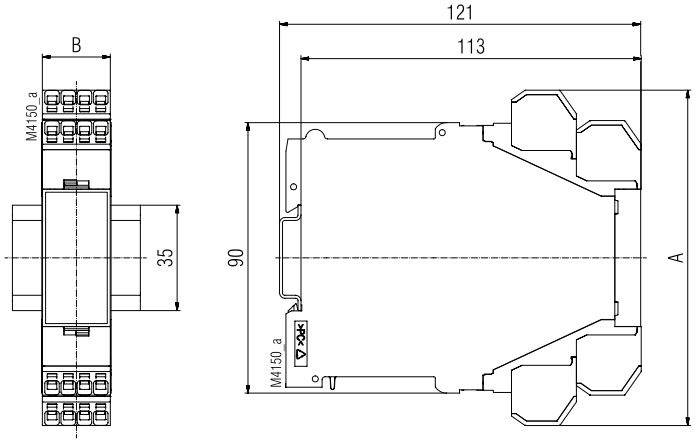


Two-hand control with contact reinforcement via external forcibly guided contactors. When switching inductive loads spark absorbers are recommended.
Suited up to SIL3, Performance Level e, Cat. 4

DE	**Anschlusstechnik**
EN	**Connection Technology**
FR	**Technologie de connexion**

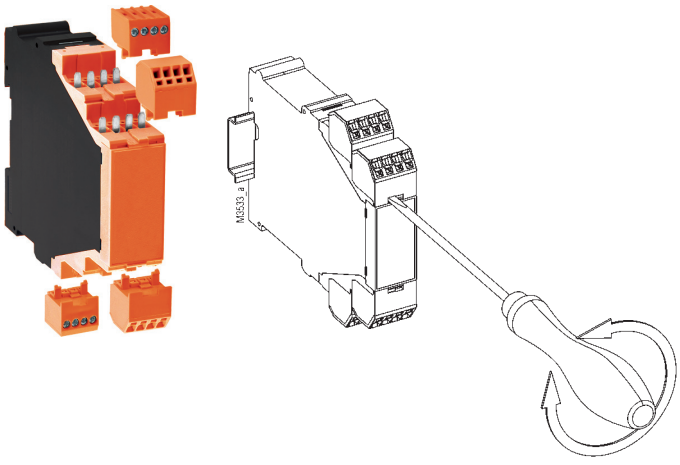
	Schraubklemme, fest Screw terminal, fixed Borne à vis, fixes	Schraubklemme, abnehmbar Screw terminal, removable Borne à vis, amovible	Federkraftklemme, abnehmbar Cage clamp terminal, removable Bornes à ressorts, amovible	
		 PS	 PC	
	ø 4 mm / PZ 1 0,8 Nm 7 LB. IN	ø 4 mm / PZ 1 0,8 Nm 7 LB. IN	DIN 5264-A; 0,5 x 3	
 M10248	A = 8 mm 1 x 0,5 ... 4 mm² 1 x AWG 20 to 12 2 x 0,5 ... 2,5 mm² 2 x AWG 20 to 14	A = 8 mm 1 x 0,5 ... 2,5 mm² 1 x AWG 20 to 14 2 x 0,5 ... 1,5 mm² 2 x AWG 20 to 16	A = 10 ... 12 mm 1 x 0,5 ... 2,5 mm² 1 x AWG 20 to 14	A = 12 mm 1 x 0,5 ... 4 mm² 1 x AWG 20 to 12
 M10249	A = 8 mm 1 x 0,5 ... 2,5 mm² 1 x AWG 20 to 14 2 x 0,5 ... 1,5 mm² 2 x AWG 20 to 16	A = 8 mm 1 x 0,5 ... 2,5 mm² 1 x AWG 20 to 14 2 x 0,5 ... 1 mm² 2 x AWG 20 to 18	A = 10 ... 12 mm 1 x 0,5 ... 1,5 mm² 1 x AWG 20 to 16	A = 12 mm 1 x 0,5 ... 2,5 mm² 1 x AWG 20 to 14
 M10250	A = 8 mm 1 x 0,5 ... 4 mm² 1 x AWG 20 to 12 2 x 0,5 ... 2,5 mm² 2 x AWG 20 to 14	A = 8 mm 1 x 0,5 ... 2,5 mm² 1 x AWG 20 to 14 2 x 0,5 ... 1,5 mm² 2 x AWG 20 to 16	A = 10 ... 12 mm 1 x 0,5 ... 2,5 mm² 1 x AWG 20 to 14	A = 12 mm 1 x 0,5 ... 4 mm² 1 x AWG 20 to 12

DE	**Maßbild (Maße in mm)**
EN	**Dimensions (dimensions in mm)**
FR	**Dimensions (dimensions en mm)**



	A	B
LG 5933	90	22,5
LG 5933 PS	103,6	22,5
LG 5933 PC	111,4	22,5

DE	**Montage / Demontage der PS / PC-Klemmenblöcke**
EN	**Mounting / disassembly of the PS / PC-terminal blocks**
FR	**Montage / Démontage des borniers PS / PC**



DE	**Sicherheitstechnische Kenndaten**
EN	**Safety Related Data**
FR	**Données techniques sécuritaires**

EN ISO 13849-1:		
Kategorie / Category:	4	
PL:	e	
$MTTF_d$:	30	a (year)
DC_{avg}:	99,0	%
d_{op}:	220	d/a (days/year)
h_{op}:	12	h/d (hours/day)
t_{cycle}:	1,40E+02	s/cycle

EN IEC 62061 EN 61508:		
maximum SIL:	3	EN IEC 62061
SIL	3	EN 61508
HFT*):	1	
DC:	99,0	%
PFH_D:	7,51E-09	h^{-1}
T_1:	20	a (year)
*) HFT = Hardware-Fehlertoleranz Hardware failure tolerance Tolérance défauts Hardware		

Anforderung seitens der Sicherheitsfunktion an das Gerät Demand to our device based on the evaluated neccessary safety level of the application. Consigne résultant de la fonction sécuritaire de l'appareil		Intervall für zyklische Überprüfung der Sicherheitsfunktion Intervall for cyclic test of the safety function Interval du contrôle cyclique de la fonction sécuritaire
nach, acc. to, selon EN ISO 13849-1	PL e with Cat. 3 or Cat. 4	einmal pro Monat once per month mensuel
	PL d with Cat. 3	einmal pro Jahr once per year annuel
nach, acc. to, selon EN IEC 62061, EN 61508	maximum SIL 3, SIL 3 with HFT = 1	einmal pro Monat once per month mensuel
	maximum SIL 2, SIL 2 with HFT = 1	einmal pro Jahr once per year annuel

Info

DE	Die angeführten Kenndaten gelten für die Standardtype. Sicherheitstechnische Kenndaten für andere Geräteausführungen erhalten Sie auf Anfrage. Die sicherheitstechnischen Kenndaten der kompletten Anlage müssen vom Anwender bestimmt werden.
EN	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.
FR	Les valeurs données sont valables pour les produits standards. Les valeurs techniques sécuritaires pour d'autres produits spéciaux sont disponibles sur simple demande. Les données techniques sécuritaires de l'installation complète doivent être définies par l'utilisateur.

DE	**EG-Konformitätserklärung**
EN	**CE-Declaration of Conformity**
FR	**Déclaration de conformité européenne**

EG - Konformitätserklärung
Declaration of Conformity
Déclaration de conformité européenne

Hersteller:
Manufacturer: / Fabricant:
Anschrift:
Address: / Adresse:

E. Dold & Söhne GmbH & Co. KG

Bregstraße 18
78120 Furtwangen
Germany

Produktbezeichnung: Zweihand-Sicherheitsrelais
Product description: *Two-hand safety relay*
Désignation du produit: *Relais de commande bimanuelle*

LG5933.48/ccc
LG5933.48tt/ccc

mit: / *with:* / *avec:*
tt = PS, PC
optional ccc = /60 .. /69

Das bezeichnete Produkt stimmt mit den Vorschriften folgender europäischer Richtlinien überein:
The indicated product is in conformance with the regulations of the following european directives:
Le produit désigné est conforme aux instructions des directives européennes:

Maschinenrichtlinie: *Machinery directive: / Directives Machines:*	2006/42/EG	EU-Abl. L157/24, 09.06.2006
EMV - Richtlinie: *EMC - Directive: / Directives- CEM::*	2014/30/EU	EU-Abl. L96/79, 29.03.2014
RoHS - Richtlinie *RoHS -Directive: / Directives - RoHS:*	2011/65/EU	EU-Abl. L174/88, 01.07.2011

Prüfgrundsätze:
Basis of Testing:
Lignes de contrôle:

EN ISO 13849-1:2015
EN IEC 62061:2021
EN IEC 60664-1:2020
EN 61326-1:2013
EN 61000-6-1:2007
EN 61000-6-3:2007 + A1:2011 + AC:2012
EN 61000-6-7:2015
EN ISO 13851:2019
EN 61508 Parts 1-7:2010
EN 61326-3-1:2017
EN 61000-6-2:2005 + AC:2005
EN 61000-6-4:2007 + A1:2011
EN 55011:2016 + A1:2017

Die Übereinstimmung eines Baumusters des bezeichneten Produktes mit der oben genannten Maschinenrichtlinie wurde bescheinigt durch:
Consistency of a production sample with the marked product in accordance to the above machiney directive has been certified by:
La conformité d'un échantillon du produit désigné aux directives machines susmentionnées a été certifiée par:

Benannte Stelle:
Certification office: / l´organisme notifié:
TÜV Rheinland Industrie Service GmbH,
Am Grauen Stein, 51105 Köln

Nummer der benannten Stelle:
Number of certification office:/ Numéro de l´organisme notifié:
NB0035

Nummer der Bescheinigung:
Certification number: / Numéro de certificat:
01/205/5042.02/22

Ausstelldatum :
Date of issue: / Date de délivrance:
21.11.2022

Für die Zusammenstellung der technischen Unterlagen ist bevollmächtigt:
For the compilation of technical documents is authorized:
Pour la composition des documents techniques est autorisé:

Gamal Hagar – Entwicklungsleiter / R&D Manager

Rechtsverbindliche Unterschrift:
Signature of authorized person:
Signature du PDG :

ppa. H. Dold

Christian Dold - Produktmanagment

Ort, Datum :
Place, Date: / Lieu, date:
Furtwangen, 01.12.2022

Diese Original - Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der Produktdokumentation sind zu beachten.
This original declaration confirms the conformity of the mentioned directives but does not comprise any guarantee of the product characteristics. The safety directives of the product documentation are to be considered.
Cette déclaration originale certifie la conformité des directives nommées mais ne comprend aucune garantie des caractéristiques du produit. Les directives de sécurité de la documentation du produit sont à considérer.

DE	**UKCA-Konformitätserklärung**
EN	**UKCA-Declaration of Conformity**
FR	**Déclaration de conformité UKCA**

UK Declaration of Conformity

Manufacturer: **E. Dold & Söhne GmbH & Co. KG**

Address: Bregstraße 18
78120 Furtwangen
Germany

Product description: Two-hand safety relay **LG5933.48ccc** **LG5933.48ttccc** with: tt = PS, PC
optional ccc = /60 .. / 69

The indicated product is in conformance with the regulations of the following British regulations:

Supply of Machinery (Safety) Regulations: S.I. 2008 No. 1597

Electromagnetic Compatibility Regulations: S.I. 2016 No. 1091

RoHS Regulations: S.I. 2012 No. 3032

Designated standards:
EN ISO 13851:2019
EN IEC 62061:2021
EN IEC 60664-1:2020
EN 61326-1:2013
EN 61000-6-1:2017
EN 61000-6-3:2007 + A1:2011
EN 61000-6-7:2015
EN ISO 13849-1:2015
EN 61508 Parts 1-7:2010
EN 61326-3-1:2017
EN 61000-6-2:2005 + AC:2005
EN 61000-6-4:2007 + A1:2011
EN 55011:2016 + A1:2017

Consistency of a production sample with the marked product in accordance to the above machinery regulation has been certified by:

Certification office: TÜV Rheinland UK Ltd., Friars Gate(Thrid Floor), 1011 Stratford Road, Shirley, Solihull B90 4BN, United Kingdom

Number of certification office: 2571

Certification number: 01/205U/5042.00/23

Date of issue: 2023-03-10

For the compilation of technical documents is authorized:

Dold Industries Ltd.

11 Hamberts Rd. Blackall Ind. Estate
South Woodham Ferrers
GB - Essex, CM3 5UW

Signature of authorized person:

ppa. Ch. Dold

Christian Dold - Productmanagement

Place, Date: Furtwangen, 2023-03-13

This original declaration confirms the conformity of the mentioned regulations but does not comprise any guarantee of the product characteristics. The safety directives of the product documentation are to be considered.

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