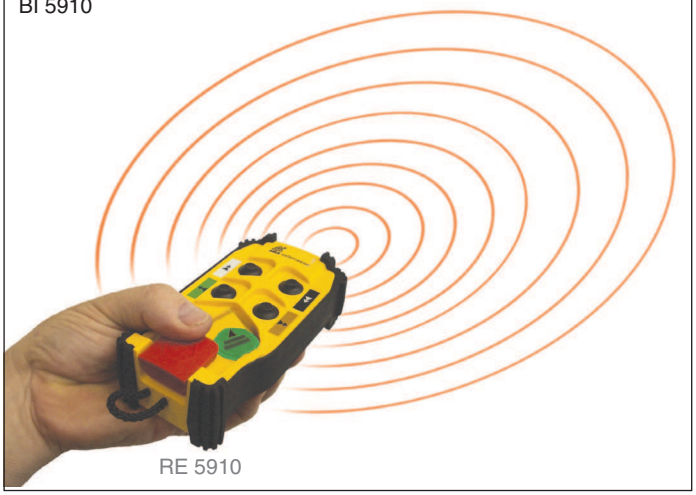
SAFEMASTER W Wireless Safety System
Radio Controlled Safety Module
BI 5910

0255173

BI 5910



RE 5910

- **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 exernal 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

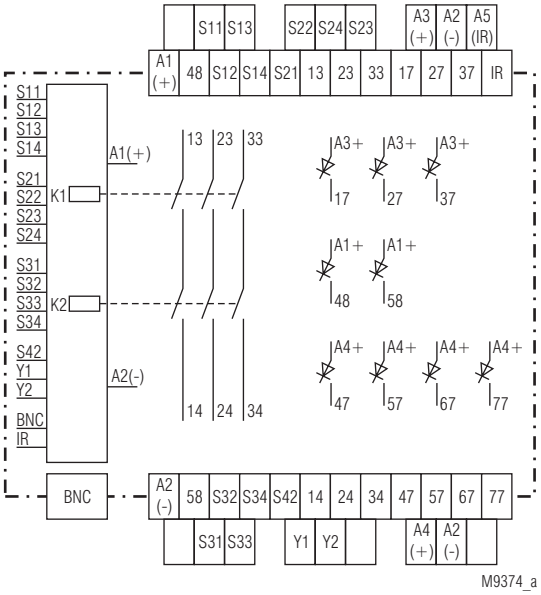
Additional Information about this topic

- Informations about the additional remote control see datasheet RE 5910

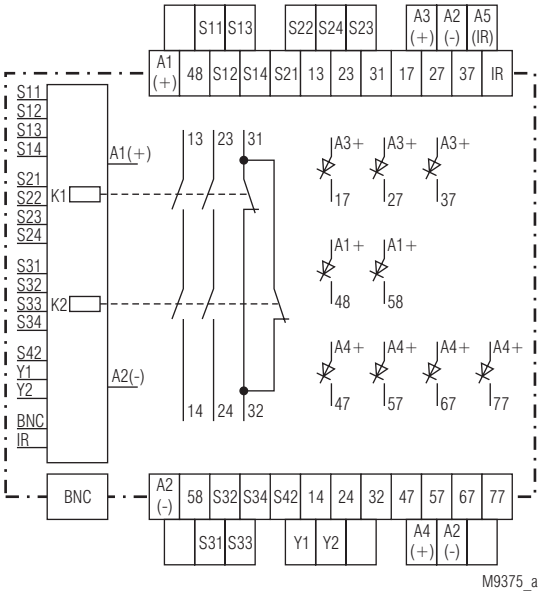
Approvals and Marking

CE TÜVRheinland Functional Safety Type Approved FS

Circuit Diagrams



BI 5910.03/00MF9



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-S32and 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 remotecontrol is only accepted if the reset signal is received via radio and via infrared. This meansthat the remote control must be pointed at the infrared receiver for reset.

Technical Data

Radio

Conformity:	ETS 300 220
Aerial:	1/4 aerial, plug in as accessory
Frequency:	64 programmable frequencies 433.1 ... 434.675 MHz
Sensitivity:	< -100 dBm
Nominal voltage U_N:	DC 24 V
Voltage range:	0.85... 1.15 U_N at max. 5% residual ripple
Nominal consumption:	max. 120 mA (Semiconductor outputs not connected)
Control voltage on S11, S13, S21, S23, S31, S33,48, 58:	DC 23 V at U_N
Control current on S12, S14, S22, S24, S32, S34, S42:	each 4.5 mA at U_N
Max. voltage for active signals on: S12, S14, S22, S24, S32, S34, S42:	DC 16 V
Max. Voltage for inactive signals on: S12, S14, S22, S24, S32, S34, S42:	DC 9 V
Max. inputvoltage on S12, S14, S22, S24, S32, S34, S42:	DC 30 V
Fusing:	Internal with PTC
Max. time differece between input signals of one fuction	
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!!
Contact type:	Relais, forcibly guided
Operating time typ. at U_N	
automatic start: max. 800 ms	
manual start:	max. 110 ms
automatic restart:	max. 70 ms
Swithing off time (reaction time)	
S12-S14, S22-S24, S32-S34:	max. 25 ms
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	
Nominal output voltage:	AC 250 V DC: see limit curve for arc-free operation
Switching of low loads:	> 100 mV
Thermal current I_{th}:	5 A
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 8A / 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
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 10^6 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 mountedin 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 ax is 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^2 strand. wire with sleeve or 1 x 4 mm^2 solid or 2 x 1.5 mm^2 stranded wire with sleeve DIN 46 228-1/-2/-3/-4
Leiterbefestigung:	Plus- minus- terminal srews M 3.5 box terminals with wire protection
Mounting:	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	
$MTTF_d$:	> 100	a
DC_{avg}:	98.4	%
d_{op}:	365	d/a (days/year)
h_{op}:	24	h/d (hours/day)
t_{Zyklus}:	3.60E+03	s/Zyklus
	≙ 1	/h (hour)

Values according to IEC/EN 61508:

SIL	3	IEC/EN 61508
HFT*):	1	
DC_{avg}:	98.4	%
SFF	99.5	%
PFH_D:	1.20E-9	h^{-1}

Safety Related Data for E-STOP via radio control

Values according to EN ISO 13849-1:

Category:	4	
PL:	e	
$MTTF_d$:	> 100	a
DC_{avg}:	98.0	%
d_{op}:	365	d/a (days/year)
h_{op}:	24	h/d (hours/day)
t_{Zyklus}:	2	h (hours)

Values according to IEC/EN 61508:

SIL	3	IEC/EN 61508
HFT*):	1	
DC_{avg}:	98.4	%
SFF	99.5	%
PFH_D:	2E-9	h^{-1}

*) HFT = Hardware-Failure Tolerance

Info 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*)

BI 5910.03/00MF9 DC 24 V
Article number: 0059003
Safety outputs: 3 NO contacts

- Function with rotational switches adjuistable
- Nominal voltage U_N: DC 24 V
- Width: 62.5 mm

*) The NC contact can only be used as indicator contact!

Ordering Example

BI 5910 ._ _ /0_MF9 DC 24 V

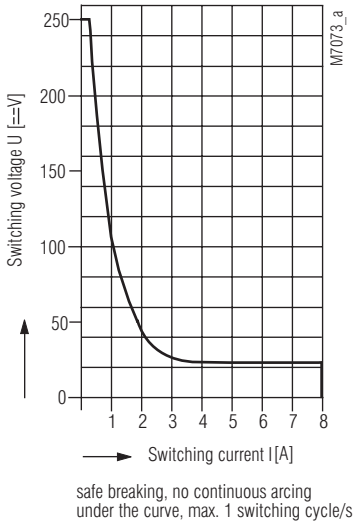
- DC 24 V: Nominal voltage
- /0_MF9: Option start by infrared
  - 0: without start by infrared
  - I: with start by infrared
- ._ _: Contacts
  - .03: 3 NO contacts
  - .22: 2 NO contacts, 1 NC contacts*)
- BI 5910: Type

*) The NC contact is not a safety contact

Accessories

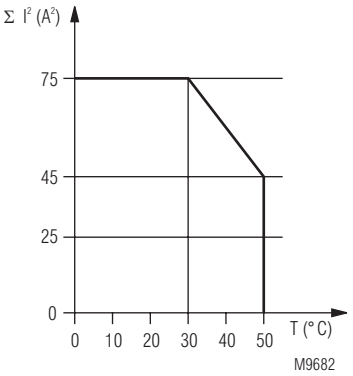
RE 5910/040:	1/4 λ aerial 433 - 434 MHz - BNC
RE 5910/041:	1/2 λ aerial 433 - 434 MHz - BNC
RE 5910/042:	2 m extension for aerial + trough hole connector - BNC fixing angle
RE 5910/043:	5 m extension for aerial + trough hole connector - BNC fixing angle
RE 5910/045:	Extension 50 cm
RE 5910/046:	90° adapter for aeriall
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