SAFEMASTER
Safety Edge Module
LG 5944

Translation
of the original instructions

DOLD

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0270929

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 5944 is used to interrupt a safety circuit in a safe way. It can be used to protect men and machines in applications with safety edges. To avoid a damage of the safety edge caused by high current in a safe way, the current generated by the LG 5944 is limited to max. 10 mA, also in the case of a short circuit. When used in accordance with its intended purpose and following these operating instructions, this device presents no known residual risks. Non observance 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.
- 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.
- If during the test the safety function does not work, the safety device has to be disconnected and if necessary sent back to the manufacturer for repair, as the operational safety is not longer garanteed!
- If the line fault is removed while the unit is on power, the output relays will energized.
- AUTOMATIC START !
  According to IEC/EN 60204-1 part 9.2.5.4.2 and 10.8.3 it is not allowed to restart automatically after emergency stop.
  Therefore the machine control has to disable the automatic start after emergency stop.
- Opening the device or implementing unauthorized changes voids any warranty

SAFEMASTER
Safety Edge Module
LG 5944

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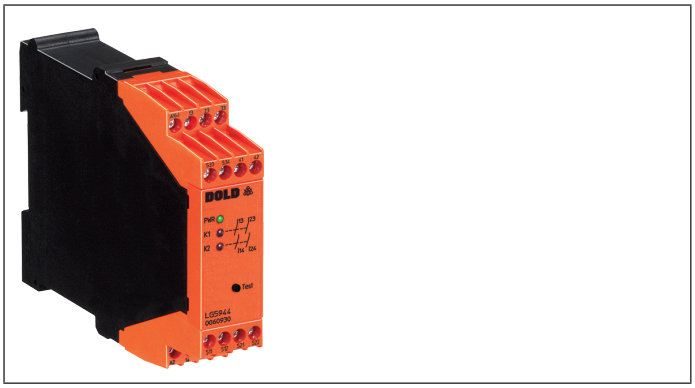


Product Description

The safety edge module LG 5944 monitors safety edges with a permitted switching current of ≥ 10mA. It enables or disables a safety circuit and can be used to protect men and machine. To avoid a damage of the safety edges by excessive currents, the current provided by the LG 5944 is limited to 10 mA even in the case of a short circuit.

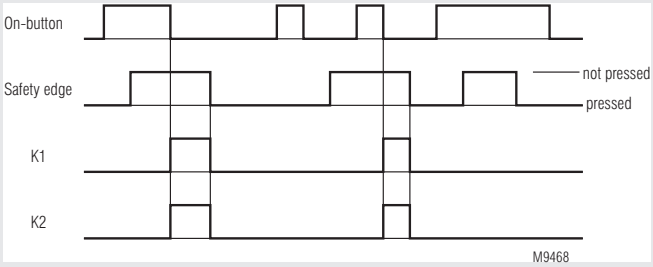
Your Advantages

- Current limitation protects the connected safety edge against electrical destruction by overcurrent and short circuit
- Universal usage with safety edges with different allowed switching currents (also for lower switching currents)
- Pluggable terminal blocks for easy exchange

Features

- **According to**
  - **Performance Level (PL) e and category 3 to EN ISO 13849-1**
  - **SIL Claimed Level (maximum SIL) 3 to IEC/EN 62061**
  - **Safety Integrity Level (SIL) 3 to IEC/EN 61508**
- Output: 2 redundant safety outputs
- Line fault detection on On-button
- Manual restart or automatic restart, switch S2
- Indication for operating condition
- LED indicator for channel 1 and 2
- As option with pluggable terminal blocks for easy exchange of devices
  - With screw terminals
  - Or with cage clamp terminals
- Width: 22.5 mm

Function Diagram



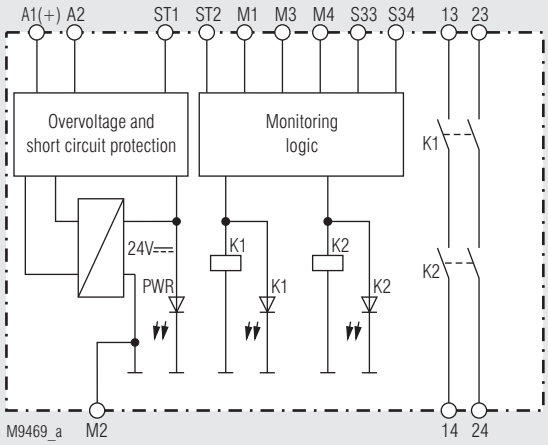
Approvals and Markings

Canada / USA

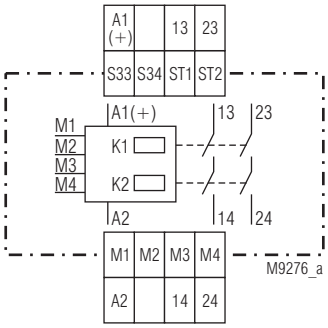
Indicators

Green LED PWR:	On, when supply connected
Green LED K1:	On, when relay K1 energized
Green LED K2:	On, when relay K2 energized

Block Diagram



Circuit Diagram



Connection Terminals

Terminal designation	Signal description
A1 (+)	+ / L
A2	- / N
M1, M2, M3, M4	Measuring input
ST1, ST2	Connections for On-button
S33, S34	Connections for Test-button
13, 14, 23, 24	Forcibly guided NO contacts for release circuit

Notes

Line fault detection on start button:
If a linefault is present on the start button before the power is applied to A1,A2, the output contacts will not switch on.
A line fault across the On-button which occurred after activation of the relay, will be detected with the next activation and the output contacts will not close.

To guarantee the oprating safety of the LG5944, the safety fuction has to be tested regularly (time period depending on the application). This has to be done in 2 steps. As first step the sensor must be operated to proof the function of the sensor. As second step the test button on the monitoring device has to be operated (the sensor must not be activated) to simulate a broken sensor wire. in both cases the safety function must operate, which results in de-energisation of the safety output relays K1, K2, switching off the LEDs (K1, K2), opening of the contacts (13/14, 23/24).

Technical Data

Input

Nominal Voltage U_N:	AC / DC 24 V
Voltage range:	DC 0.9 ... 1.2 U_N / AC 0.8 ... 1.1 U_N
Nominal frequency:	50 / 60 Hz
Nominal consumption:	DC approx. 1.6 W / AC approx. 3 VA
Short-circuit protection:	Internal with PTC / electr. current limit
Overvoltage protection:	Internal VDR
Max. permissible safety edge contact resistance	
LG 5944/_0_:	200 Ω
LG 5944/_1_:	800 Ω
Termination resistor of the safety edge when connected in 2 wire circuit:	
LG 5944/_0_:	1,2 kΩ
LG 5944/_1_:	8,2 kΩ
Switching current when operated by the safety edge	
LG 5944/00_:	
DC:	Approx. 5,5 mA at U_N
AC:	Approx. 7,5 mA at U_N
LG 5944/01_:	
DC:	Approx. 1,2 mA at U_N
AC:	Approx. 1,6 mA at U_N
LG 5944/10_:	
DC:	Approx. 3,0 mA at U_N
AC:	Approx. 4,1 mA at U_N
LG 5944/11_:	
DC:	Approx. 0,6 mA at U_N
AC:	Approx. 0,8 mA at U_N

Output

Contacts:	2 Schließer	
Operate delay typ. bei U_N:		
Manual start:	20 ms	
Automatic start when connecting the power supply:	300 ms	
when enabled by the safety edge:	20 ms	
Release delay typ. bei U_N:		
Disconnecting the supply:	80 ms	
when activating the safety edge:	40 ms	
Contact type:	forcibly guided	
Nominal output voltage:	AC 250 V DC: see arc limit curve	
Thermal current I_{th}:	max. 5 A	
Switching capacity		
to AC 15:	3 A / AC 230 V	IEC/EN 60947-5-1
to DC 13:	2 A / DC 24 V	IEC/EN 60947-5-1
to DC 13:	4 A / 24 V at 0.1 Hz	

Technical Data

Electrical contact life		
to AC 15 at 2 A, AC 230 V:	10^5 switching cycles	IEC/EN 60947-5-1
Permissible operating frequency:	Max. 1200 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

Operating mode:	Continuous operation	
Temperature range		
Operation:	- 15 ... + 55 °C At an altitude of > 2000 m the maximum permissible temperature reduces by 0.5°C / 100 m	
Storage:	- 25 ... + 85 °C	
Altitude, Clearance and creepage distances		
Rated impulse voltage / pollution degree:	IEC 60664-1 ≤ 2000 m / 4 kV / 2 > 2000 m to ≤ 4000 m / 2.5 kV / 2	
EMC	IEC/EN 61326-3-1, EN61000-6-7	
Interference suppression:	Limit value class B	EN 55011
Degree of protection		
Housing:	IP 40	IEC/EN 60529
Terminals:	IP 20	IEC/EN 60529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm frequency 10 ... 55 Hz	IEC/EN 60068-2-6
Climate resistance:	15 / 055 / 04	IEC/EN 60068-1
Terminal designation:		EN 50005
Wire fixing:	Plus-minus terminal screws M 3.5 box terminals with wire protection or cage clamp terminals	
Mounting:	DIN rail	IEC/EN 60715
Weight:	Approx. 200 g	

Dimensions

Width x height x depth	
LG 5944:	22.5 x 90 x 121 mm
LG 5944 PC:	22.5 x 111 x 121 mm
LG 5944 PS:	22.5 x 104 x 121 mm

UL-Data

The safety functions were not evaluated by UL. Listing is accomplished according to requirements of Standard UL60947, "general use applications"

Standards:
- ANSI/UL 60947-1, 5th Edition (Low-Voltage Switchgear and Controlgear Part1: General rules)
- ANSI/UL 60947-5-1, 3th Edition (Low-Voltage Switchgear and Controlgear Part5-1: Control circuit Devices an Switching Elements - Electromechanical Control Circuits Devices)
- CAN/CSA-C22.2 No. 60947-1-13, 2nd Edition (Low-Voltage Switchgear and Controlgear - Part1: General rules)
- CAN/CSA-C22.2 No. 60947-1-14, 1st Edition (Low-Voltage Switchgear and Controlgear - Part5-1: Control circuit Devices an Switching Elements - Electromechanical Control Circuits Devices)

Switching capacity:	Pilot duty B300, R300 8A 250Vac Resistive or G.P. 8A 24Vdc
Altitude:	≤ 2000 m
Wire connection:	min. 60°C copper conductors

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

Standard Type

LG 5944.02PC/61	AC/DC 24 V
Article number:	0059038
• Output:	2 NO contacts
• Nominal voltage U_N:	AC/DC 24 V
• Width:	22.5 mm

Ordering Example

LG 5944 .02 _ _ /_ _ _ /61 AC/DC 24 V

- Nominal voltage
- UL-approval
- Termination resistor of the safety edge in 2 wire connection
  - 0 ... 1.2 kΩ
  - 1 ... 8.2 kΩ
- Number of safety edges wire connection
  - 0 device for 1 safety edge (2- and 4- wire connection possible)
  - 1 device for 2 safety edges (only 2-wire connection possible)
- 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
- Contacts
- Type

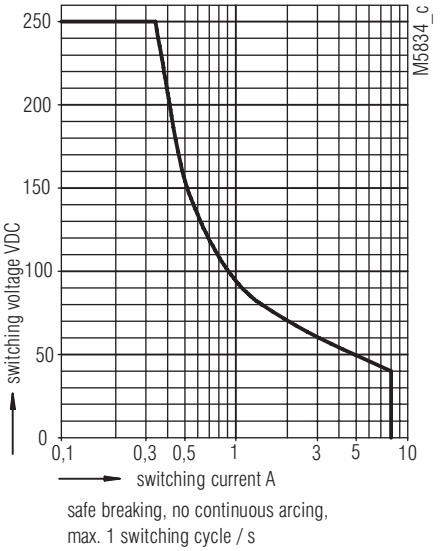
Troubleshooting

Failure	Potential cause
LED "Power" does not light up	- Power supply not connected - Cross fault between S11 and S21
LED "K1" lights up, but "K2" remains off	- Safety relay K1 is welded (replace device) - A 1-channel switch-off occurred on S12 (switch channel off on S22)
LED "K2" lights up, but "K1" remains off	- Safety relay K2 is welded (replace device) - A 1-channel switch-off occurred on S22 (switch channel off on S12)
Device cannot be activated	Manual start mode: - Line fault on start-button (disconnect power supply and remove fault) Automatic start mode: - S33-S34 not bridged - A safety relay is welded (replace device) - Incorrect setting of switch S1

Maintenance and repairs

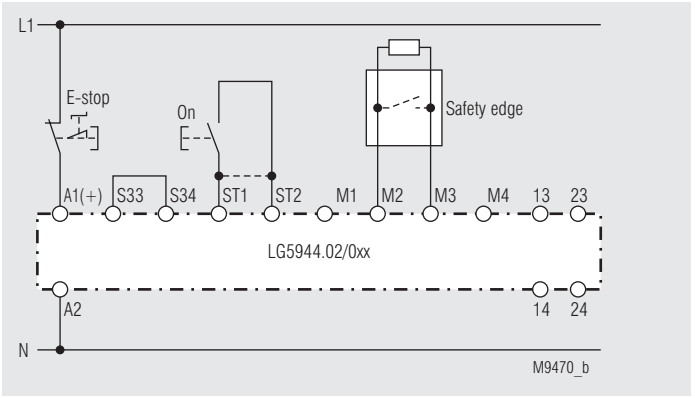
- The device contains no parts that require maintenance.
- In case of failure, do not open the device but send it to manufacturer for repair.

Characteristics

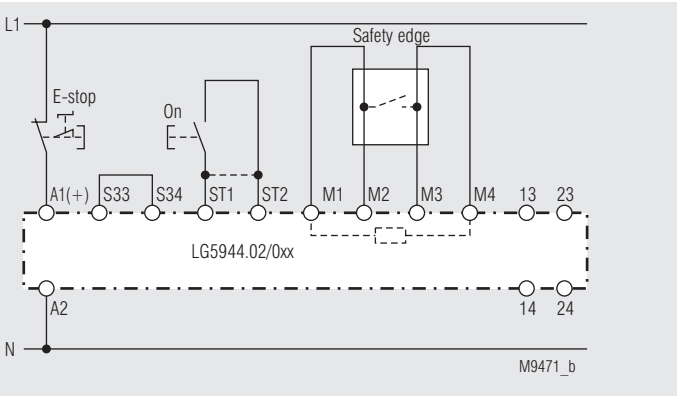


safe breaking, no continuous arcing,
max. 1 switching cycle / s

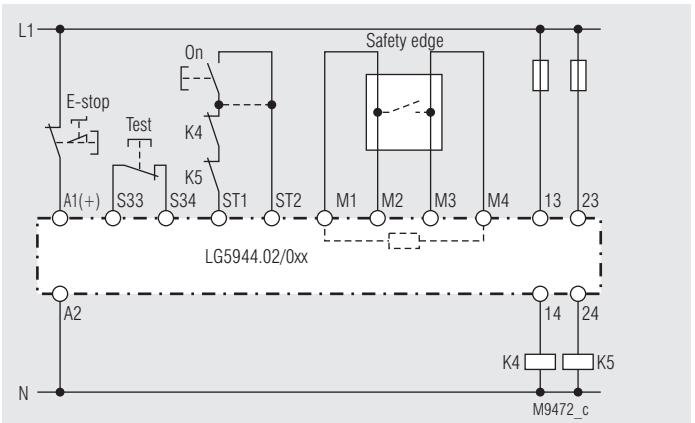
Arc limit curve



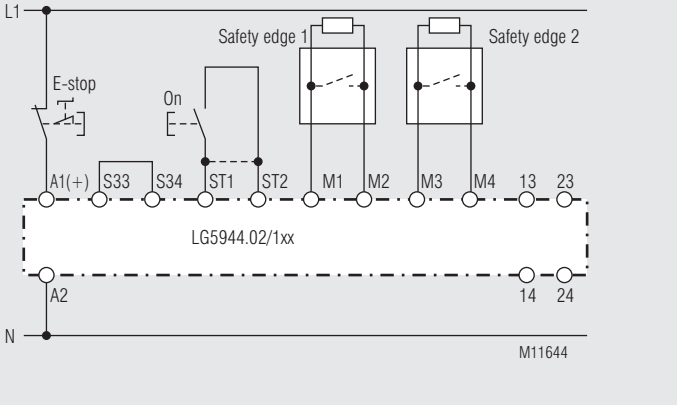
Application example for /0xx
Safety device fore safety edges
Switches in pos.: S2: manual start
(for automatic restart S2 on autostart and ST1-ST2 bridged)
Connection: 2-wire circuit
Suited up to SIL3, Performance Level e, Cat. 3



Application example for /0xx
Safety device fore safety edges
Switches in pos.: S2: manual start
(for automatic restart S2 on autostart and ST1-ST2 bridged)
Connection: 4-wire circuit
Suited up to SIL3, Performance Level e, Cat. 3

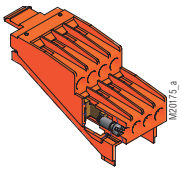
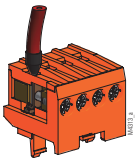
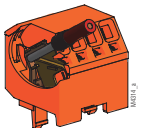
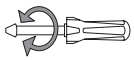
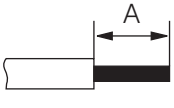
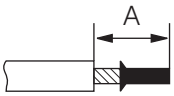
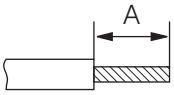


Application example for /0xx
Contact multiplication by external contactors.
The function of the external contactors is monitored by connecting the NC contacts into the feedback circuit ST1-ST2 (for automatic restart S2 on autostart and instead of the ON button ST1-ST2 has to be bridged).

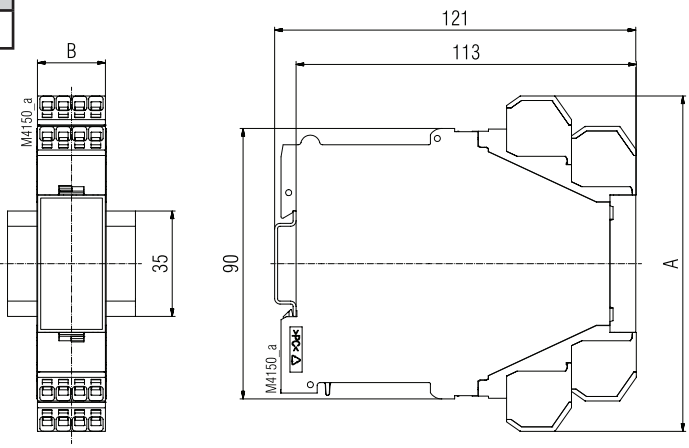


Application example for /1xx
Safety device fore safety edges
Switches in pos.: S2: manual start
(for automatic restart S2 on autostart and ST1-ST2 bridged)
If only 1 sensor is connected to one of the sensor inputs M1/M2, the other sensor input M3/M4 has has to be bridged with a resistor (/10x: 1,2 kOHM ±1%; /11x: 8,2 kOhm ±1%).
Suited up to SIL3, Performance Level e, Cat. 3

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

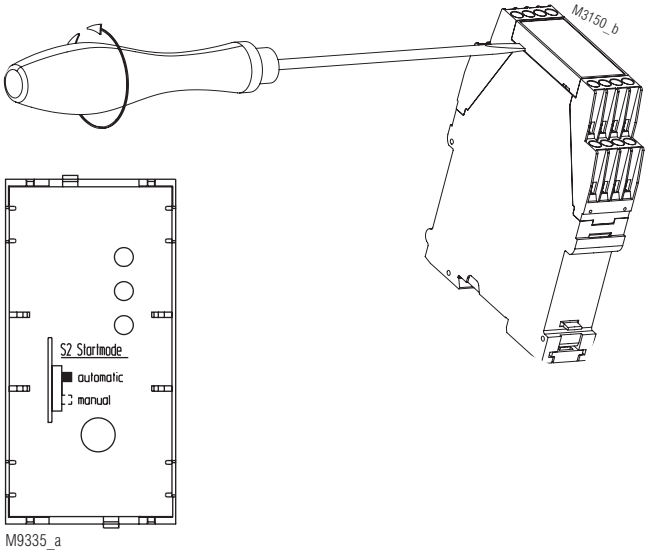
	Schraubklemmen, nicht abnehmbar Screw terminals, fixed Bornes à vis, fixe	Schraubklemmen, abnehmbar Screw terminals, pluggable Bornes à vis, amovibles	Federkraftklemmen, abnehmbar Cage clamp terminals, pluggable Bornes ressorts, amovibles	
		 PS	 PC	
	ø 4 mm / PZ 1 0,8 Nm 7 LB. IN	ø 4 mm / PZ 1 0,8 Nm 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)**



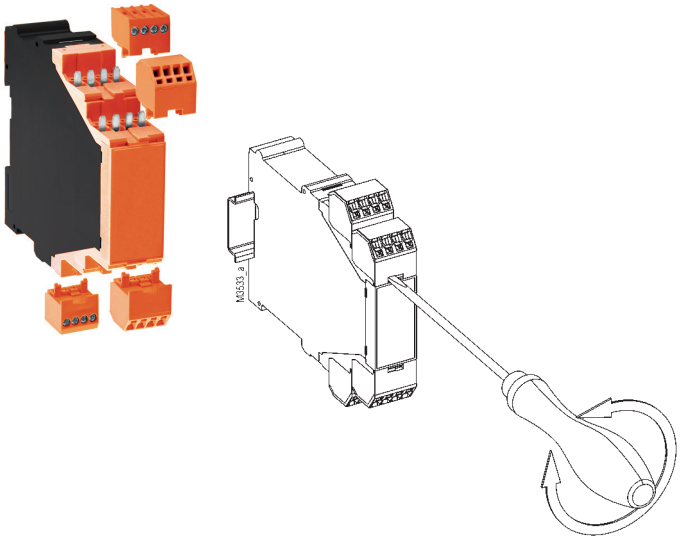
	A	B
LG 5944	90	22,5
LG 5944 PS	104	22,5
LG 5944 PC	111	22,5

DE	**Geräteprogrammierung**
EN	**Setting**
FR	**Programmation de l'appareil**



DE	S2 darf nur bei unbestromtem Gerät betätigt werden! Die Schalterstellung zeigt den Lieferzustand.
EN	Disconnect unit before setting of S2 Drawing shows setting at the state of delivery
FR	Commutation de S2 uniquement hors tension. Appareil livré tel que sur le schéma.

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



DE	**Demontage der steckbaren Klemmenblöcke (Stecker)** 1. Gerät spannungsfrei schalten. 2. Schraubendreher in die frontseitige Aussparung zwischen Stecker und Frontplatte hineinschieben. 3. Schraubendreher um seine Längsachse drehen. 4. Beachten Sie bitte, dass die Klemmenblöcke nur auf dem zugehörigen Steckplatz montiert werden.
EN	**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.
FR	**Démontage des borniers amovibles** 1. Mise hors tension de l'appareil 2. Enfoncer un tourne-vis dans la fente entre la face avant et le bornier 3. Tourner le tourne-vis pour libérer le bornier 4. Tenir compte du fait que les borniers ne doivent être montés qu'à leur place appropriée

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

EN ISO 13849-1:		
Kategorie / Category:	3	
PL:	e	
$MTTF_d$:	703,0	a (year)
DC_{avg}:	99,0	%
d_{op}:	365	d/a (days/year)
h_{op}:	24	h/d (hours/day)
t_{cycle}:	3600	s/cycle
	≙ 1	/h (hour)

IEC EN 62061 IEC EN 61508:		
maximum SIL:	3	IEC EN 62061
SIL	3	IEC EN 61508
HFT*):	1	
DC:	99,0	%
PFH_D:	6,7E-11	h^{-1}
T_1:	20	a (year)

*) HFT = Hardware-Fehlertoleranz
Hardware failure tolerance
Tolérance défauts Hardware

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.

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

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:
E. Dold & Söhne GmbH & Co. KG

Anschrift:
Address: / Adresse:
Bregstraße 18
78120 Furtwangen
Germany

Produktbezeichnung:	Schaltleistenmodul	LG5944.02/xy0ccc LG5944.02tt/xy0ccc	mit:	x, y = 0, 1 tt = PS, PC
Product description:	*Safety Edge module*		*with:*	optional ccc = /60 .. /69
Désignation du produit:	*Module de sécurité pour bords sensibles*		*avec:*	

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 IEC 62061:2021 EN 61326-1:2013 EN 61000-6-1:2007 EN 61000-6-3:2007 + A1:2011 + AC:2012	EN 61508 Parts 1, 2:2010 EN 61326-3-1:2017 EN 61000-6-2:2005 + AC:2005 EN 61000-6-4:2007 + A1:2011

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 Süd Product Service GmbH
Ridlerstraße 65, 80339 München

Nummer der benannten Stelle:
Number of certification office:/ Numéro de l´organisme notifié:
0123

Nummer der Bescheinigung:
Certification number: / Numéro de certificat:
Z10 040066 0021 Rev. 00

Ausstelldatum :
Date of issue: / Date de délivrance:
22.09.2021

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 autorisée :

ppa. Ch. Dold

Christian Dold, Produktmanagment

Ort, Datum :
Place, Date: / Lieu, date:
Furtwangen, 06.10.2021

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.

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