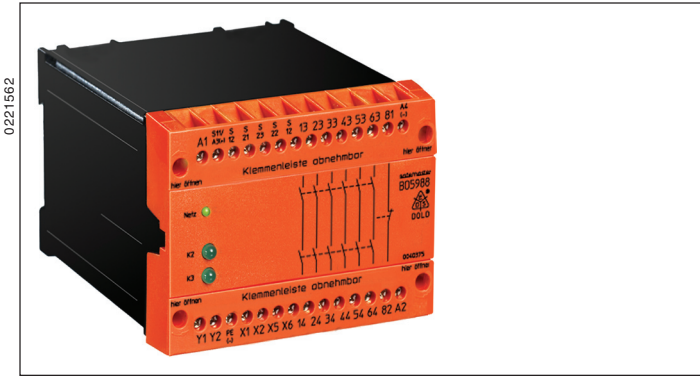


Emergency stop module BO 5988
SAFEMASTER®



- According to
 - SIL-Claimed Level (SIL CL) 3 to EN 62061
 - Performance Level (PL) e to DIN EN ISO 13849-1
 - Category 4 to EN 954-1
- Output: max. 6 NO, 1 NC contacts or 1 NO contact for AC 250 V
- Optionally with release delayed NO contact to 10 min
- 1-channel or 2-channel connection
- Line fault detection at On pushbutton
- Optionally automatic On function after connection of operating voltage or activation via On pushbutton
- Optionally cross fault detection in emergency stop control circuit
- Optionally dual voltage version
- Feedback circuit X1-X2 for monitoring external contactors
- Integrated short-circuit and overvoltage protection
- Optionally with protective separation to IEC/EN 60 140, IEC/EN 60 947-1
- LED displays for channels 1 and 2 and supply
- Removable terminal strips
- Wire connection: also 2 x 1,5 mm² stranded ferruled (isolated), DIN 46 228-1/-2/-3-4 or 2 x 2,5 mm² stranded ferruled DIN 46 228-1/-2/-3
- Width 100 mm

Function diagram



Approvals and marking



BG valid 31.12.2009; ¹⁾ pending; * see variants

Applications

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

Indication

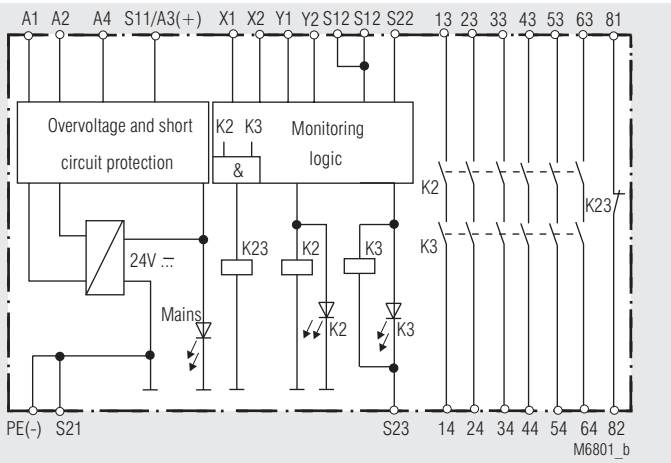
- LED power supply: on, when operating voltage present
- LED K2: on, when supply on relay K2
- LED K3: on, when supply on relay K3

only at BO 5988/4_ __,
BO 5988/5_ __:
LED KT2, KT3: on, when delayed contacts are energised

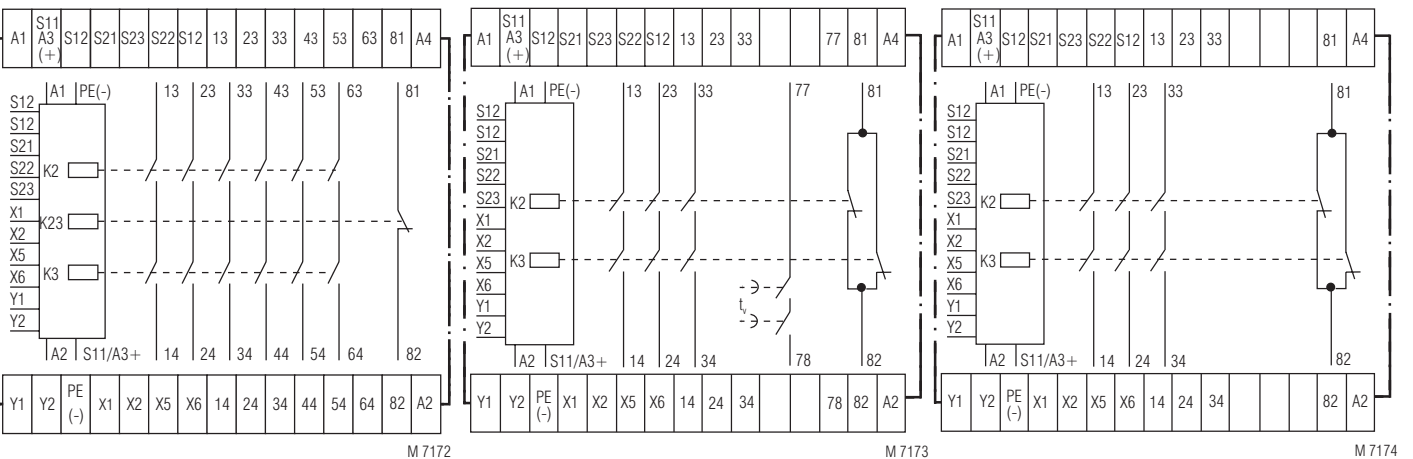
Note

Safety category 4 according to EN 954-1 only at applications with cross fault detection.
At delayed contacts: Safety category 3 according to EN 954-1 for delays up to 30 s max. For longer delays category 1.

Block diagram



Circuit diagrams



BO 5988.61

BO 5988.47

BO 5988.48

Notes

Jumper assignment for functions:
Activation via On pushbutton / or automatic On function

On push-button Y1 - Y2	Jumper X5 - X6	Function
		The output contacts are switches only after operation of the On pushbutton. Line fault monitoring at the On pushbutton
		Automatic On function for operating voltage Off/On or after emergency stop release

Line fault detection at the On pushbutton:

The output contacts cannot be closed if the On pushbutton is already closed before the voltage is applied to S12, S22 (also in the event of a line fault at the On pushbutton).

A line fault at the On pushbutton which occurs after activation of the device is recognized when switching-on takes place again and closing of the output contacts is then prevented.

If a line fault occurs at the On pushbutton after the voltage is already present at S12, S22, undesired activation will take place, because this line fault does not differ from the normal closing function.

The gold-plated contacts of the BO 5988 also mean that this module is suitable for switching small loads of 1 mVA ... 7 VA, 1 mW ... 7 W in the range 0,1 ... 60 V, 1 ... 300 mA. The contacts also permit the maximum switching current. However, since the gold plating is burnt off at this current level, the device is no longer suitable for switching small loads after this.

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. The internal short-circuit protection will be bridged on DC devices, if the protective ground is connected to terminal PE.

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 BO 5988.

ATTENTION - AUTOMATIC START!



According to IEC/EN 60 204-1 part 9.2.5.4.2 it is not allowed to restart automatically after emergency stop. Therefore the machine control has to disable the automatic start after emergency stop.

Technical data

Input

Nominal voltage U_N

BO 5988.--/00: DC 24 V
BO 5988.--/24: DC 24 V¹⁾ + AC 24 V²⁾

DC 24 V¹⁾ + AC 48 V²⁾

DC 24 V¹⁾ + AC 110 V²⁾

DC 24 V¹⁾ + AC 230 V²⁾

DC 24 V¹⁾ + AC 240 V²⁾

¹⁾ at terminals A3-A4

²⁾ at terminals A1-A2

Voltage range:

at 10 % residual ripple:

at 48 % residual ripple:

Nominal consumption:

AC: approx. 6 VA, DC: approx. 3 W

Nominal frequency:

50 / 60 Hz

Control voltage

at S11:

typ. DC + 24 V

at S21:

0 V

Control current:

typ. DC 110 mA

Minimum voltage

at terminals S12, S22:

DC 21 V with activated device

Recovery time:

2 s

A minimum switch-off time of 20 s must be observed if the line fault monitoring function at the On pushbutton is active

Technical Data

Output

Contact

BO 5988.48:

3 NO, 1 NC indicator contact

BO 5988.61:

6 NO, 1 NC indicator contact

BO 5988.62:

6 NO, 1 NO indicator contact

BO 5988.47:

3 NO, 1 NC indicator contact

1 NO release delayed

The NO contacts 13...63 / 14...64 are

safety contacts. The NO contact 77/78

can be use as safety contact for units

with time delay up to max. 30 s.

ATTENTION! The NC contacts 81-82 or one NO contact 83-84 can only be used for monitoring.

Operate time

manual restart:

typ. 30 ms

automatic restart:

1 s

Release time

opening in secondary circuit

(S12-S22):

30 ms ± 50 %

opening in supply circuit

BO5988.47, BO 5988.48:

100 ms + 50 %

BO 5988.61, BO 5988.62:

50 ms + 50 %

Time delay t_v :

BO 5988.47/1 __ :

Auxiliary supply is not necessary

during elapse of time:

0,1 ... 1 s 0,3 ... 3 s

BO 5988.47/2 __ :

1 s, 3 s, 5 s, 10 s

BO 5988.47/4 __ :

Auxiliary supply must be connected

during elapse of time:

0,1... 1 s 0,1 ... 1 min

0,3... 3 s 0,3 ... 3 min

1 ... 10 s 0,5 ... 5 min

3 ... 30 s 1 ... 10 min

BO 5988.47/5 __ :

1 s, 3 s, 10, 30 s

1 min, 3 min, 5 min, 10 min

Repeat accuracy

BO 5988.47/1 __ and

BO 5988.47/2 __ :

± 15 % of setting value

BO 5988.47/4 __ and

BO 5988.47/5 __ :

± 1 % of setting value

Contact type:

Nominal output voltage:

Relay, positively-driven

AC 250 V

DC: see limit curve for arc-free

operation

Signalling contact of

BO 5988.61 and BO 5988.62: AC 10 ... 250 V, DC 10 ... 120 V

for AC/DC 0,1 ... 1 A

see total current limit curve

(max. 10 A in one contact path)

Thermal current I_{th} :

release delayed NO contact

77-78 at BO 5988.47:

max. 8 A

Switching capacity

to AC 15

NO contact:

5 A / AC 230 V

IEC/EN 60 947-5-1

NC contact:

2 A / AC 230 V

IEC/EN 60 947-5-1

BO 5988.47

release delayed NO contact:

3 A / AC 230V

IEC/EN 60 947-5-1

to DC 13

NO contact:

4 A / DC 24 V

IEC/EN 60 947-5-1

NC contact:

4 A / DC 24 V

IEC/EN 60 947-5-1

to DC 13

NC contact:

10 A / 24 V > 10⁵

On: 0,4 s, Off: 9,6 s

Electrical life

to AC 15 at 2 A, AC 230 V:

10⁵ switching cycles IEC/EN 60 947-5-1

to DC 13 at 2 A, AC 230 V:

> 240 x 10³ switching

cycles IEC/EN 60 947-5-1

Permissible operating

frequency:

600 switching cycles / h

Short circuit strength

max. fuse rating:

6 A gL

IEC/EN 60 947-5-1

max. line circuit breaker:

C 10 A

Mechanical life:

30 x 10⁶ switching cycles