

- According to
  - Performance Level (PL) e and category 4 to EN ISO 13849-1: 2008
  - Safety Integrity Level (SIL 3) to IEC/EN 61508
  - Category 4 to EN 954-1
- Safety radio transmission
- Radio receiver for:
  - E-stop
  - Control signals for 6 non-safety semiconductor outputs
- Multifunction safety modul with additional control input to connect:
  - E-stop pushbutton (2-channel), safety gate or LC type 4 according to EN 61496
  - 1 Start button
  - 1 or 2 monitoring contacts to signal the use of radio
- Adjustable functions with step switch for:
  - Manual start or automatic start
  - when removing the remote control from the charger (open control contact) manual start is possible by remote control
  - possibility of disabling the access protection (gate) with active remote control
- Broken wire and short circuit monitoring with error indication
- 2 semiconductor outputs for status indication
- Feedback circuit Y1/Y2 for monitoring of external contactors
- LEDs for status indication
- Easy connection
- DIN rail mounting
- removable terminal blocks allow fast exchange of module
- Also as input modul for multifunction, modular safety system SAFEMASTER M available
- Compact unit, only 67.5 mm width

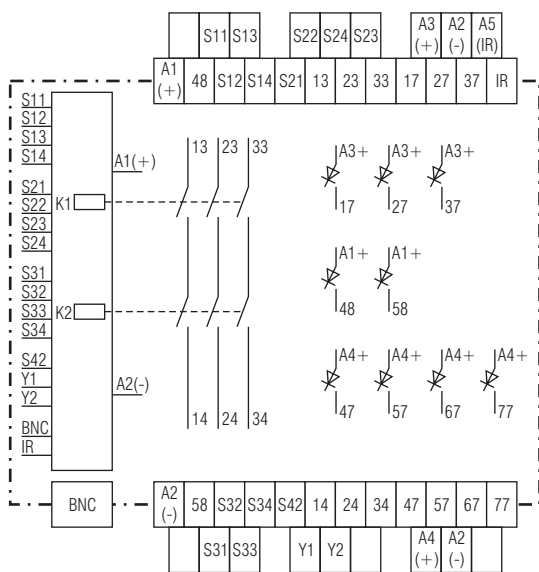
### Additional Information about this topic

- Informations about the additional remote control see datasheet RE 5910

### Approvals and Marking

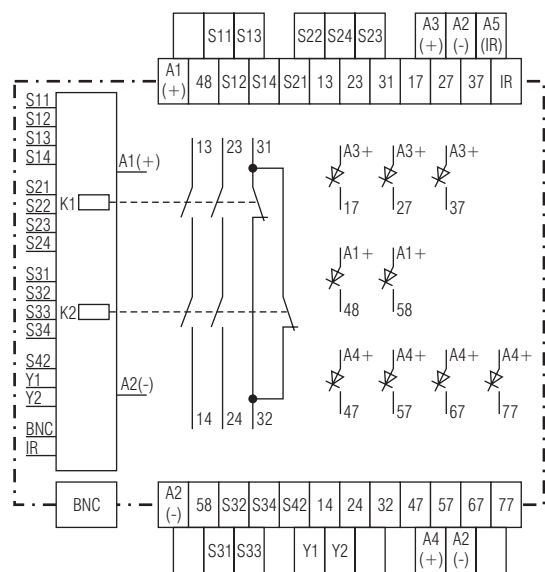


### Circuit Diagrams



M9374\_a

BI 5910.03/00MF9



M9375\_a

BI 5910.22/00MF9

## Indication for Remote Control

The device is equipped with a safety radio receiver to operate the signals from a remote control with remote e-stop. It has 1 or 2 inputs depending on the operation mode (S31-S32 and S33-S34) to connect the indication contacts of a battery charger for the remote control.

## Aerial Connection

The radio connection of the radio controlled safety module to the remote control is made via an aerial that is mounted directly on the front of the BI 5910. If the unit is built into a metal cabinet the aerial has to be mounted outside. The connection is made via DOLD coax cable. Special functions like activity monitoring and selection of radio frequency can be adjusted on the remote control.

## Indications

green LEDs K1 and K2:	on when safety relay activated
green LED reception:	on at radio receive
yellow LEDs run 1, run 2 and outputs 48 and 58:	indicate the actual status of the modul
red LED receiver error:	indicate errors on radio-receiver

## Notes

**A machine must only be started from a location from which one can see that no person is present in the dangerous area.**

To solve this there are 2 variants of the BI 5910:

### BI 5910.\_\_/00MF9

This unit is used in applications where start is only possible from a hard-wired start button.

### BI 5910.\_\_/01MF9

This unit has in addition to the radio control also an infrared function. The reset of the remote control is only accepted if the reset signal is received via radio and via infrared. This means that the remote control must be pointed at the infrared receiver for reset.

## Technical Data

<b>Radio</b>	
Conformity:	ETS 300 220
Aerial:	1/4 aerial, plug in as accessory
Frequency:	64 programmable frequencies 433.1 ... 434.675 MHz
Sensitivity:	< -100 dBm
<b>Nominal voltage <math>U_N</math>:</b>	DC 24 V
<b>Voltage range:</b>	0.85... 1.15 $U_N$ at max. 5% residual ripple max. 120 mA (Semiconductor outputs not connected)
<b>Nominal consumption:</b>	
<b>Control voltage on S11, S13, S21, S23, S31, S33, 48, 58:</b>	DC 23 V at $U_N$
<b>Control current on S12, S14, S22, S24, S32, S34, S42:</b>	each 4.5 mA at $U_N$
<b>Max. voltage for active signals on: S12, S14, S22, S24, S32, S34, S42:</b>	DC 16 V
<b>Max. Voltage for inactive signals on: S12, S14, S22, S24, S32, S34, S42:</b>	DC 9 V
<b>Max. input voltage on S12, S14, S22, S24, S32, S34, S42:</b>	DC 30 V
<b>Fusing:</b>	Internal with PTC
<b>Max. time difference between input signals of one function</b>	
E-stop, Light curtains:	250 ms
Gates:	3 s

## Technical Data

### Safety output

#### Contacts

BI 5910.03:	3 NO contacts
BI 5910.22:	2 NO contacts, 1 NC contact
	The NC contact can only be used as indicator contact!!
	Relais, forcibly guided

#### Contact type:

#### Operating time typ. at $U_N$

automatic start: max. 800 ms	
manual start:	max. 110 ms
automatic restart:	max. 70 ms

#### Switching off time (reaction time)

S12-S14, S22-S24, S32-S34:	max. 25 ms
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E-stop (Radio): max. 170 ms	
Passive disconnection because of interrupted radio signal:	max. 500ms

Disconnection with active radio signal and closed charge control contact: max. 1 s

<b>Nominal output voltage:</b>	AC 250 V
	DC: see limit curve for arc-free operation
	> 100 mV
	5 A

#### Switching of low loads:

#### Thermal current $I_{th}$ :

#### Switching capacity

to AC 15	
NO contacts:	AC 3 A /230 V IEC/EN 60 947-5-1
NC contacts:	AC 2 A /230 V IEC/EN 60 947-5-1
to DC 13:	DC 8 A / 24V at 0.1Hz IEC/EN 60 947-5-1

#### Electrical life

to AC 15 at 2 A, AC 230 V:	100000 switching cycles IEC/EN 60 947-5-1
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**Permissible switching frequency:** max. 1200 switching cycles / h

Short circuit strength	
Max. fuse rating:	6 A gL IEC/EN 60 947-5-1
Line circuit breaker:	C 8 A
Mechanical life:	10 x 10 <sup>6</sup> switching cycles

## Semiconductor outputs

### Outputs

(terminals 48, 58, 17, 27, 37,

47, 57, 67, 77): transistor outputs, switching +

Nominal output voltage

(A3+, A4+): DC 24 V

Nom. output voltage at  $U_N$ : min. DC 23 V, max. 100 mA cont. current  
max. 400 mA für 0.5 s internal short circuit, over temperature and overload protection

Min. operating current: min. 0.5 mA

Residual current: min. 0.1 mA

## General Data

**Operating mode:** Continuous operation

#### Temperature range

operation: 0 ... 50°C

storage: - 25 ... + 85 °C

**altitude:** < 2.000 m

#### Clearance and creepage distance

rated impuls voltage / pollution degree: 4 kV / 2 (basis insulation) IEC 60 664-1

#### EMC

HF-irradiation: 10 V / m IEC/EN 61 000-4-3

Fast transients

on wires for power supply A1-A2: 2 kV IEC/EN 61 000-4-4

on signal and control wires: 2 kV IEC/EN 61 000-4-4

Surge voltages

between wires for power supply 1 kV IEC/EN 61 000-4-5

between wire and ground: 2 kV IEC/EN 61 000-4-5

HF- wire guided: 10 V IEC/EN 61 000-4-6

Interference suppression: Limit value class B EN 55 011

**Degree of protection:** acc. to EN 61 496-1 (1997) the unit has to be mounted in a control cabinet with protection class 54

Housing: IP 40 IEC/EN 60 529

Terminals: IP 20 IEC/EN 60 529

**Enclosure:** Thermoplastic with V0 behaviour according to UL subject 94

## Technical Data

**Vibration resistance:** according to EN 61496-1 (1997)  
Amplitude 0.35 mm IEC/EN 60 068-2-6  
Frequency 10 ... 55 Hz

### Shock proof

Acceleration: 10g  
Impulse length: 16 ms  
Number of shocks: 1000 per axis on all 3 axes

**Climate resistance:** 0 / 050 / 04 IEC/EN 60068-1

**Terminal designation:** EN 50 005

**Wire connection:** 1 x 2.5 mm<sup>2</sup> strand. wire with sleeve or  
1 x 4 mm<sup>2</sup> solid or  
2 x 1.5 mm<sup>2</sup> stranded wire with sleeve  
DIN 46 228-1/-2/-3/-4

**Leiterbefestigung:** Plus- minus- terminal screws M 3.5

box terminals with wire protection  
DIN-rail IEC/EN 60 715  
**Weight:** 495g

## Dimensions

Width x height x depth: 67.5 x 84 x 129 mm

## Safety Related Data for E-STOP via wired e-stop button

### Values according to EN ISO 13849-1:

Category:	4	
PL:	e	
MTTF <sub>d</sub> :	> 100	a
DC <sub>avg</sub> :	98.4	%
d <sub>op</sub> :	365	d/a (days/year)
h <sub>op</sub> :	24	h/d (hours/day)
t <sub>Zyklus</sub> :	3.60E+03	s/Zyklus
	≅ 1	/h (hour)

### Values according to IEC/EN 61508:

SIL	3	IEC/EN 61508
HFT <sup>1)</sup> :	1	
DC <sub>avg</sub> :	98.4	%
SFF	99.5	%
PFH <sub>D</sub> :	1.20E-9	h <sup>-1</sup>

## Safety Related Data for E-STOP via radio control

### Values according to EN ISO 13849-1:

Category:	4	
PL:	e	
MTTF <sub>d</sub> :	> 100	a
DC <sub>avg</sub> :	98.0	%
d <sub>op</sub> :	365	d/a (days/year)
h <sub>op</sub> :	24	h/d (hours/day)
t <sub>Zyklus</sub> :	2	h (hours)

### Values according to IEC/EN 61508:

SIL	3	IEC/EN 61508
HFT <sup>1)</sup> :	1	
DC <sub>avg</sub> :	98.4	%
SFF	99.5	%
PFH <sub>D</sub> :	2E-9	h <sup>-1</sup>

<sup>1)</sup> HFT = Hardware-Failure Tolerance



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.

## Standard Types

BI 5910.22/00MF9 DC 24 V

Article number: 0059002

Safety outputs: 2 NO contacts, 1 NC contact<sup>\*)</sup>

BI 5910.03/00MF9 DC 24 V

Article number: 0059003

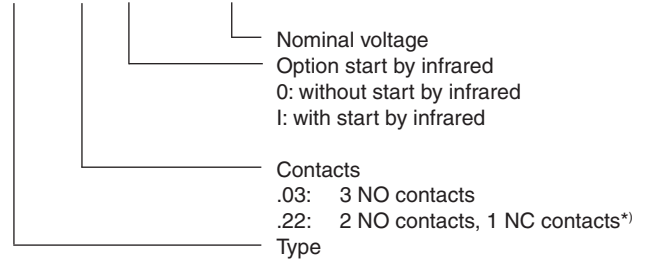
Safety outputs: 3 NO contacts

- Function with rotational switches adjustable
- Nominal voltage U<sub>N</sub>: DC 24 V
- Width: 62.5 mm

<sup>\*)</sup> The NC contact can only be used as indicator contact!

## Ordering Example

BI 5910 \_ \_ \_ /0\_MF9 \_ \_ DC 24 V



## Accessories

RE 5910/040: 1/4 λ aerial 433 - 434 MHz - BNC

RE 5910/041: 1/2 λ aerial 433 - 434 MHz - BNC

RE 5910/042: 2 m extension for aerial + trough hole connector - BNC fixing angle

RE 5910/043: 5 m extension for aerial + trough hole connector - BNC fixing angle

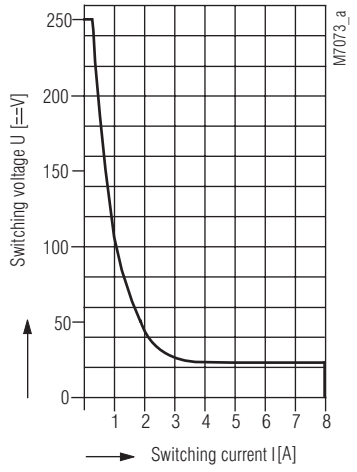
RE 5910/045: Extension 50 cm

RE 5910/046: 90° adapter for aerial

RE 5910/060: 1 infra red receiver with 10 m wire

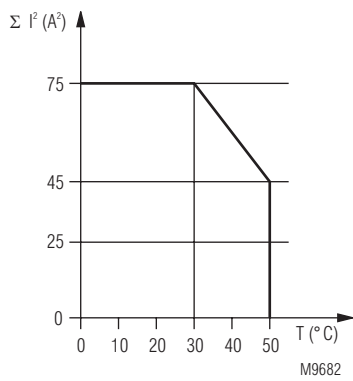
RE 5910/061: 10 m extension wire for infra red module

## Characteristics



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

### Limit curve for arc-free operation



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

### Quadratic total current limit curve