SAFEMASTER
Emergency Stop Module
BN 5930.48

Translation
of the original instructions

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

0266286

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 BN 5930.48 is used to interrupt a safety circuit in a safe way. It can be used to protect people and machines in applications with e-stop buttons and safety gates.
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. 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.

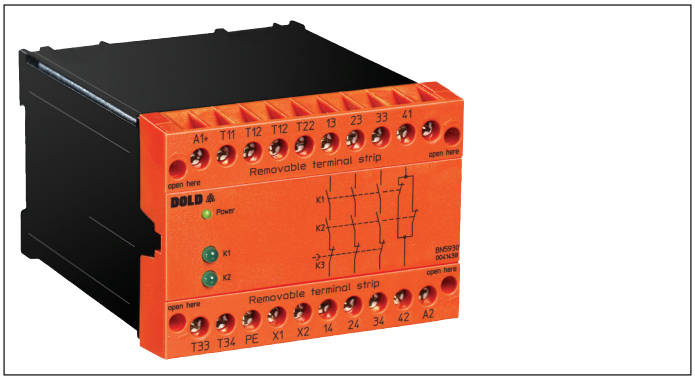
Installation fault!
Danger to life, risk of serious injuries or property damage.

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

Attention!

- The safety function must be triggered during commissioning.
- AUTOMATIC START !
  According to IEC/EN 60 204-1 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
Emergency Stop Module
BN 5930.48



- Same as BN 5983, but with other terminal designation (see circuit diagram)
- **According to**
  - **Performance Level (PL) e and category 4 to EN ISO 13849-1**
  - **SIL Claimed Level (SIL CL) 3 to IEC/EN 62061**
  - **Safety Integrity Level (SIL) 3 to IEC/EN 61508**
- Output: 3 NO, 1 NC contacts for AC 400 V
- 1-channel or 2-channel circuit
- LED displays for channel 1, 2 and mains
- Feedback circuit X1 - X2 for monitoring external contactors
- Removable terminal strips
- Width 100 mm

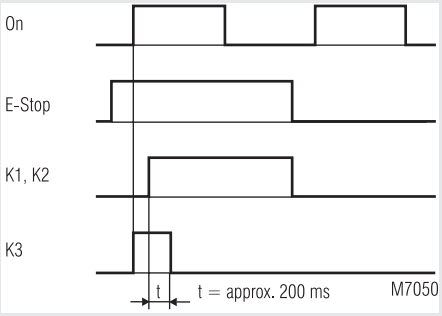
Product Description

The BN 5930.48 is used to interrupt a safety circuit in a safe way. It can be used to protect people and machines in applications with e-stop buttons and safety gates

Approvals and Markings

CE

Function Diagram



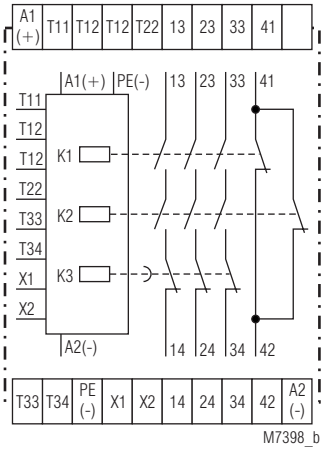
Applications

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

Indicators

LED Power:	On when operating voltage present
LED K1:	On when supply on relay K1
LED K2:	On when supply on relay K2

Circuit Diagram



Notes

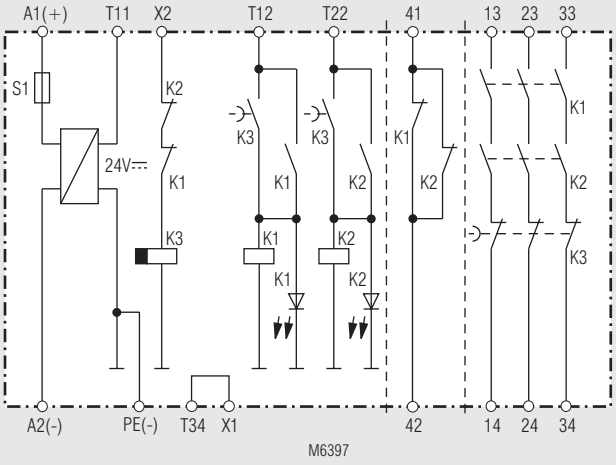
The PE terminal permits operation of the device in IT systems with insulation monitoring and also serves as a reference point for testing the control voltage.

One or more extension modules BN 3081 or external contactors with positively-driven contacts may be used to multiply the number of contacts of the emergency-stop module BN 5930.

Connection Terminals

Terminal designation	Signal description
A1 (+)	+ / L
A2 (-)	- / N
T12, T22, X1, X2	Inputs
T11, PE(-), T34	Outputs
13, 14, 23, 24, 33, 34	Forcibly guided NO contacts for release circuit
41, 42	Forcibly guided indicator output

Block Diagrams



Technical Data

Input

Nominal voltage U_N:	AC 24, 48, 110, 127, 230, 240 V *) DC 24 V *) *) see device label
Voltage range:	AC 0.8 ... 1.1 U_N
at 10 % residual ripple:	DC 0.9 ... 1.2 U_N
at 48 % residual ripple:	DC 0.8 ... 1.1 U_N
Nominal consumption:	5 VA ± 30 %
Nominal frequency:	50 / 60 Hz
Control voltage S11:	DC 24 V
Control current:	Max. DC 100 mA
Minimum voltage at terminals T33, T34:	DC 21 V with activated device

Output

Contacts

BN 5930.48:	3 NO, 1 NC contacts 1 delay-release NO contact (K1.3)

The NO contacts 13...33 / 14...34 are safety contacts.
The NC contact 41-42 can only be used for monitoring.

Operate time:	35 ms
Release time	
opening in secondary circuit (T33 - T34):	30 ms ± 25 %
opening in supply circuit:	100 ms ± 50 %
Release delay of K3:	Approx. 200 ms
Contact type:	Relay, positively-driven
Nominal output voltage:	AC 400 V / DC 220 V
Switching capacity:	AC 10 A cos φ 1 .. 0,7, DC 10 A (see arc limit curve)
Thermal current I_{th}:	See continuous current limit curve
Switching capacity	
to AC 15	
NO contact:	3 A / AC 250 V IEC/EN 60947-5-1
NC contact:	2 A / AC 250 V IEC/EN 60947-5-1
to AC 15	
NO contact:	6 A / AC 230 V at 0.25 Hz
NC contact:	2 A / AC 230 V at 0.25 Hz
to DC 13	
NO contact:	2 A / DC 24 V IEC/EN 60947-5-1
NC contact:	2 A / DC 24 V IEC/EN 60947-5-1
to DC 13	
NO contact:	6 A / DC 24 V at 0.1 Hz
NC contact:	6 A / DC 24 V at 0.1 Hz
Switching capacity max.:	2000 VA (cos φ = 1) / 120 W
Electrical life	
at AC 230 V, 6 A cos φ = 1:	> 5 x 10^5 switching cycles
Permissible operating frequency:	6000 switching cycles / h
Short circuit strength	
max. fuse rating:	10 A gG / gL IEC/EN 60947-5-1
max. line circuit breaker:	C 10 A
Mechanical life:	10 x 10^6 switching cycles

Technical Data

General Data

Operating mode:	Continuous operation
Temperature range	
Operation:	- 15 ... + 55°C at max. 90 % humidity
Storage:	- 25 ... + 85 °C
Altitude:	≤ 2000 m
Clearance and creepage distances	
Rated impuls voltage / pollution degree:	4 kV / 2 (basis insulation) IEC 60664-1
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:	Thermoplastic with V0 behaviour according to UL subject 94
Vibration resistance:	Amplitude 0.35 mm IEC/EN 60068-2-6 frequency: 10 ... 55 Hz
Climate resistance:	15 / 055 / 04 IEC/EN 60068-1
Terminal designation:	EN 50 005
Wire fixing:	Flat terminals with self-lifting clamping piece IEC/EN 60999-1 Removable terminal strip
Mounting:	DIN rail IEC/EN 60715
Weight:	840 g

Dimensions

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

Standard Type

BN 5930.48 DC 24 V

Article number:	0041438
• Output:	3 NO contacts, 1 NC contact for AC 400 V
• Nominal voltage U_N:	DC 24 V
• Width:	100 mm

Ordering Example

BN 5930 .48 AC 230 V 50/60 Hz

- 50/60 Hz — Nominal frequency
- AC 230 V — Nominal voltage
- .48 — Contacts
- BN 5930 — Type

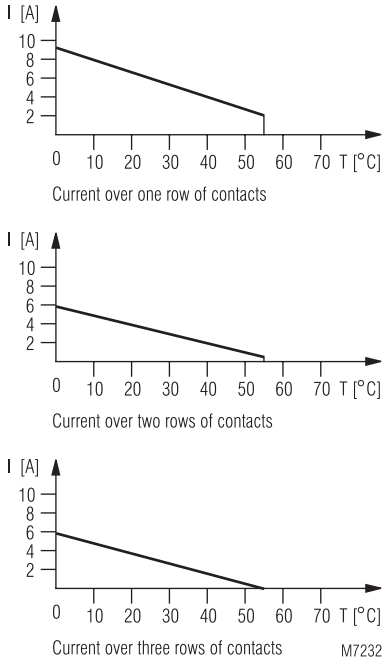
Troubleshooting

Failure	Potential cause
LED "Power" does not light up	Power supply not connected
LED "K1" lights up, but "K2" remains off	- Safety relay K1 is welded (replace device) - A 1-channel switch-off occurred on T22 (switch channel off on T12)
LED "K2" lights up, but "K1" remains off	- Safety relay K2 is welded (replace device) - A 1-channel switch-off occurred on T12 (switch channel off on T22)
Device cannot be activated	- Safety relay is welded (replace device)

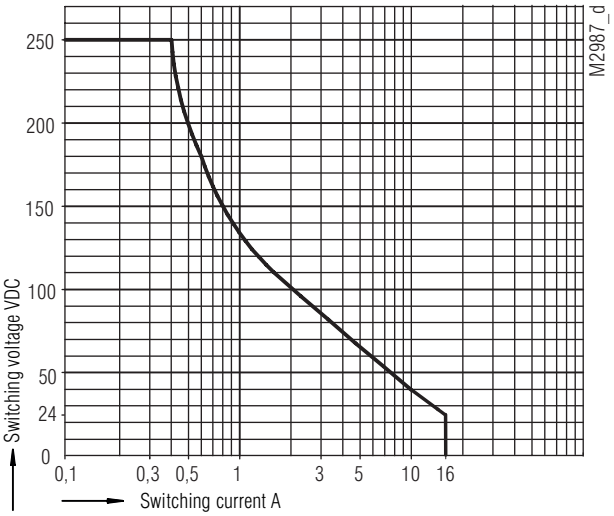
Maintenance and repairs

- 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

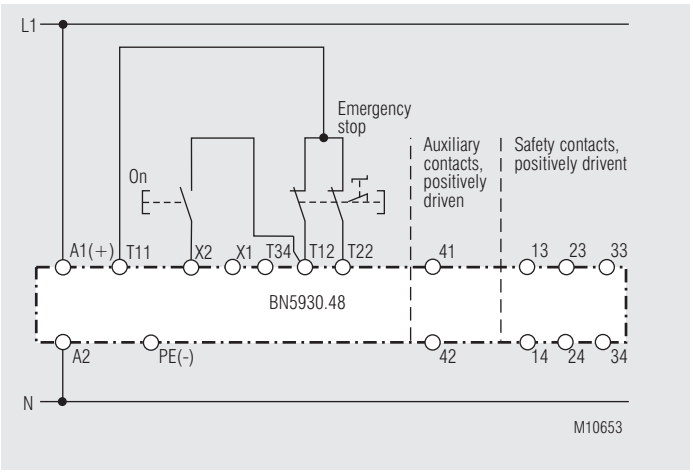


Continuous current limit curves depend on the ambient temperature

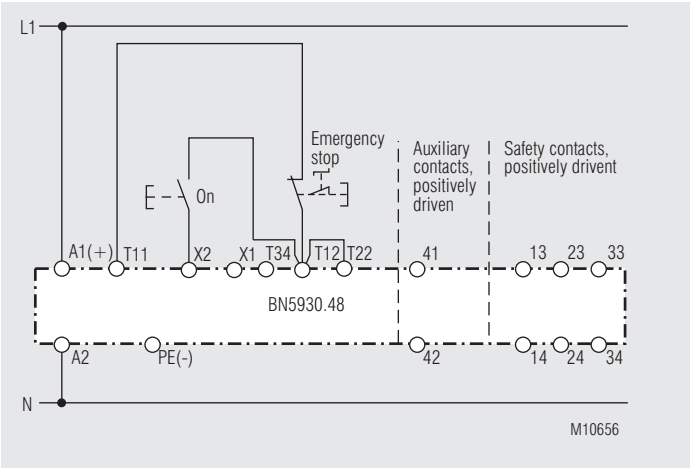


Arc limit curve

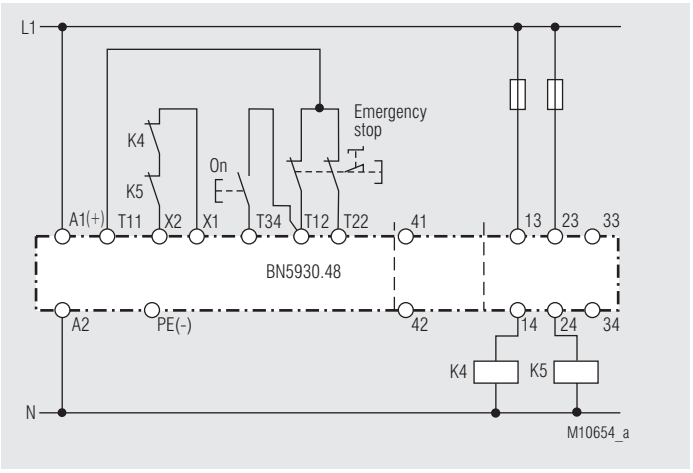
Application Examples



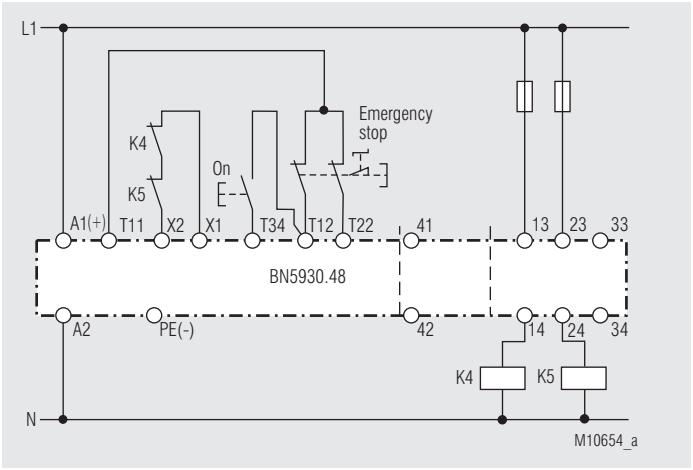
Two-channel emergency stop circuit
Suited up to SIL3, Performance Level e, Cat. 4



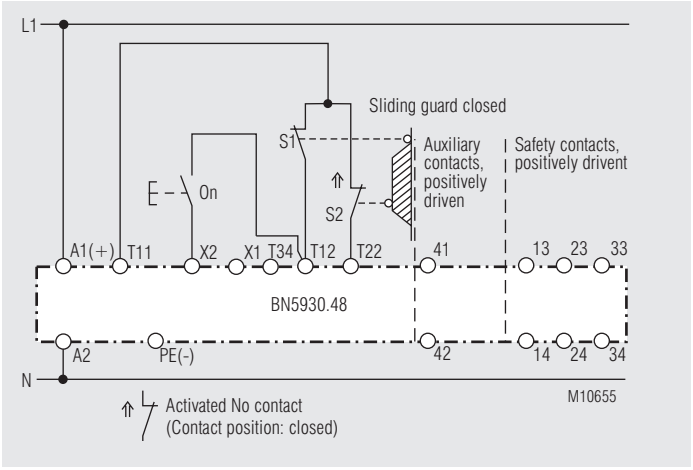
One-channel emergency-stop circuit. This circuit does not have any redundancy in the emergency-stop control circuit.
Suited up to SIL2, Performance Level d, Cat. 3



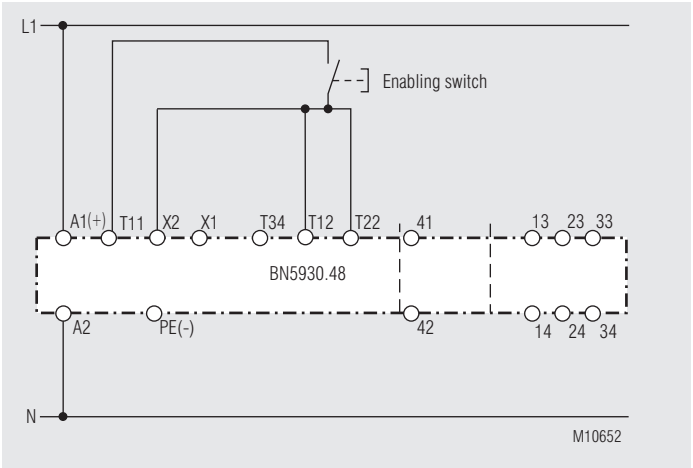
Contact reinforcement by external contactors, 2-channel.
The output contacts can be reinforced by external contactors with positively driven contacts for switching currents > 10 A. Functioning of the external contactors is monitored by looping the NC contacts into the closing circuit (terminals X1 - X2).
Suited up to SIL3, Performance Level e, Cat. 4



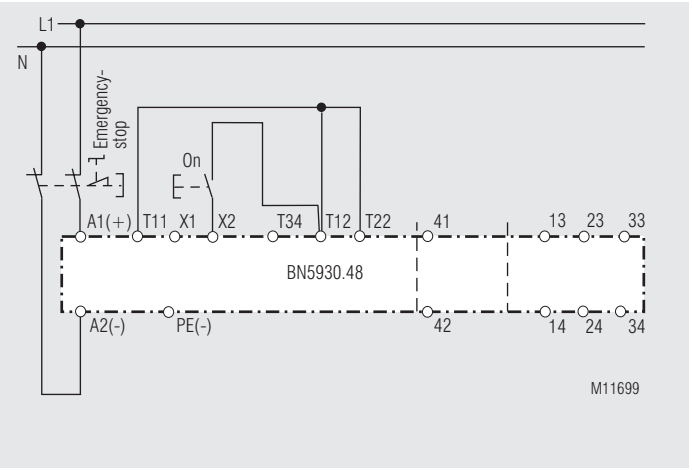
Contact reinforcement by external contactors with reduced safety level.
Suited up to SIL3, Performance Level e, Cat. 4



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



Emergency stop circuit with control of enabling swtich.
Suited up to SIL1, Performance Level c, Cat. 1

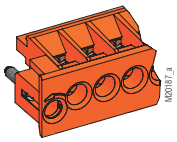
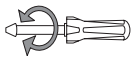
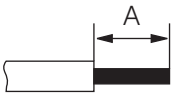
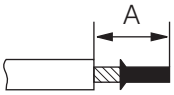
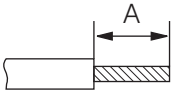


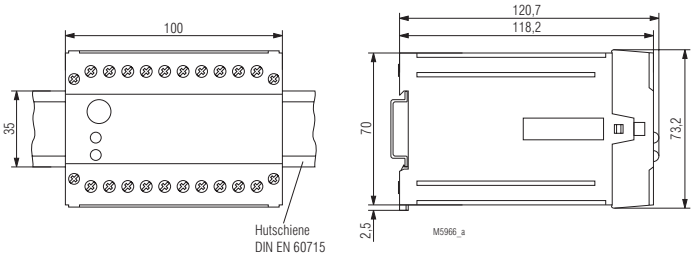
Two-pole emergency-stop with emergency-stop control device in the supply circuit..
Application for long emergency-stop loops in which the control voltage dropped below the minimum voltage of 21 V.

Important:
Single faults (line shorts over the emergency-stop control device) are not identified with this external circuit.
Suited up to SIL3, Performance Level e, Cat. 3

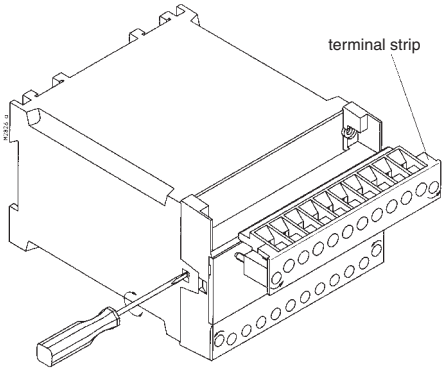
DE	**Anschlusstechnik**
EN	**Connection Technology**
FR	**Technologie de connexion**

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

	Klemmenleiste, abnehmbar Terminal strip, pluggable Bornier, amovibles
	
	ø 6 mm / PZ 2 0,8 Nm 7 LB. IN
 M10248	A = 10 mm 1 x 0,5 ... 2,5 mm² 1 x AWG 20 to 14 2 x 0,5 ... 2,5 mm² 2 x AWG 20 to 14
 M10249	A = 10 mm 1 x 0,5 ... 1,5 mm² 1 x AWG 20 to 16 2 x 0,5 ... 1,5 mm² 2 x AWG 20 to 16
 M10250	A = 10 mm 1 x 0,5 ... 2,5 mm² 1 x AWG 20 to 14 2 x 0,5 ... 2,5 mm² 2 x AWG 20 to 14



DE	**Montage / Demontage der PS / PC-Klemmenleiste**
EN	**Mounting / disassembly of the PS / PC-terminal strip**
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	
$MTTF_d$:	240,5	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		
SIL CL:	3	IEC/EN 62061
SIL	3	IEC/EN 61508
HFT*):	1	
DC:	99,0	%
PFH_D:	2,05E-10	h^{-1}
*) 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 IEC/EN 62061, IEC/EN 61508	SIL CL 3, SIL 3 with HFT = 1	einmal pro Monat once per month mensuel
	SIL CL 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: Not-Aus-Modul
Product description: *Emergency Stop Module*
Désignation du produit: *Module d'arrêt d'urgence*

BN5930.kkccc
BN5930.kk/vvvccc

mit: kk = 48
vvv = 203, 204
with: optional ccc = /60 ... /69
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 IEC 62061:2021
EN IEC 60664-1:2020 + AC:2020
EN 61000-6-1:2007
EN 61000-6-3:2007 + A1:2011 + AC:2012
EN 61000-6-7:2015
EN 61326-3-1:2017
EN 61508 Parts 1-7:2010
EN 60664-1:2007
EN 61000-6-2:2005 + AC:2005
EN 61000-6-4:2007 + A1:2011
EN 61326-1:2013

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:
01/205/5038.02/22

Ausstelldatum :
Date of issue: / Date de délivrance:
25.05.2022

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 autorisée :

ppa. A. Dold

Christian Dold, Produktmanagement / Productmanagement

Ort, Datum :
Place, Date: / Lieu, date:
Furtwangen, 08.06.2022

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.