SAFEMASTER
Two-Hand Safety Relay
BG 5933, BH 5933

Translation
of the original instructions

DOLD

E. Dold & Söhne GmbH & Co. KG
Bregstraße 18 • 78120 Furtwangen • Germany
Phone: +49 7723 654-0 • Fax +49 7723 654356
dold-relays@dold.com • www.dold.com

0262946

Contents

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

Keep instructions for future reference

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.

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 BG 5933 or BH 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
BG 5933, BH 5933

0230733

BG 5933

BH 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

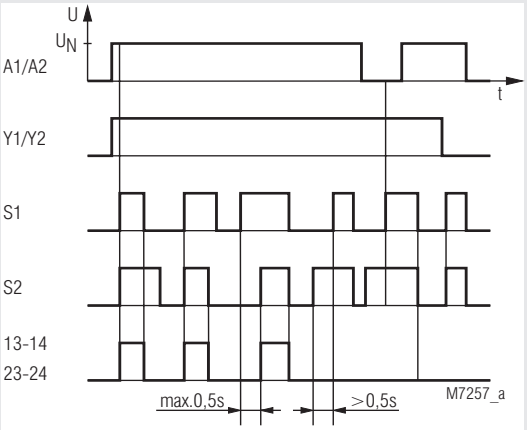
Features

- **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 according to EN ISO 13851**
  - **the safety regulations for two-hand controls on power-operated presses in metalworking ZH 1-456**
- Inputs for 2 push buttons with 1 NC and 1 NO contact
- Output: 2 NO contacts, 1 NC contact or
  3 NO contacts, 1 NC contact
- Overvoltage and short circuit protection
- Wire connection: also 2 x 1.5 mm² stranded ferruled (isolated), DIN 46228-1/-2/-3/-4 or 2 x 2.5 mm² stranded ferruled DIN 46228-1/-2/-3
- BG 5933: Width 22.5 mm
  BH 5933: Width 45 mm

Product Description

The BG 5933 or BH 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

CE · TÜVRheinland CERTIFIED Product Safety Functional Safety www.tuv.com ID 0600000000 · c UL us LISTED Canada / USA · UKCA

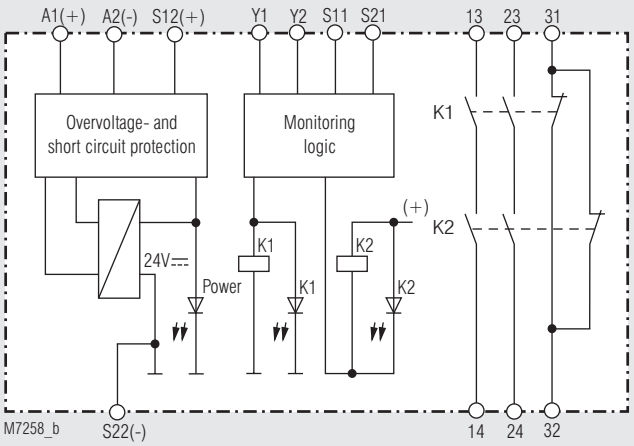
Applications

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

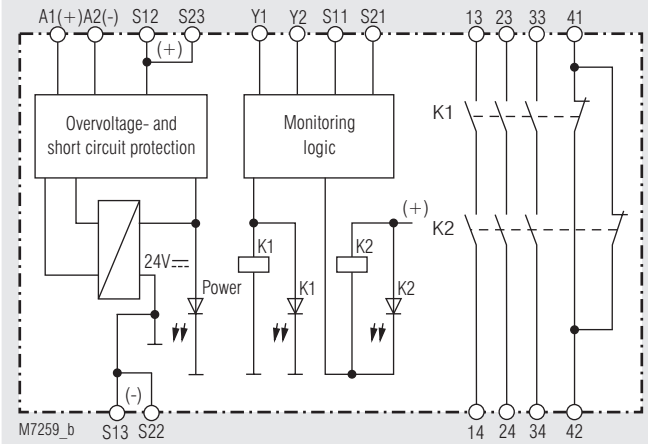
Indication

LED Power:	On, when operating voltage applied
LED K1:	On, when relay K1 active
LED K2:	On, when relay K2 active

Block Diagram

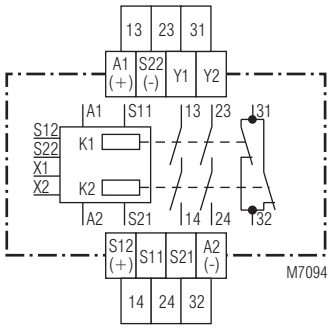


BG 5933

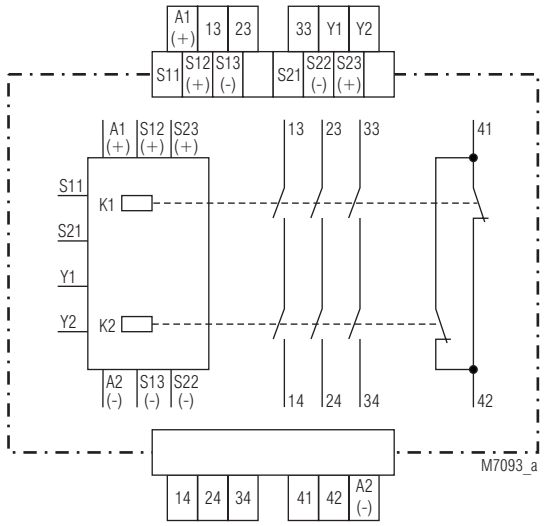


BH 5933

Circuit Diagrams



BG 5933.22



BH 5933.48

Connection Terminals

Terminal designation	Signal description
A1 (+)	+ / L
A2 (-)	- / N
S11, S21, Y1, Y2	Inputs
S12(+), S13(-), S22(-), S23(+)	Outputs
13, 14, 23, 24, 33, 34	Forcibly guided NO contacts for release circuit
31, 32, 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 BG 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:
$s = v \times t + C$

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 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:	
BG 5933:	AC 24 V; DC 24 V
BH 5933:	AC 24, 42, 48, 110, 120, 127, 230, 240 V DC 24 V
Voltage range:	AC 0.85 ... 1.1 U_N
at 10 % residual ripple:	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:		
BG 5933.22:	2 NO, 1 NC contacts	
BH 5933.48:	3 NO, 1 NC contacts	

The NO contacts are safety contacts.
The NC contacts 31-32 and 41-42 can only be used for monitoring.

Operate time:	Typ. 40 ms	
Release time:	Typ. 15 ms	
Contact type:	Relay, 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}:	Max. 5 A (see arc limit curve)	
Switching capacity		
to AC 15:		
NO contacts:	3 A / AC 230 V	IEC/EN 60947-5-1
NC contacts:	1 A / AC 230 V	IEC/EN 60947-5-1
to DC 13:		
NO contacts:	1 A / DC 24 V	IEC/EN 60947-5-1
NC contacts:	1 A / DC 24 V	IEC/EN 60947-5-1
to DC 13:		
NO contact:	4 A / DC 24 V at 0.1 Hz	
NC contact:	4 A / DC 24 V at 0.1 Hz	

Technical Data

Electrical contact life
to 5 A, AC 230 V cos φ = 1: 2 x 10^5 switching cycles
Permissible switching capacity: Max. 1 800 switching cycles / h
Short circuit strength
max. fuse rating: 6 A gG / gL IEC/EN 60947-5-1
Line circuit breaker: C 8 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
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 50 005
Wire fixing: Terminal screws M3.5
Box terminals with self-lifting wire protection
Fixing torque: 0.8 Nm
Mounting: DIN rail IEC/EN 60715
Weight
BG 5933: 200 g
BH 5933: 400 g

Dimensions

Width x height x depth
BG 5933: 22.5 x 84 x 121 mm
BH 5933: 45.0 x 84 x 121 mm

UL-Data

The safety functions were not evaluated by UL. Listing is accomplished according to requirements of Standard UL 508, "general use applications"

Nominal voltage U_N:
BG 5933: AC 24V , DC 24 V
BH 5933: AC 24, 42, 48, 110, 120, 230 V
DC 24V

Ambient temperature: - 15 … + 55 °C

Altitude: ≤ 2000 m

Switching capacity:
Ambient temperature 45°C: Pilot duty B300
5A 250Vac G.P.
5A 24Vdc
Ambient temperature 55°C: Pilot duty B300
4A 250Vac G.P.
4A 24Vdc

Wire connection: 60 °C / 75 °C copper conductors only
AWG 20 - 12 Sol Torque 0.8 Nm
AWG 20 - 14 Str Torque 0.8 Nm

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

Standard Types

BG 5933.22/61 DC 24 V
Artikelnummer: 0063397
- Ausgang: 2 Schließer, 1 Öffner
- Nennspannung U_N: DC 24 V
- Baubreite: 22,5 mm

BH 5933.48/61 AC 230 V
Artikelnummer: 0061926
- Ausgang: 3 Schließer, 1 Öffner
- Nennspannung U_N: AC 230 V
- Baubreite: 45 mm

Ordering example

B_ 5933 .22 /61 DC 24 V

- DC 24 V: Nominal voltage
- /61: With UL approval
- .22: Contacts
- 5933: G: 22.5 mm width, H: 45 mm width

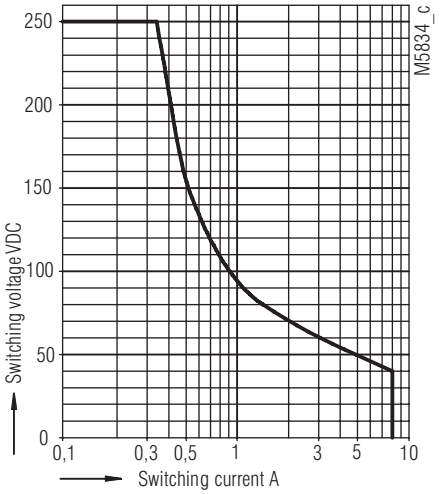
Troubleshooting

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.

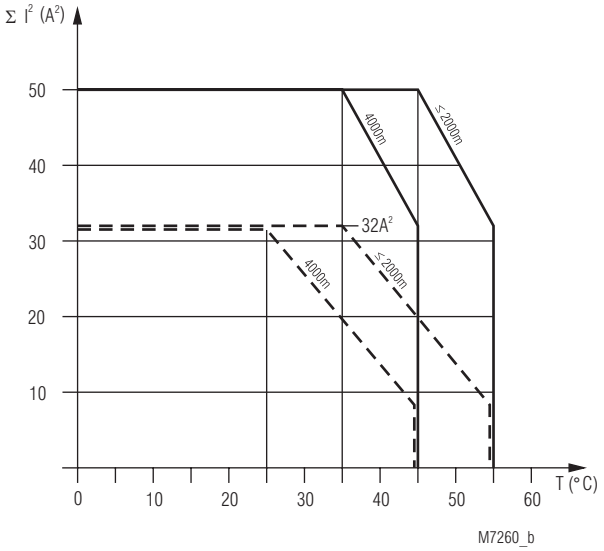
Characteristics



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

Arc LImit curve for with resistive load

Characteristics



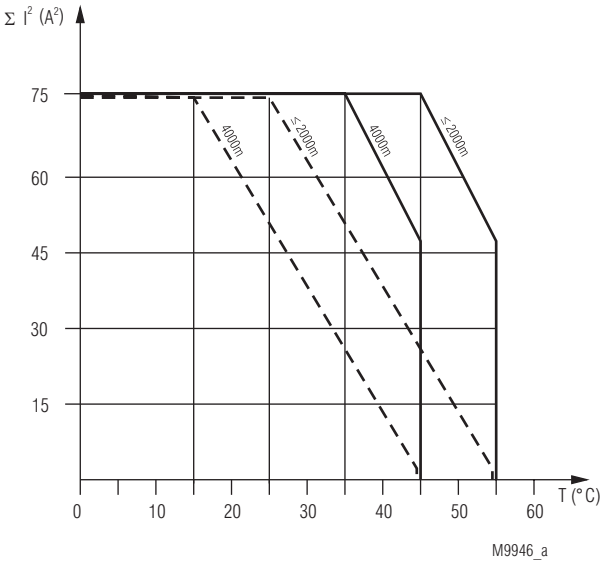
Device mounted on distancte, with air circulation.
Max. current at 55°C (≤ 2000m) or 45°C (4000m) over
2 contact paths = 4A ≙ $2x4^2A^2 = 32A^2$

Device mounted without distance heated by
devices with same load.
Max. current at 55°C (≤ 2000m) or 45°C (4000m) over
2 contact paths = 2A ≙ $2x2^2A^2 = 8A^2$

$$\Sigma I^2 = I_1^2 + I_2^2$$

I_1, I_2 - Current in contact paths

Continuous current limit curve BG 5933
From an altitude of > 2000 m the curve is adjusted by -0.5° C / 100 m
(see example for 4000 m).



Device mounted on distancte, with air circulation.
Max. current at 55°C (≤ 2000m) or 45°C (4000m) over
3 contact paths = 4A ≙ $3x4^2A^2 = 48A^2$

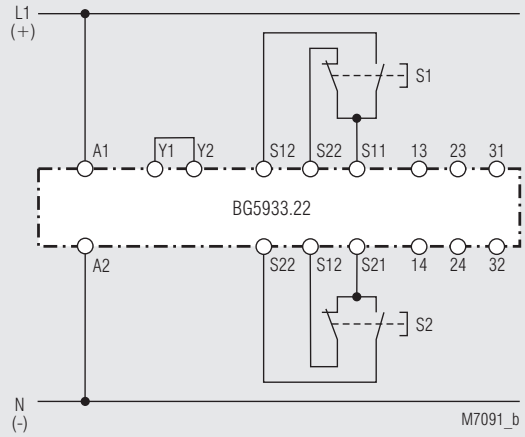
Device mounted without distance heated by
devices with same load.
Max. current at 55°C (≤ 2000m) or 45°C (4000m) over
3 contact paths = 1A ≙ $3x1^2A^2 = 3A^2$

$$\Sigma I^2 = I_1^2 + I_2^2 + I_3^2$$

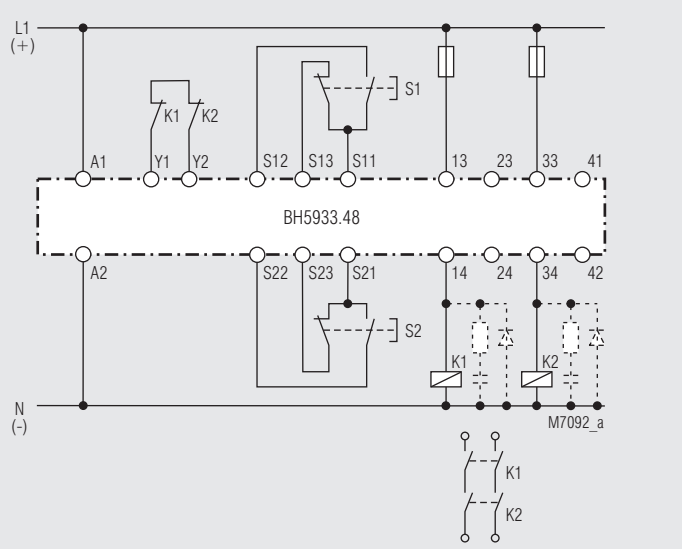
I_1, I_2, I_3 - Current in contact paths

Continuous current limit curve BH 5933
From an altitude of > 2000 m the curve is adjusted by -0.5° C / 100 m
(see example for 4000 m).

Application Examples

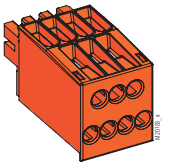
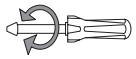
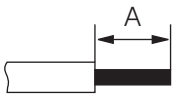
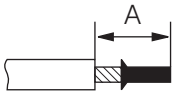
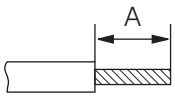


Two-hand control
Suited up to SIL3, Performance Level e, Cat. 4

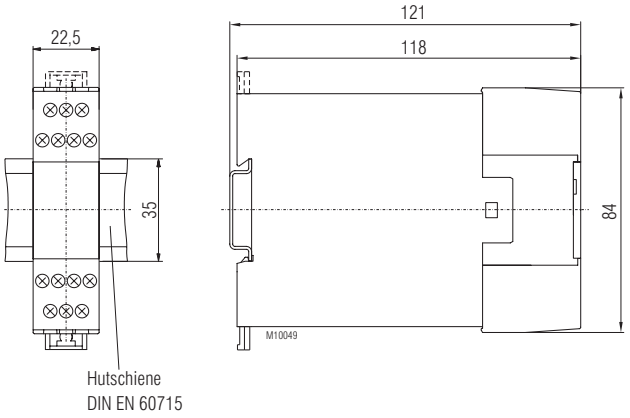


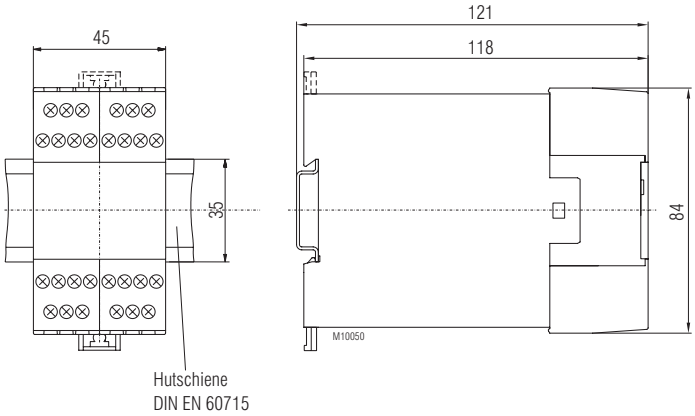
Two-hand control with contact reinforcement via external forcibly guided contactors. When switching inductive loads spark absorbers are recommended.
Suited up to SIL3, Performance Level e, Cat. 4

DE	**Anschlusstechnik**
EN	**Connection Technology**
FR	**Technologie de connexion**
IT	**Tecnologia di connessione**

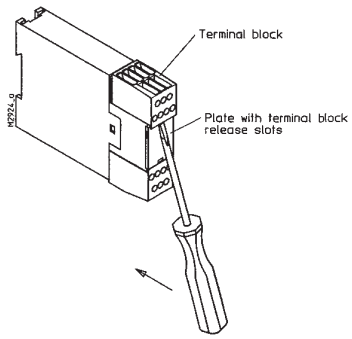
	Schraubklemme, abnehmbar Screw terminal, removable Borne à vis, amovible Terminale a vite, rimovibile
	
	ø 4 mm / PZ 1 0,8 Nm 7 LB. IN
 M10248	A = 10 mm 1 x 0,5 ... 4 mm² 1 x AWG 20 to 12 2 x 0,5 ... 1,5 mm² 2 x AWG 20 to 16
 M10249	A = 10 mm 1 x 0,5 ... 2,5 mm² 1 x AWG 20 to 14 2 x 0,5 ... 1,5 mm² 2 x AWG 20 to 16
 M10250	A = 10 mm 1 x 0,5 ... 4 mm² 1 x AWG 20 to 12 2 x 0,5 ... 1,5 mm² 2 x AWG 20 to 16

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





DE	**Montage / Demontage der Klemmenblöcke**
EN	**Mounting / disassembly of the terminal blocks**
FR	**Montage / Démontage des borniers ammovibles**
IT	**Montaggio / Smontaggio di morsetti estraibili**



DE	**Sicherheitstechnische Kenndaten**
EN	**Safety Related Data**
FR	**Données techniques sécuritaires**
IT	**I dati di sicurezza**

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)
BG 5933 t_{cycle}:	9,50E+01	s/cycle
BH5933 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	%
BG 5933 PFH_D:	7,26E-09	h^{-1}
BH 5933 PFH_D:	7,51E-09	h^{-1}
T_1:	20	a (year)
*) HFT = Hardware-Fehlertoleranz Hardware failure tolerance Tolérance défauts Hardware Tolleranza ai guasti hardware		

Anforderung seitens der Sicherheits-funktion an das Gerät		Intervall für zyklische Überprü-fung 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
Richiesta al nostro dispositivo basato sul livello di sicurezza neccessary valutata dell'applicazione		Intervall per test ciclico della funzione di securezzia
nach; acc. to; selon; conformi a EN ISO 13849-1	PL e with Cat. 3 or Cat. 4	einmal pro Monat once per month mensuel una volta al mese
	PL d with Cat. 3	einmal pro Jahr once per year annuel una volta al mese
nach; acc. to; selon; conformi a EN IEC 62061, EN 61508	maximum SIL 3, SIL 3 with HFT = 1	einmal pro Monat once per month mensuel una volta al mese
	maximum SIL 2, SIL 2 with HFT = 1	einmal pro Jahr once per year annuel una volta al mese

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.
IT	I rating sopra si applicano al tipo standard. Dati di sicurezza per gli altri modelli sono disponibili su richiesta. I dati caratteristici relativi alla sicurezza per l'intero sistema deve essere determinato dall'utente.

DE	**EG-Konformitätserklärung**
EN	**CE-Declaration of Conformity**
FR	**Déclaration de conformité européenne**
IT	**Dichiarazione di conformità CE**

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: Zweihand-Sicherheitsrelais **BG5933.22/ccc** mit:
Product description: *Two-hand safety relay* **BH5933.48/ccc** *with:* optional ccc = /60 .. /69
Désignation du produit: *Relais de commande bimanuelle* *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	EN ISO 13851:2019
EN IEC 62061:2021	EN 61508 Parts 1-7:2010
EN IEC 60664-1:2020	
EN 61326-1:2013	EN 61326-3-1:2017
EN 61000-6-1:2007	EN 61000-6-2:2005 + AC:2005
EN 61000-6-3:2007 + A1:2011 + AC:2012	EN 61000-6-4:2007 + A1:2011
EN 61000-6-7:2015	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: TÜV Rheinland Industrie Service GmbH,
Certification office: / l´organisme notifié: Am Grauen Stein, 51105 Köln
Nummer der benannten Stelle: NB0035
Number of certification office:/ Numéro de l´organisme notifié:
Nummer der Bescheinigung: 01/205/5042.02/22
Certification number: / Numéro de certificat:
Ausstelldatum : 21.11.2022
Date of issue: / Date de délivrance:

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. Ch. Dold

Christian Dold - Produktmanagment

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

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**
IT	**Dichiarazione di conformità UKCA**

UK Declaration of Conformity

DOLD

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

Address: Bregstraße 18
78120 Furtwangen
Germany

Product description: Two-hand safety relay **BG5933.22ccc** **BH5933.48ccc** with: 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. A. 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.

E. Dold & Söhne GmbH & Co. KG • D-78120 Furtwangen • Bregstraße 18 • Telefon +49 7723 654-0 • Fax +49 7723 654356
dold-relays@dold.com • www.dold.com