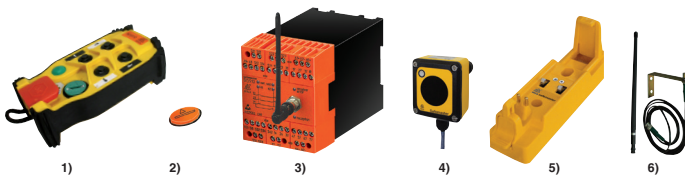


Short Description

The Wireless E-Stop-System includes a very compact and ergonomic remote control RE 5910 and a safety module with radio control BI 5910. The remote control provides personal protection when entering dangerous areas and allows besides the emergency stop function also control functions with the integrated push buttons and switches. The safety outputs of the BI 5910 guarantee safe disconnection. For control functions it includes 7 semiconductor outputs.

The System Components



Remote control ¹⁾

The remote control includes 1 e-stop and 1 start button as well as 4 function buttons for radio remote control. It does not replace conventional safety circuits, but offers additional features. I.e. wired safety circuits remain active, although a remote control is used.

Electronic Key for Remote Control ²⁾

The electronic key enables the activation of the remote control and offers personal access permission to a certain configuration of the remote control. It contains the following information:

- Frequency that is used for transmission
- Identity code of the system
- Time interval for activity monitoring

Radio Controlled Safety Module BI 5910 ³⁾

The radio safety module reacts on the signals of the corresponding remote control and the wired safety components. To detect the corresponding remote control frequency and identity code must be identical.

Infrared Module RE 5910/060 ⁴⁾

If the start of a plant must only be possible from a certain area, e. g. to have a view on the dangerous zone, the option with infrared start is the ideal solution. Accidents can be avoided by starting from defined zones.

Charger Station RE 5910/010 ⁵⁾

If the remote control is not used it has to be placed in the charger and switched off. This starts the charging process for the battery. The charger has 2 monitoring contacts. These are used to detect the removal of the remote control.

Aerials ⁶⁾

The receiver unit requires an aerial that can be mounted directly on the front of BI 5910. If the receiver is mounted in a metal enclosure the aerial has to be placed outside. For the outside mounting a special coaxial cable is available.

Your Advantages

- Ideal solutions for mobile and stationary machines and plants with dangerous areas
 - During automatic operation e. g. to clear failures
 - During set up e. g. to adjust machine parameters, maintenance, set up
- Higher availability of machines because damage of trailing cables is avoided
- Less mounting, installation and wiring time
- No wearing on trailing cables, slip rings etc.
- Easy retrofit and modernising of machines
- Optimised sight on operating area during set up
- User legitimating with electronic key on remote control possible

Features

Total System

- According to
 - Performance Level (PL) e and category 4 to EN ISO 13849-1: 2015
 - Safety Integrity Level (SIL 3) to IEC/EN 61508
- Applicable in the scope of the EN 60204-1 as well as in emergency stop applications according to EN ISO 13850
- Safety radio transmission
- Radio receiver for:
 - E-stop
 - Control signals for 6 non-safety semiconductor outputs

Radio Controlled Safety Module

- 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
- Feedback circuit Y1/Y2 for monitoring of external contactors
- 2 semiconductor outputs for status indication
- Removable terminal blocks allow fast exchange of module
- Compact unit, only 67.5 mm width

Remote control

- Comfortable single hand operation
- Options with 4 configurable push buttons or rotational switches for control functions
- With perceptible 2 step push buttons
- With marking space besides the push buttons
- Protection against unintentional activation
- Speed charging and high battery capacity
- Fast change of frequency
- Pocket for remote control as option

Additional Information About This Topic

- You will find more information about the Wireless E-Stop-System in the User Manual

Approvals and Markings



Applications

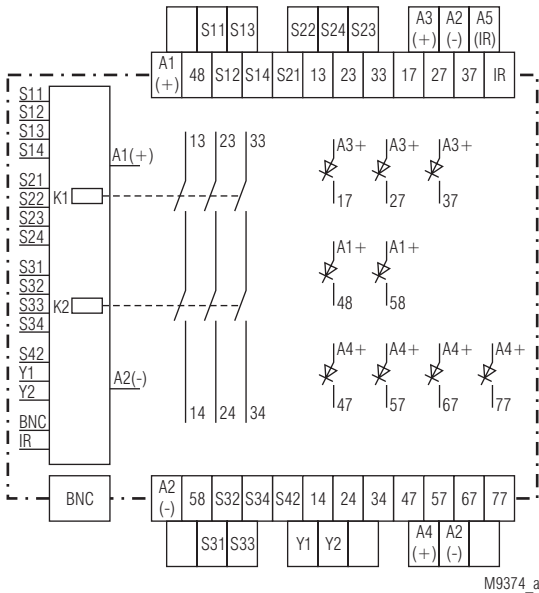
E-Stop

Protection of men and machines in mobile and large plants where a fixed wiring is not possible, e.g. production halls, mounting scaffolds, plants and dangerous accessible areas.

Also for control functions for e. g. :

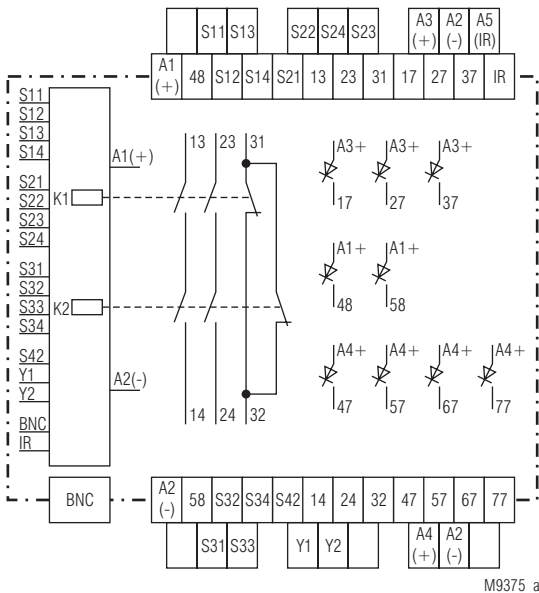
- Step control
- Start-stop functions
- Speed adjustment
- Positioning and actuator selection

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 (e.g. RE 5910/042; Article number: 0059653).

Special functions like activity monitoring and selection of radio frequency can be adjusted on the remote control.

Connection Terminals

| Terminal designation | Signal description |
|------------------------|---|
| A1+ | DC 24 V; Supply voltage for radio controlled safety module |
| A2 | Common ground |
| A3+ | DC 24 V; Voltage supply of semiconductor outputs |
| A5+ | Voltage output DC 12 V |
| S11/S12 | Input 1 for 1 st emergency stop or LC |
| S13/S14 | Input 2 for 1 st emergency stop or LC |
| S21/S22 | Input 1 for 2 nd emergency stop or LC |
| S23/S24 | Input 2 for 2 nd emergency stop or LC |
| S31/S32 | 1 st control input for charger unit |
| S33/S34 | 2 nd control input for charger unit |
| S42 | Input for hard-wired start button |
| 13/14 | 1 st safety output, NO safety contact |
| 17 | Non safe static output Mode 0 to 4 and 8,9: Activated without remote control Mode 5,6 and 7: Activation on start button of remote control |
| 23/24 | 2 nd safety output, NO safety contact |
| 27, 37, 47, 57, 67, 77 | Non-safety semi-conductor outputs, assignment to push buttons / switches of remote control depending on selected model |
| 31/32 | Monitoring output NC contact only for contact variant .22 |
| 33/34 | 3 rd safety output, NO safety contact only for contact variant .03 |
| 48/58 | Non-safety semiconductor outputs 24 V: State of radio-controlled safety module |
| Y1/Y2 | Input for feed back loop of external contact amplifier |
| IR | Input signal |

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 module |
| 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 means that the remote control must be pointed at the infrared receiver for reset.

A visible e-stop button must be active all the time.

This means that the e-stop button of the remote control must not be visible when it is inactive. Therefore the charger must be mounted in a way that the remote control is not visible while charging.

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. input voltage on S12, S14, S22, S24, S32, S34, S42: | DC 30 V |
| Fusing: | Internal with PTC |
| Max. time difference between input signals of one function | |
| E-stop, Light curtains: | 250 ms |
| Gates: | 3 s |

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 |
| 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 arc limit curve

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 60947-5-1

NC contacts: AC 2 A / 230 V IEC/EN 60947-5-1

to DC 13: DC 8 A / 24 V at 0.1Hz IEC/EN 60947-5-1

Electrical life

to AC 15 at 2 A, AC 230 V: 10⁵ switching cycles IEC/EN 60947-5-1

Permissible switching frequency: Max. 1200 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 10⁶ 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: | < 2000 m |

Clearance and creepage distance

Rated impulse voltage / pollution degree: 4 kV / 2 (basis insulation) IEC 60664-1

EMC

HF-irradiation: 10 V / m IEC/EN 61000-4-3

Fast transients

on wires for power supply A1-A2: 2 kV IEC/EN 61000-4-4

on signal and control wires: 2 kV IEC/EN 61000-4-4

Surge voltages

between wires for power supply 1 kV IEC/EN 61000-4-5

between wire and ground: 2 kV IEC/EN 61000-4-5

HF- wire guided: 10 V IEC/EN 61000-4-6

Interference suppression: Limit value class B EN 55011

Degree of protection: Acc. to EN 61496-1 (1997) the unit has to be mounted in a control cabinet with protection class 54

Housing: IP 40 IEC/EN 60529

Terminals: IP 20 IEC/EN 60529

Enclosure: Thermoplastic with V0 behaviour according to UL subject 94

according to EN 61496-1 (1997)

Amplitude 0.35 mm IEC/EN 60068-2-6

Frequency 10 ... 55 Hz

Shock proof

Acceleration: 10 g

Impulse length: 16 ms

Number of shocks: 1000 per axis is on all 3 axes

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

Terminal designation: EN 50005

Wire connection: 1 x 2.5 mm² strand. wire with sleeve or

1 x 4 mm² solid or

2 x 1.5 mm² stranded wire with sleeve

DIN 46228-1/-2/-3/-4

Wire fixing: Plus- minus- terminal screws M 3.5

box terminals with wire protection

Mounting: DIN rail IEC/EN 60715

Weight: 495 g

Dimensions

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

Standard Types Radio Controlled Safety Module BI 5910

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 adjustable

• Nominal voltage U_N: DC 24 V

• Width: 62.5 mm

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

Technical Data Remote Control RE 5910

Radio

| | |
|--------------------|---|
| Conformity: | ETS 300 220 |
| Carrier frequency: | UHF, frequency modulated (FM) |
| Frequency: | 64 programmable frequencies |
| Frequency range: | 433.1 ... 434.675 MHz |
| HF-power: | < 10 mW (without licence), integrated aerial |
| Distance: | Approx. 150- 200 m under industrial ambient conditions ^{*)} , approx. 600 m in open area |

^{*)} The distance can vary with the ambient conditions of the remote control and the receiver aerial (roof construction, metal walls etc.)

Battery

| | |
|---------------------|--|
| Type: | Lithium-ion |
| Service life: | Min. 500 cycles (charge/discharge cycles) |
| Charging time: | 2 h, bei + 20 °C (80 %) (for completely discharged battery) |
| Full charging time: | 2 h 30 min (100 %) |

Charge capacity

| | |
|--|-------------------------------------|
| - Normal operation of push buttons: | 20 h, at 50 % operation and + 20 °C |
| - After 10 minutes charging of discharged battery: | approx. 1 h |
| Storage temperature: | - 20 °C ... + 50 °C |
| Charging temperature: | 0 °C ... + 40 °C |

Attention! Slow charging outside temperature range may damage the battery

Enclosure

| | |
|---------------------------|--------------------|
| Material: | ABS |
| Degree of protection: | IP 65 |
| Ambient temperature: | - 20°C ... + 50 °C |
| Holder for non-operation: | Charger unit |
| Weight (with battery): | 240 g |

Dimensions

Width x height x depth: 46 x 78 x 143 mm

Standard Type Remote Control RE 5910

RE 5910/001

Article number: 0060610

- With 4 2 step push buttons
- Without infrared
- With electronic key

Ordering Example

BI 5910 . . . /0_MF9 DC 24 V

Nominal voltage
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^{*)}
Type

^{*)}The NC contact is not a safety contact

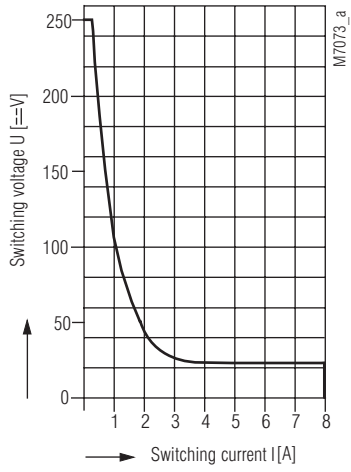
RE 5910/00

Variant

- 1: with 4 2 step push buttons, without IR
 - 2: with 4 2 step push buttons, with IR
 - 3: with 4 1 step push buttons, without IR
 - 4: with 4 1 step push buttons, with IR
 - 5: B1-B3: step push button (BPSV),
B4: rotational switch with auto return (COM3R)
 - 6: B1-2: 1 step pushbutton (BPSV),
B3-B4: rotational switch (COM3), with IR
 - 7: B1-B2: 1 step pushbutton (BPSV)
B3-B4: rotational switch (COM3),
without IR, with electronic key
 - 8: B1-B2: 2 step pushbutton (BPDV)
B3-B4: rotational switch (COM2),
without IR, without electronic key
- 9114: B1-B3: 1 step pushbutton (BPSV),
B4: rotational switch (COM3R), with IR

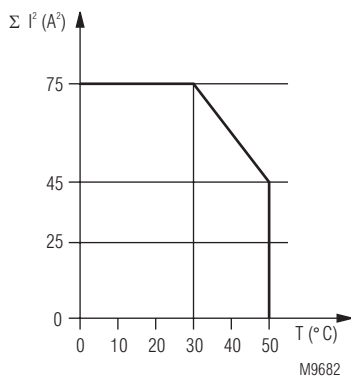
others on request

Characteristics Radio Controlled Safety Module BI 5910



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

Arc limit curve



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

Technical Data Power supply AC 230 V RE 5910/011 and RE 5910/013

Input

| | |
|------------------|-----------------|
| Nominal voltage: | AC 230 V |
| Voltage range: | AC 90 ... 264 V |
| Efficiency: | > 70 % |

Output

| | |
|----------------------|-------------------------|
| Voltage: | DC 5 V |
| Voltage control: | 4.8 - 5.2 V |
| Residual ripple: | < 150 mV p-p 100 Hz |
| Output current: | 0 ... 1 A |
| Power: | 5 W |
| Input control: | < 0.1 % |
| Load control: | < 1 % von 0 bis Vollast |
| Overload protection: | Typ. 110 % |

General Data

| | |
|-------------------------|-----------------------------------|
| Nominal operating mode: | Continuous operation |
| Temperature range: | - 10 ... + 40 °C |
| Insulation class: | II |
| EMC | |
| EMC irradiation: | According to EN 61000-6-3, FCC15B |
| EMC proof: | According to EN 61000-6-1 |

| | |
|---------|------|
| Weight: | 65 g |
|---------|------|

Dimensions

| | |
|---------------------------------|-----------------|
| Length x width x height: | 75 x 32 x 40 mm |
|---------------------------------|-----------------|

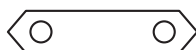
Standard Type Power supply AC 230 V RE 5910/011 and RE 5910/013

| | |
|-----------------|---------|
| RE 5910/011 | EU plug |
| Article number: | 0060617 |

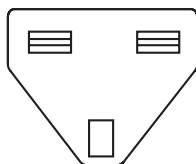
| | |
|-----------------|---------|
| RE 5910/013 | UK plug |
| Article number: | 0061323 |

Plug Variants Power supply AC 230 V RE 5910/011 and RE 5910/013

plug EU RE5910/011



plug UK RE5910/013



M11197

Technical Data Power supply DC 24 V RE 5910/012

Input

| | |
|------------------|-----------------|
| Nominal voltage: | DC 24 V |
| Voltage range: | DC 18 ... 36 V |
| Input current: | 0.9 A / DC 24 V |
| Efficiency: | > 70 % |

Output

| | |
|-------------------------|--|
| Voltage: | DC 5 V |
| Voltage control: | 4.75 - 5.5 V |
| Residual ripple: | < 100 mV p-p |
| Output current: | 0 ... 3 A (see derating curve) |
| Power: | 15 W |
| Input and load control: | ± 0.5 % |
| Overload protection: | 105 % ... 160 % selfrecovering when failure removed |
| Overvoltage protection: | 5.75 V ... 6.75 V |

General Data

| | |
|-------------------------|---------------------------------------|
| Nominal operating mode: | Continuous operation |
| Temperature range: | - 10 ... + 55 °C (see derating curve) |
| Insulation class: | II |

EMC and protection

| | |
|--|--|
| Input / Output: | 2 kV AC |
| Input / Earth: | 1 kV AC |
| Output / Earth: | 0.5 kV AC |
| Insulating resistance: | |
| Input / Output, Input / Earth, Output / Earth: | 100 MΩ / 500 V DC / 25 °C / 70 % RH |
| EMC irradiation: | According to EN 55022 (CISPR22) |
| EMC proof: | According to EN 61000-4-2,3,4,6,8 EN 55024 light industry level, criteria A |

| | |
|---------|-------|
| Weight: | 200 g |
|---------|-------|

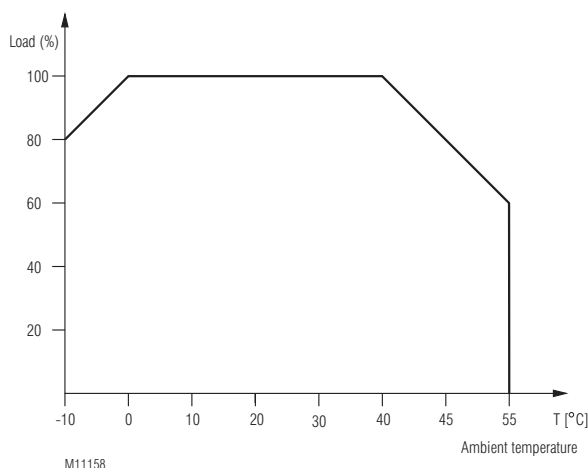
Dimensions

| | |
|--------------------------------|-----------------|
| Width x height x depth: | 91 x 51 x 37 mm |
|--------------------------------|-----------------|

Standard Type Power supply DC 24 V RE 5910/012

| | |
|-----------------|-------------------------------------|
| RE 5910/012 | Power supply for industrial charger |
| Article number: | 0060818 |

Characteristic Power supply DC 24 V RE 5910/012



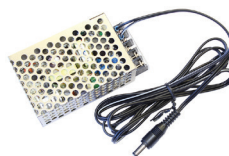
Derating curve



RE 5910/011



Charger Station



RE 5910/012



Charger Station

Accessories

| | |
|--------------|--|
| RE 5910/010: | Industrial charger unit Article number: 0060616 |
| RE 5910/011: | Power supply for charger AC 230 V (Euro connector) Article number: 0060617 |
| RE 5910/012: | Power supply for charger DC 24 V Article number: 0060618 |
| RE 5910/013: | Power supply for charger AC 230 V (U.K. connector) Article number: 0061323 |
| RE 5910/030: | Set with 6 colour stickers "movements" for 2-step push buttons Article number: 0059660 |
| RE 5910/031: | Set with 90 black and white stickers Article number: on request |
| RE 5910/033: | Set with 48 white stickers + 48 transparent protection stickers for individual marking Article number: 0059663 |
| RE 5910/040: | 1/4 λ aerial 433 - 434 MHz - BNC Article number: 0059573 |
| RE 5910/041: | 1/2 λ aerial 433 - 434 MHz - BNC Article number: 0059652 |
| RE 5910/042: | 2 m extension for aerial + trough hole connector - BNC fixing angle Article number: 0059653 |
| RE 5910/043: | 5 m extension for aerial + trough hole connector - BNC fixing angle Article number: 0059654 |
| RE 5910/045: | Extension 50 cm Article number: 0059656 |
| RE 5910/046: | 90° adapter for aerial Article number: 0061685 |
| RE 5910/051: | Replacement rechargeable battery Article number: 0060621 |
| RE 5910/060: | 1 infra red receiver with 10 m wire Article number: 0059665 |
| RE 5910/061: | 10 m extension wire for infra red module Article number: 0059666 |
| RE5910/070: | Remote control holster for RE5910; Material: leather, - Metal clip to fix it on belt. - With rings to clip in the personal mounting harness RE 5910/071 Article number: 0060490 |
| RE 5910/071: | Personal mounting harness with elastic straps to carry the remote control in the holster RE5910/070 on the body of the operator. Article number: 0060491 |

Elektronische Ersatzschlüssel

| | |
|--------------|--|
| RE 5910/020: | Grüner elektronischer Schlüssel, programmiert Artikelnummer: 0060619 |
| RE 5910/021: | Orangefarbener elektronischer Schlüssel, programmiert Artikelnummer: 0060620 |

Electrical replacement key

| | |
|--------------|---|
| RE 5910/020: | Green electronic key with program Article number: 0060619 |
| RE 5910/021: | Orange electronic key with program Article number: 0060620 |

Important:

- Please state the following details on order:
- Number of electronic key (6 figure number, noted on page 2 of this manual)
 - Frequency channel, if it should be programmed by manufacturer
 - Time delay for activity control (01-99 sec or 01-98 min)

