# *User manual*

# System Cobra 100

## Cobra narrowband system

Handheld transmitter CS4S / receiver CR2S

Schmidiger GmbH
Funkmodule • Funkapplikationen

***Version list***

| Date | Version | Description |
|---|---|---|
| 16.04.2007 | 1.0 | Represents Software dated April 2007 |
| 02.06.2007 | 1.1E | Translation of version 1.1 into English |
| 22.08.2013 | 3.1E | Translation of version 3.1 into English |
| 26.06.2014 | 3.2E | Translation of version 3.2 into English |

# Contents

# 1. Summary

The bidirectional Cobra radio control system is made up of one or more handheld transmitters, and one or more intelligent receivers communicating together in both directions[1]. Owing to the narrow band wireless technology of the latest generation it provides for an excellent data link and the system automatically escapes from the interferences, which may be caused by other radio systems.

The receiver can be programmed for all practical purposes with just a few steps. It has an integrated antenna and is therefore easy to install. With a build-in width of only 35 mm, it takes up only very little space in the switch cabinet.

The handheld transmitter is equipped with a silicone keyboard, which can be easily used with gloves. Two batteries of the type 1.5V-AAA assure continuous functioning for over 60 hours[2] thus allowing for economical operation.

With two ways to carry the transmitter is always at hand and does not get lost. Additionally, there is a parking possibility, where the transmitter can be attached to a metal wall using two magnets.

# 2. Characteristics of the Cobra system

### *General characteristics*

- Most recent bidirectional radio transmission technology
- Shortest possible reaction period with no noticeable delay
- High range[3] of up to 300 m in the open country / 50 m within buildings
- Automatically selects a free frequency and escapes interferences
- Several Cobra systems can be used simultaneously

### *Handheld transmitter*

- Aesthetic, compact and solid case
- Radio link control and battery control via LED
- Displays switch status of the receiver relays
- Power supply via two 1.5 Volt batteries (AAA / LR03)
- Owing to comfortable carrying and parking possibilities not losable
- Extended functions can be selected with configuration menu and a DIP switch
- High error safety because of resistive keyboard monitoring

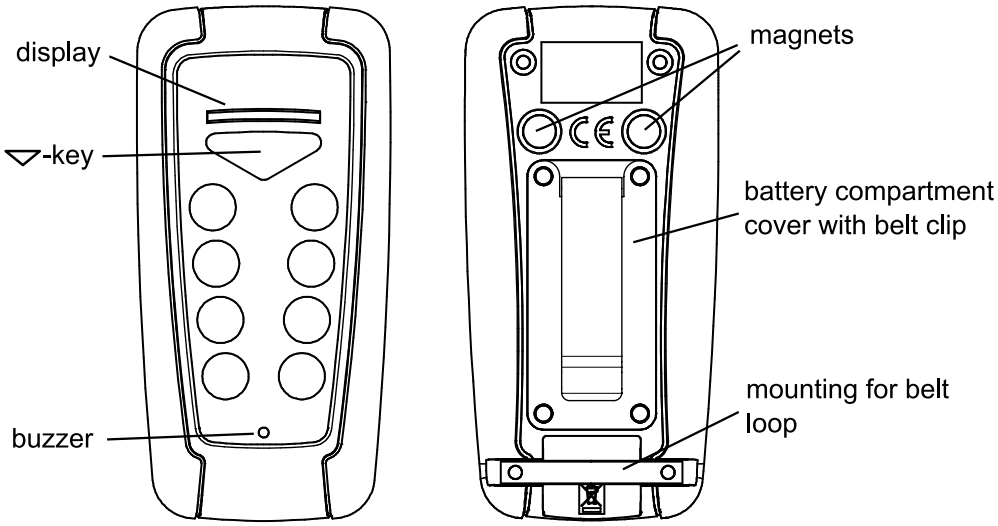
### *Receiver*

- Is very flexible and provides for simple on-site programming
- Programming can be carried out using a screwdriver without opening the case
- Place-saving DIN-railbox with a built-in width of only 35 mm on a DIN rail
- Clamps for ease of installation and simple servicing
- Aesthetic and closed case
- Integrated antenna, connection for an external antenna
- Function display via several LED's
- Extended function with slave module for up to 32 relays (possibility)
- 1 input for status feedback to the transmitter

[1] At the same time there can be just one handheld transmitter activated for a receiver!
[2] Using 2.4 kBit/s 40 h.
[3] Using 2.4 kBit/s and external antenna by the handheld transmitter and receiver up to 2 km range in the open country.

# 3. Handheld Transmitter CS4S

## Summary

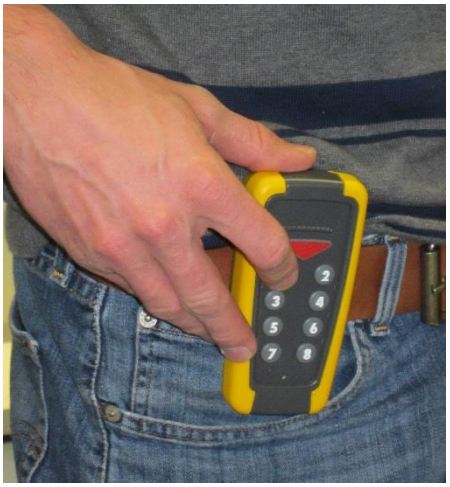



## Carrying possibilities

The handheld transmitter can be attached to the belt in different ways, so that it is always at hand. The reliable attachment on the operator prevents losing the transmitter.

### *Belt clip*

The transmitter is attached to the belt in a vertical position. The transmitter is stiff, so that the operator has a restricted view on the keys.

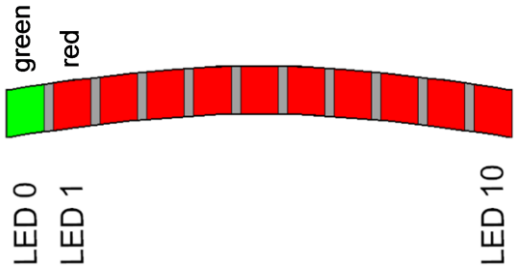


### *Belt loop*

The transmitter is captively and upside down with a loop attached to the belt. The operator reaches for the transmitter and then, he has a complete view on the keyboard.

# Display

A ten step red and a green LED display is used for the handheld transmitter.




Depending on the operating mode there are different functions. The most important ones are descripted in the following.

### *Radio link control*

With each pressing of a key LED 0 and 1 will display if there is a successful radio link to the receiver.
LED 0 is on → radio link
LED 1 is on → no radio link[4]

If both LED 0 and 1 light up alternatively (in the order red-green-red-green...), that means, that the radio link is interrupted temporarily.

If LED 0 and 1 flash simultaneously (turning on and off at the same time), that means, that the system is searching for a new frequency (see “Automatic frequency selection” on page 30).

### *Power supply / battery*

If a key is pushed for more than 5s, the transmitter displays the battery’s status with the LED from 1 to 10 as soon as the key is no longer pushed. If the battery voltage is under 2.45V, the LED 10 is flashing every 2 seconds. In this case the remaining battery power is less than 20% (see “power supply/ battery” on page 7).

### *Relays status*

If the status display for relays 1 to 8 is turned on, the transmitter displays the receiver’s relay status with every push of a key (see “Status display for relays 1 to 8” on page 11).

### *Status display for external input*

If the status display for the external input of the receiver is turned on, the transmitter displays the external input with every push of the ▽-key (see “Status display for external input" on page 11).

### *Flashing codes*

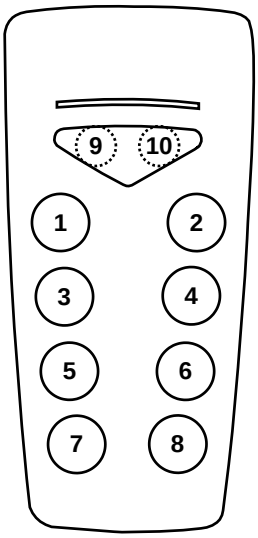
A summary for all flash codes can be found on page 17.

### *Double click display*

If the DoubleClickExtension is activated and a double click is done, LED 5 in the display’s middle is turned on (see “DoubleClickExtension” on page 8).

[4] Exception: Relay display and display external input, see page 11

## Keys




Numeration of key contacts

The transmitter has 9 silicone keys. With the two key contacts under the ▽-key, 10 functions can perform as well. If there are more functions needed, the double click function can be turned on. Therefore, up to 20 functions are possible (see “DoubleClickExtension” on page 8).

If the STOP-function on the ▽- key is turned on, the two key contacts under the ▽-key will be connected and cannot be used separately. Using this function, the amount of keys is therefore reduced on 8 + ▽-key respectively 16 + ▽-key.

(More information about the STOP-function can be found on page 12).

## Power supply / battery

Two 1.5V batteries (LR03/ AAA) are the battery’s power supply. In case they are put into the transmitter the wrong way, around a polarity protection makes sure that the transmitter is not damaged.

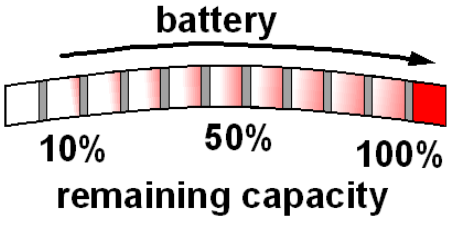
### Using of rechargeable batteries

The transmitter can also be operated with NiCd or NiMH rechargeable batteries, but we do not recommend the use of those.

In comparison to standard batteries, rechargeable batteries have a much higher self-discharge. This causes a lowering of the battery voltage, even if the transmitter is not used. The low nominal voltage of 1.2 to 1.3V causes an early activation of the voltage control. Therefore, the use of rechargeable batteries is rarely advisable.

### Battery power control

The handheld transmitter checks the battery power continuously. If a key is pushed for more than 5s, the transmitter displays the battery’s power with the LED from 1 to 10 as soon as the key is no longer pushed. The closer the turned on LED is to the right end of the display, the more remaining power is in the battery. If the turned on LED is at the right end (LED 10), the battery is full. If the turned on LED is at the left end (LED 1), the battery is nearly empty and should be replaced soon.




If the battery voltage is under 2.45V, LED 10 is flashing every 2 seconds. In this case the remaining battery power is less than about 20%.

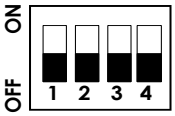
If the voltage is under 2.3V, the under voltage monitoring turns off the transmitter. So a regular flashing means that the transmitter will still work, but the batteries need to be replaced soon.

# Extended transmitter functions

## *DIP-switch (DSW)*

A DIP switch is located inside the battery compartment of the handheld transmitter. It can be used to activate additional functions. Those functions extend the transmitter with an activation protection, a double occupancy using the DoubleClick function and prevent the simultaneous transmission two channel selections. In the factory settings all DIP-switches are turned off.

***Standard (10K)*** **1**: Off, **2**: Off, **3**: X, **4**: X




Each key transmits upon activation.

***DoubleclickLock-20s (10K)*** **1**: On, **2**: Off, **3**: X, **4**: X

To activate a transmitter, a key must be pressed twice with only a short interval (double-click). Only then the transmitter will be activated and function according to the standard parameter settings. If after that no further key is pressed for the next 20 seconds, the locking will automatically be reactivated; that means, that pressing an individual key then won't produce any more effect. As compared to the DoubleClickLock function, the handling is a bit more comfortable, because only the first respective key needs to be pressed twice. As long as the transmitter is activated, LED 5 will flash shortly in intervals of two seconds.

*Use*: Protection against inappropriate or involuntary activation, child-proof lock

***DoubleClickLock (10K)*** **1**: On, **2**: On, **3**: X, **4**: X

Each key can only be used with one double-click. This function differs from DoubleclickLock-20s so far, as that the keys are locked immediately after release and not only 20 seconds later. Therefore, the protection provided is slightly higher as compared to the DoubleclickLock-20s function.

*Use*: Protection against inappropriate or involuntary activation, child-proof lock

***DoubleClickExtension (20K)*** **1**: Off, **2**: On, **3**: X, **4**: X

The usual 10 command channels are increased to 20, which means that two alternative functions are allocated to each key. A normal single pressing of a key transmits the command channels 1 to 10. If you press twice (double-click) the command channels 11 to 20 will be activated. If the STOP-function on the ▽-key was turned on in the transmitter settings, only 17 command channels can be used, because key 9 and 10 are connected and recognised by the system as a single click command.

*Use*: Example: Engine control: Double-click = fast, single click = slow

***OneKeyLock*** **1**: X, **2**: X, **3**: On, **4**: X

This function inhibits the simultaneous transmission of a second command channel if several keys are pressed at the same time. The command channel that was pressed first is transmitted. As long as that command channel is active, all other command channels will be ignored.

*Use*: Example: Protective function, so two commands cannot by carried out at the same time, e. g. engine control with forward and backward motion

***Autofrequency***

**Mode 1:** (recommended standard setting) **1:** X, **2:** X, **3:** X, **4:** Off

If there is no acknowledgement from the receiver, after 3 seconds[5], the transmitter starts a frequency scan, until the contact with the receiver has been re-established or the transmission key is released.

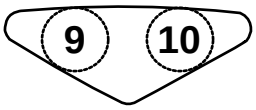
**Mode 2:** **1:** X, **2:** X, **3:** X, **4:** On

If there is no acknowledgement from the receiver, after 3 seconds[5], the transmitter starts a frequency scan, but transmission will be carried out with priority on the last used frequency. This setting will be used if the handheld transmitter is exposed to extreme interferences, and therefore receives few or no acknowledgements from the receiver. In such cases the relays can still be switched despite all interferences. This mode can be used only, if the autofrequency from the receiver is deactivated (see page 30).

[5] 2.4 kBit/s: 10s

## *Configuration menu-10/10*

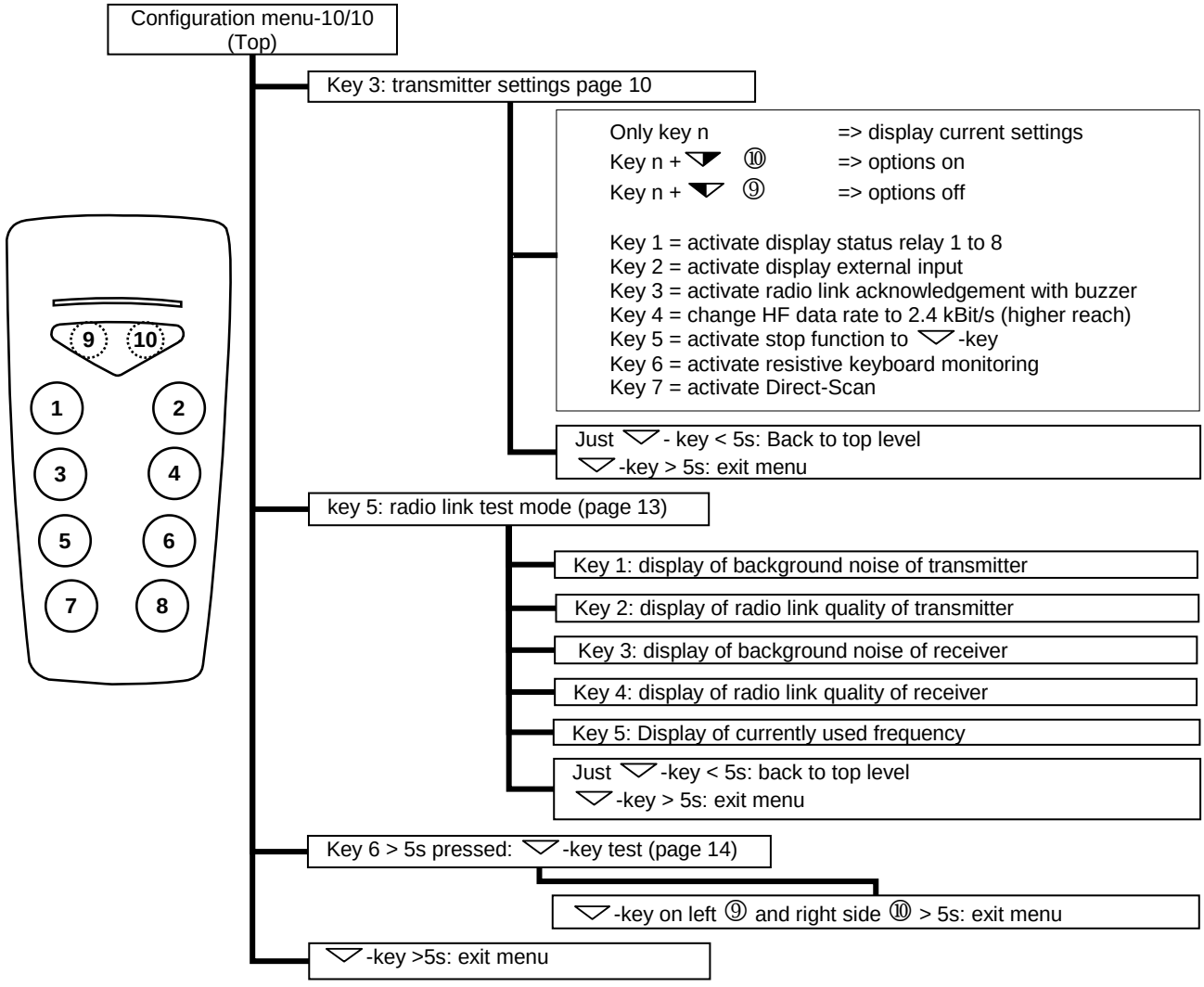
The configuration menu contains handheld transmitter settings and radio link test mode. Those extended settings will be rarely needed and therefore do not need to be changed.




The configuration menu-10/10 can be opened by using a special key combination that will not occur while normal operation. There are two separated internal contacts under the ▽-key, one on the left and one on the right. To activate the configuration menu, press the ▽-key ⑨ on the left side 10 times in max. 4s and then the ▽-key ⑩ on the right side IMMEDIATELY 10 times in max. 4s.The menu will only open if the operator adheres strictly to the instructions given above.

(Advise: Disconnect the receiver from the power supply, so the relays and buzzer do not disturb.)

Before the configuration menu is opened, the three LEDs in the middle of the display will turn on for approximately 1s. During this time no key must be pushed; otherwise the menu will not open. After that, the configuration menu will be opened and the green LED will start flashing.




In the menu the 8 function keys and the ▽-key can be used to navigate:

- With keys 1 to 8 a menu item for configuration can be selected
- Press the ▽-key to change from the lower level menu to the top level
- With pushing the ▽-key for more than 5s the configuration menu can be quit
- After 2 min without a pushed key, the transmitter quits the menu automatically

After quitting the configuration menu, the middle red LED is turned on until no key is pushed anymore. After that, the normal functions of the transmitter are executed. (There is no accidental pulling out of relays from the receiver before a new key is pressed).

The settings are saved permanently, even though a battery change.

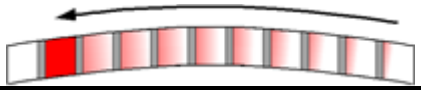
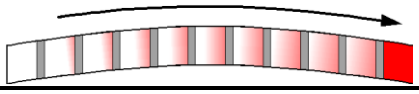
**Transmitter settings**

Extended functions from transmitter can be turned on and off.

If key 3 is pressed in the top level menu, the transmitter changes to the transmitter settings and flashes fast with LED 5.

In this configuration menu each key from 1 to 8 stands for a transmitter setting. With each key a function can be activated or deactivated. If the adequate key is pushed, an ascending light of the red LED displays that the function was turned on. A decreasing light means that the adequate function was turned off.

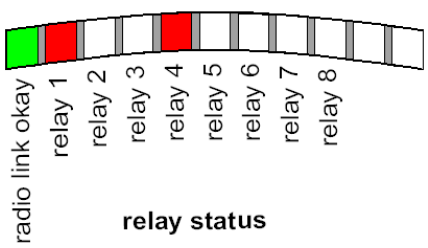
To activate a certain function, the adequate key and the right side of the ▽-key ⑩ needs to be pushed. The activation is acknowledged with an ascending LED light. If the left side of the ▽-key ⑨ is pushed as well, a function can be turned off. The deactivation of a function is acknowledged with a decreasing LED light.

| | Currently settings | |
|---|---|---|
| Key | Extension off  | Extension on  |
| 1 | Status display for relays 1 to 8 deactivated | Status display for relays 1 to 8 activated. |
| 2 | Status display for external input deactivated | Status display for external input activated. |
| 3 | Radio link acknowledgement with buzzer deactivated | Radio link acknowledgement with buzzer activated |
| 4 | Radio data rate for high range (2.4kBit/s) deactivated | Radio data rate for high range (2.4kBit/s) activated |
| 5 | STOP-function on ▽-key deactivated | STOP-function on ▽-key activated |
| 6 | Resistive keyboard monitoring deactivated | Resistive keyboard monitoring activated |
| 7 | Direct-Scan deactivated | Direct-Scan activated |
| 8 | (not assigned yet) | (not assigned yet) |
| Change: | Turning off: key + ⑨◥▽ | Turning on: key + ◥▽⑩ |

### *Status display for relays 1 to 8*

Especially when using relays with the toggle function, it can be hard to see, which status each of the relays has. In those cases it can be helpful to use the status display on the transmitter.

**Example: relay 1 and 4 turned on**




If the status display is turned on, the adequate LED (from 1 to 8) for the relay is turned on. Therefore, it can be checked if the pushed key turns on the right LED. If a key is pushed that was not assigned yet, the relay status can be checked without changing the relay status (this function cannot be used when using the multi receiver function).

During each radio communication the display is turned off. For that reason it is normal if the display flashes for a short time.

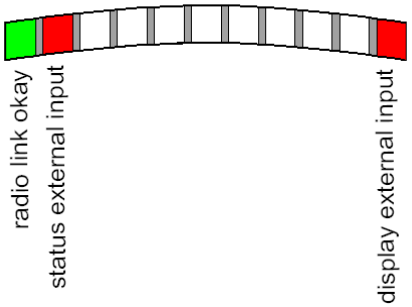
When using this function, the battery life is reduced (especially with low temperatures). When using receivers with more than 8 relays (or more than one slave module) the display of relay 5 to 8 can be wrong!

### *Status display for external input*

The receiver has an external input, where a potential free contact can be connected. If then the display for the external input is turned on, the status of the contact can be checked by using the ▽-key. If the contact is closed, LED1 is turned on if the ▽-key is pushed. If the contact is open, LED1 is turned off if the ▽-key is pushed. Thereby, LED10 displays that the status of the external input is displayed (and not the relay status).

A “low battery” warning is not displayed when using this function!

**Example: Status display for external imput**




Is this option activated the status display for the relays is not displayed with pushing the ▽-key.

During each radio communication the display is turned off. For that reason it is normal if the display flashes for a short time.

Moreover, this function reduces the battery life (especially with low temperatures).

### *Radio link acknowledgement with buzzer*

If the transmitter is used blindly, the transmission can be acknowledged by the buzzer.

When this function is activated each transmission is acknowledged with a sound. If a key is hold, the sound is repeated once every second.

### *Radio data rate*

The radio data rate is normally set on 19.2 kBit/s and the receiver works immediately. If the range is unsatisfying, the radio data rate can be changed to 2.4 kBit/s. Using this function, the response time of the receiver and the frequency scan needs more time.

The settings for all receivers and transmitters must be the same. Therefore, the radio date rate has to be changed as well at the receiver (see “radio data rate” on page 31).

### *STOP-function on the ▽-key*

The STOP-function on the▽-key is normally used with a RESET-key on the receiver. Therefore, all relays can be reseted or turned off by using the ▽-key.

If the STOP-function on the ▽-key is activated, this key gains a higher safety:

- The STOP-function connects key 9 and 10 with each other and therefore, these work as one key.
- Also commands given by the ▽-key will be executed with highest priority and will even be executed when “OneKeyLock” is activated and another key is pushed.
- If the resistive keyboard monitoring finds a malfunction with the ▽-key and STOP-function, it is transmitted as pushed so that it changes into a safe status.

The STOP-function on the ▽-key should be set as a reset-key. When setting the reset key functions, it can be decided, which relays will be turned off in the reset mode. All relays that will not be turned off will keep their status (see “Reset keys” on page 27).

We recommend using the STOP-function with resistive keyboard monitoring.

### *Resistive keyboard monitoring*

With this function, the resistive keyboard monitoring can be activated. In the factory settings this function is deactivated.

An activation of the resistive keyboard monitoring results in a higher safety. Thereby, the resistive keyboard monitoring resistance of the open and closed keys is checked for extreme values. This results in a detection of humidity, corrosion and aging keys.

As soon as a malfunction is detected, all impulse relays become deactivated. If the ▽-key and STOP-function are activated and the keyboard monitoring detects a malfunction caused by this key, the STOP-function on the receiver is executed (More about the “STOP-function” can be found above and about the “Reset keys” on page 27).

A system error is displayed on the LED display (see page 17).

Rarely the keyboard monitoring can be activated by e.g. a too soft push or a push on the edge of a key. If this error occurs regularly, the transmitter has to be send back to the manufacturer.

### *Direct-Scan*

If the transmitter has lost the radio link to the receiver, usually the transmitter starts after 3s[6] with the scan-mode to find the receiver on a new frequency. With the activated Direct-Scan function and lost radio link, the transmitter starts already 200ms[7] later with the scan-mode. So, the delay-time can be reduced during a loss of the radio link.

With the Direct-Scan function, interference from other systems are minimized. The disadvantage is that the system changes the frequency more often. We recommend using Direct-Scan function for systems with multi-receiver mode.

[6] 2.4kBit/s: 10s

[7] 2.4kBit/s: 1.6s

### Radio link test mode

The Cobra system has a sight range of 1km, so that a check of this data is really time costly and not doable without tools. For that reason a radio link test mode was put into the system. This system can be used to measure the range and detect the interferences caused by external systems.

A radio link test mode is started by key 5 on the top level.

The radio link test mode also has to be activated at the receiver (see page 32).

The transmitter quits the test mode if no key is pushed for 20min. The test mode can also be cancelled by pushing the ▽-key. In this case the system automatically displays the top level.

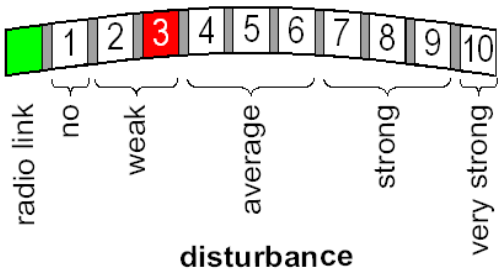
The green LED displays if there is a radio link between transmitter and receiver (green LED turned off = no radio link). The ten red LEDs display the radio link quality or disturbance level for the transmitter's or receiver's site. The meaning of the red LEDs can be chosen by the keys 1 to 5.

#### *Changing LED-display for radio link test mode*

Key 1: Disturbance at the transmitter's site
Key 2: Radio link quality at the transmitter's site
Key 3: Disturbance at the receiver's site
Key 4: Radio link quality at the receiver's site
Key 5: Currently frequency (frequency, on which the radio link is executed)

#### *Disturbance*

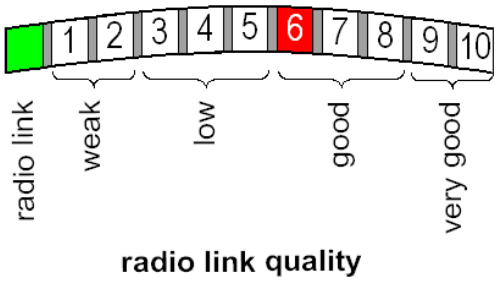
The disturbance display shows, what level of disturbance is on the location. If the red LED at the very left side is turned on, there are no or weak disturbances. The more the LED is on the right the stronger is the disturbance.




| LED | Disturbance | Display steps 19.2k | Display steps 2.4k |
|---|---|---|---|
| 1 | No | < -112 dBm | < -123 dBm |
| 2 | Weak | -112 ... -110 dBm | -123 ... -121 dBm |
| 3 | | -109 … -107 dBm | -120 … -118 dBm |
| 4 | Average | -106 … -104 dBm | -117 … -115 dBm |
| 5 | | -103 … -101 dBm | -114 … -112 dBm |
| 6 | | -100 … -98 dBm | -111 … -109 dBm |
| 7 | Strong | -97 … -94 dBm | -108 … -106 dBm |
| 8 | | -93 … -90 dBm | -105 … -103 dBm |
| 9 | | -89 … -85 dBm | -102 … -100 dBm |
| 10 | Very strong | > -85 dBm | > -100 dBm |

#### *Radio link quality*

The radio link quality displays, how good the signal quality on the selected site is. If the red LED at the very right side is turned on, the radio link is very good. The more the LED is on the left the worse is the radio link.

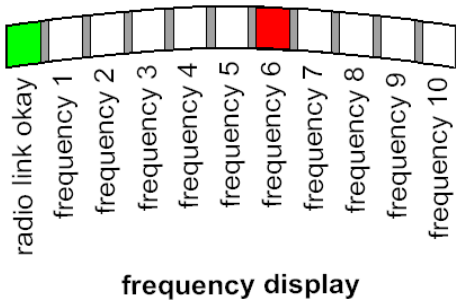



| LED | Radio link | Display steps 19.2k und 2.4k |
|---|---|---|
| 1 | Very low | < 12dB |
| 2 | | 12 … 14dB |
| 3 | low | 15 … 17dB |
| 4 | | 18 … 20dB |
| 5 | | 21 … 23dB |
| 6 | good | 24 … 29dB |
| 7 | | 30 … 35dB |
| 8 | | 36 … 41dB |
| 9 | Very good | 42 … 47dB |
| 10 | | >47dB |

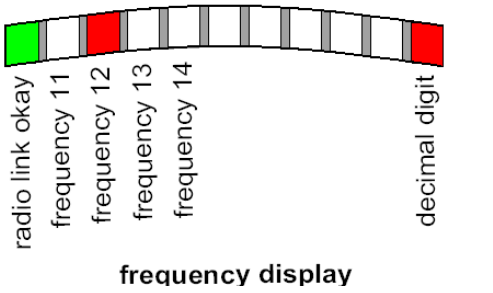
***Currently frequency***

The radio link test mode always uses one of the 14 frequencies of the Cobra system. The currently frequency is displayed by the 10 red LEDs:

**Example: frequency 6 = 433.625MHz**

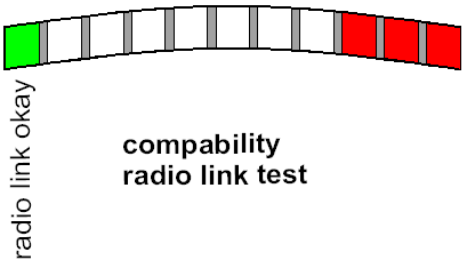



**Example: frequency 12 = 434.525MHz**




To increase the frequency, key 5 and the right side of the ▽-key need to be pushed. To decrease the frequency, key 5 and the left side of the ▽-key need to be pushed.

If the currently frequency is 14 and it is tried to increase the frequency again, the compatibility radio link test mode is activated (LEDs 8 to 10 are turned on). The radio link test mode takes fixed place at frequency 433.150 MHz. This compatibility radio link test mode is just needed for the older receiver models (CR1S), because it has a fixed test frequency at 433.150 MHz.



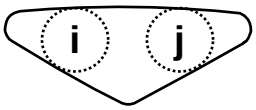

**Key test**

With key 6 the transmitter changes to the top level of the key test. This mode is just needed for service and is therefore not explained any further.

To leave that mode the whole ▽-key (key on the left and on the right) need to be pushed for at least 5s. The transmitter leaves the mode itself if no key is pushed for 10min.

## *Configuration menu-7/12 (keyboard modification)*

In the configuration menu-7/12 the assignment of keys can be changed. This is needed very rarely, because the assignment of keys → relays is normally done at the receiver. In rare cases it might make sense to ensure compatibility, e. g. when using replacement transmitters.

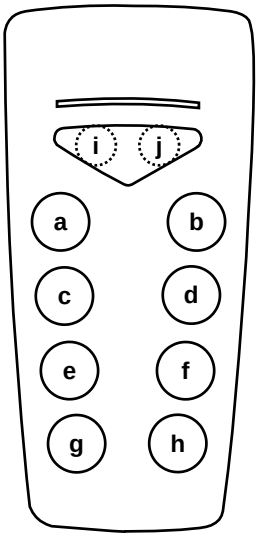



A special key combination that would never occur during normal operation opens the configuration menu-7/12. The▽-key has two contacts, one on the left and one on the right side. To activate the menu the left side needs to be pushed 7 times in 4s and then the right side of the ▽-key needs to be pushed 12 times in 4s. These instructions must be followed strictly, otherwise the menu will not open.

(Advise: Disconnect the receiver from the power supply, so the buzzer and the relays do not disturb)

Before the menu opens, the 3LEDs in the middle turn on for 1s. During this time no key can be pushed, otherwise the menu will not open. After that, the configuration menu-7/12 will open and the green LED will start fast flashing.

With help of this menu, the numbers for each key can be changed. Several keys can thereby get the same number and the key numbers range from 1 to 10. If the double click function over the DIP switch is activated, the chosen key number increases by 12 if using a double click.




**Standard key numeration**

Double click deactivated:

⇨ a = 1, b = 2 … j = 10

Double click activated, single click executed:

⇨ a = 1, b = 2 … j = 10

Double click activated, double click executed:

⇨ a = 13, b = 14 … j = 22

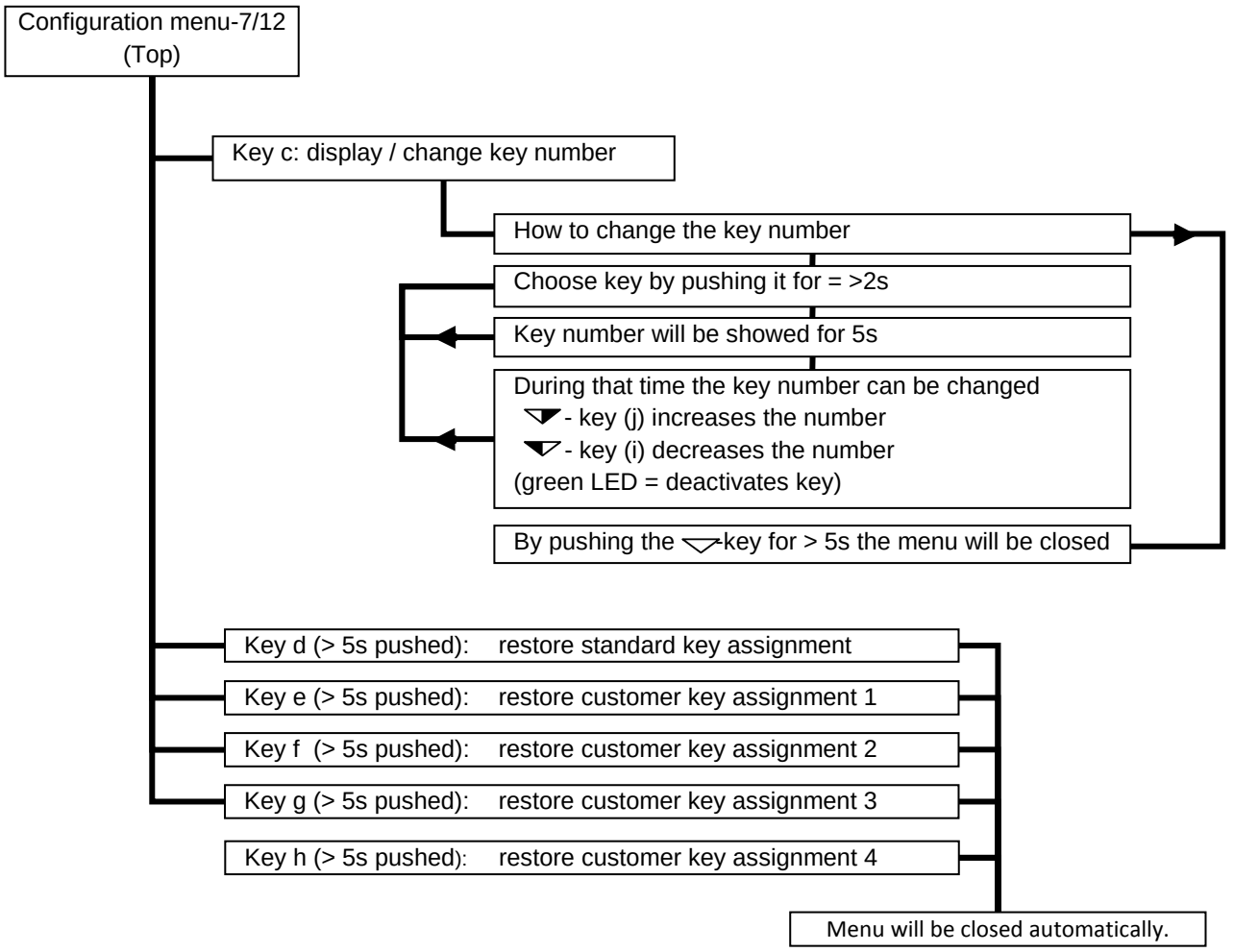
**General**

The change from a low level to a top level is not possible. For opening the top level the menu has to be closed and activated again.

If no key is pushed for 2min, the configuration menu-7/12 is closed automatically.

After closing the menu, the red LED in the middle is turned on until all keys are released. After that, the normal function of the transmitter start again (thereby, no relays will be switched).

The assignment of keys will be saved permanently and also through battery changes.




**Displaying / changing key numbers**

If you press key (c) at the top level, key numbers are displayed and can be changed. The red LED (10) flashes fast.

To choose a key, it must be pressed for >2s. After that, the key number will be displayed for 5s. To increase the number, the right side of the ▽-key must be pushed while those 5s. To decrease the number, the left side of the ▽-key must be pushed while those 5s. The new number will be taken over directly. If the key number is 1 (red LED at the very left is turned on) and the left side of the ▽-key is pushed, the key will be deactivated (will be displayed by green LED). Through increasing of the key number, the key can be activated again.

If during the 5s display a key is pushed for 2s (apart from the ▽-key), the key number will be displayed.

To quit the menu, the 5s-period must be over! After that, the ▽-key must be pushed for 5s. The closing of the menu will be displayed by changing flashing of the three middle LEDs.

**Restoring standard key assignment**

If the key (d) is pushed in the top level, the key assignment will be reset. This process will be acknowledged with changing flashing of the three LEDs in the middle.

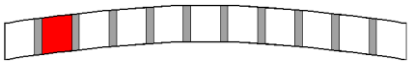
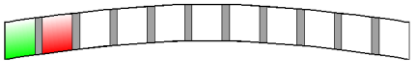
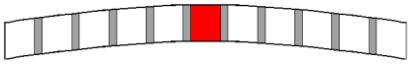
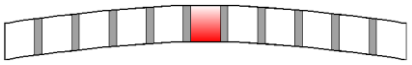
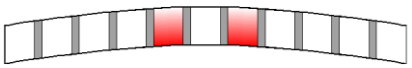
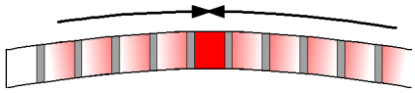
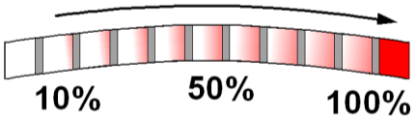
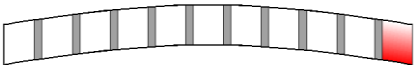
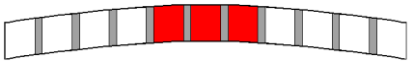
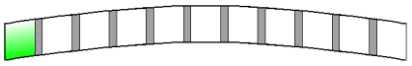
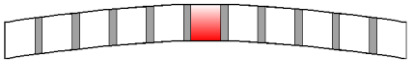
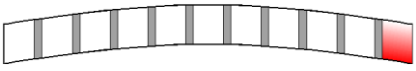
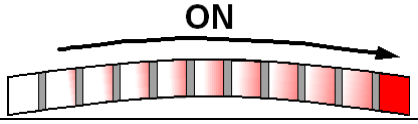
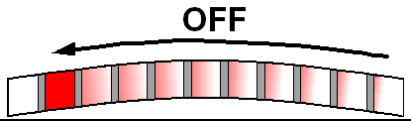
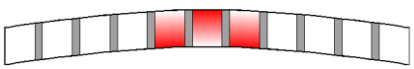
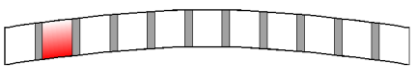
**Restoring customer key assignment**

The manufacturer can save four customer key assignments. If the keys (e), (f), (g) or (h) are pressed for more than 5s, the chosen key assignment will be restored.

| | |
|---|---|
| Key e (> 5s pushed): | restore customer key assignment 1 |
| Key f (> 5s pushed): | restore customer key assignment 2 |
| Key g (> 5s pushed): | restore customer key assignment 3 |
| Key h (> 5s pushed): | restore customer key assignment 4 |

Optionally, a new key assignment can be defined by the manufacturer, according to the customer request.

## Flashing codes transmitter

| | Display | Description | Special |
|---|---|---|---|
| Off |  | Transmitter is turned off | |
| Radio link |  | radio link okay | |
| |  | No radio link | |
| |  | Frequency scan | Radio link build up with receiver or short radio interference |
| DoubleClick |  | DoubleClick is executed with DoubleClick Extension | Together with radio link information and battery capacity < 20% |
| |  | DoublecklickLock-20s, but no key pushed | Flashes about every 2s |
| |  | Malfunctioning double click at locked transmitter | Display is just displayed, when double click lock is activated, LEDs flash shortly |
| Keyboard |  | Error keyboard monitoring | Chaser light starts at from both edges and meets in the middle |
| Battery |  | Battery display | Chaser light starts at the left end and goes up to battery capacity |
| |  | Battery capacity < 20% (Just if transmitter is activated) | Together with radio link information<br>Batteries must be changed |
| Menu flashing codes |  | Control time before opening of the menu | 1s; If a key is pushed during this time, the menu does not open |
| |  | Top level is open | Fast flashing |
| |  | Transmitter settings are open | Fast flashing |
| |  | Key assignment menu is open | Fast flashing |
| |  | Transmitter options are turned on | Chaser light from the left to the right |
| |  | Transmitter options are turned off | Chaser light from the right to the left |
| |  | Menu for key assignment is closed | (Changes are saved) |
| |  | Keyboard test is activated | Press ▽-key for 5s to close (see page 14) |

# 4. Receiver CR2S – Master module

## Summary


## Installation

### *Advices for installation*

The receiver is assembled on a DIN-bar in dry environment. If the receiver is inside a metal switch cabinet, the radio range might be too low. In this case an external antenna can be attached and the internal antenna can be switched off (see page 31).

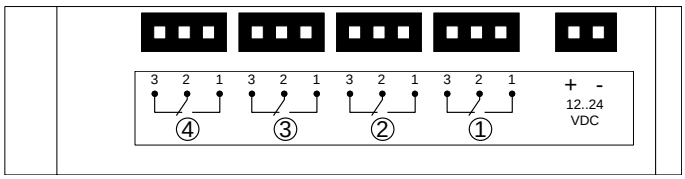
### *Terminal assignment*

Power supply through bipolar terminal clamp

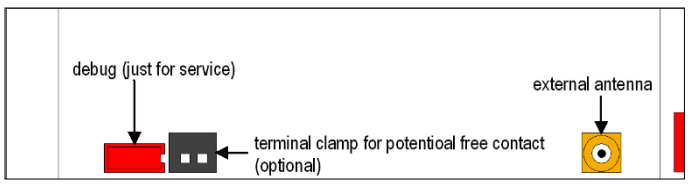
+ : 12 to 24 VDC (min. 9 VDC, max. 30 VDC)
- : 0 V (GND)

The wiring of the relays can be seen at the labelling of the terminal clamps.

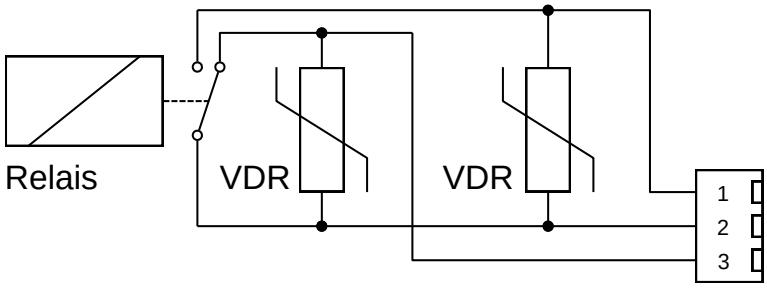
**View from above:**




**View from below:**



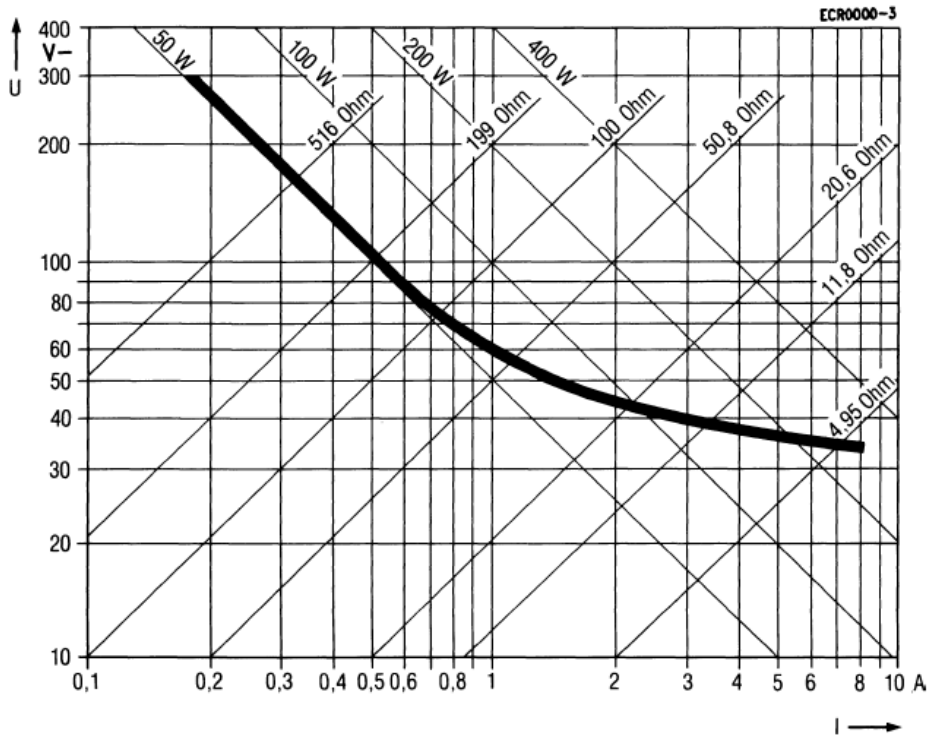
**Relay pin assignment:**




Attention:
Operation with **400 VAC is not permitted**!

**Characteristics for the relays:**

- Switching voltage max. 300 VDC / 250 VAC
- Switching current max. 8A
- Switching power alternating voltage max. 2000 VA
- Switching power direct current voltage max. 50-270 W (voltage depending, see figure below)




*I* = *switching current*
*U* = *switching voltage*

# General functions

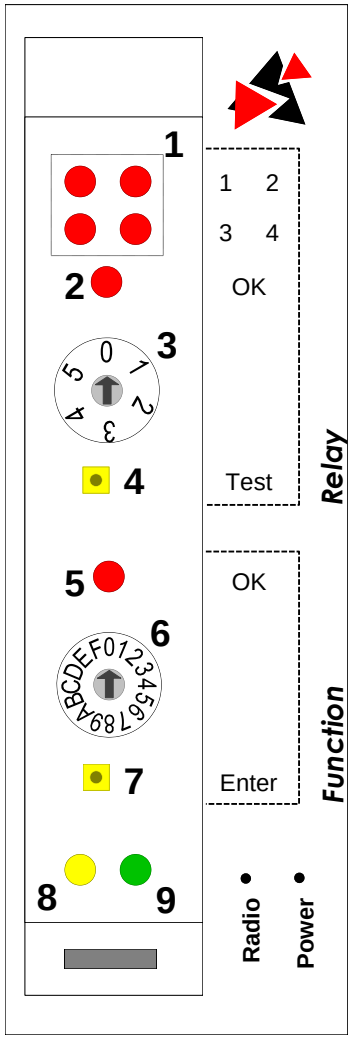
## *Operating instruction*

The receiver has two keys and two rotary switches for programming the relays etc.

To test the relays, position relay rotary switch on the selected relay, then set the function rotary switch on position 0 and press the test key. Depending on the relay function, which has been programmed, it will now be activated, deactivated or remain active until the key is released again. The programmed priority groups will be considered in this context. That means, if a relay from the same priority group is active, it can be that another relay cannot be activated.
If the *function* rotary switch is set on position 1, 2 or 3 and you press the *test key,* only those relays which correspond to the set function (impulse, toggle, or on/off) will be activated.

**Warning: if the *function* rotary switch not set on position 0, the relays will be activated while *test* key is held without consideration of the priority programming, which is inactive in that case!**

From both rotary switches, 0 is the lock position. After programming has been completed, it is this position which should be set, to avoid involuntary change of programming.




1 Status display for the relay
*If the LED is on, that means, that the corresponding relay = on.*

*2* Relay-OK LED (Status test key)
*Lights up if the test key is pressed.*

3 Relay rotary switch
*Select one or all relays (Pos 5)*
*Pos 0 = lock position*

*4* Test key **(Warning: this key will activate all relays!)**
*Activates the relays selected with rotary switch.*
*This function is independent of the position of the function rotary switch.*

*5* Function-OK LED (Status functions)
*Lights up if the Enter key is pressed and gives acknowledgements during programming. Refer to the table of flash codes.*

6 Function rotary switch
*Selects the requested function for programming*
*(Refer to the following page)*
*Pos 0 = lock position*

*7* Enter key
*Serves to program the function selected with the function rotary switch.*

*8* Radio LED (Transmission activity, antenna)
*Regularly flashes if no radio transmission takes place (Pause flashing). Refer to the table of flash codes.*

9 Power LED (Power supply)
Lights up as soon as the receiver is on.

## *Relay rotary switch*

0 Lock position
While in lock position it is not possible to activate a relay with the test key, which means, that the relays can only be activated with a handheld transmitter.
1 Relay 1
2 Relay 2
3 Relay 3
4 Relay 4
5 All relays
can be used for programming and also for testing.

## *Function rotary switch*

For programming instructions refer to page 23.

**Warning: Pressing the test key will activate the relay. In some cases it may be necessary to remove the plug-in terminals beforehand, that is because some tests *don't consider* the priority groups and because the connected devices are getting activated.**

0 Lock position
In the lock position the Enter key is not active. If you press the test key, the selected relay will react according to the set function (impulse, toggle or on/off). Priorities are taken into consideration.

1 Programming the relay for the impulse function
Relays set with the relay rotary switch get programmed for impulse function when you press the Enter key. If you press the test key, the relays set by the rotary switch will be activated if they are programmed for impulse function.

2 Programming the relay for toggle function
Relays set with the relay rotary switch get programmed for toggle function when you press the Enter key. If you press the test key, the relays set by the rotary switch will be activated if they are programmed for toggle function.

3 Programming the relay for the on/off function
Relays set with the relay rotary switch get programmed for on/off function when you press the Enter key. If you press the test key, the relays set by the rotary switch will be activated if they are programmed for on/off function.

4 Relay for the priority group 1 pressed / >10s = delete group 1 / pressed >30s = change settings
Relays set with the relay rotary switch get assigned for the priority group 1 if the Enter key is pressed. If you press the Enter key for 10 seconds, the priority group will be emptied. If you press the Enter key for 30s, the mode can be changed to “1st pressed” and “last pressed”. If you press the test key, the relays set with the rotary switch will be activated if they have been assigned to the priority group 1.

5 Relay for the priority group 2 pressed / >10s = Delete group 2
Relays set with the relay rotary switch get assigned for the priority group 2 if the Enter key is pressed. If you press the Enter key for 10 seconds, the priority group will be emptied. If you press the Enter key for 30s, the mode can be changed to “1st pressed” and “last pressed”. If you press the test key, the relays set with the rotary switch will be activated if they have been assigned to the priority group 2.

6 Registering in the transmitter
When the Enter key is pressed, the login mode is started and you can register a transmitter. Press any key of the handheld transmitter for duration of about 4 seconds[8].

[8] 2.4 kBit/s: 14s

7 Configuring the key assignment for this transmitter
The assignment process can be started after pressing the Enter key. Each key, which is pressed on the handheld transmitter will be assigned to the relay selected by the rotary switch. The assignment process ends 20 seconds after the last pressing of a key.

8 Changing of key assignment
Currently key assignment will be changed. After pressing the Enter key, the assignment will be started. Each key on the transmitter will be connected to a relay at the rotary switch. All keys have to be assigned again, even if just you just want to change one. The assignment process ends 20 seconds after the last pressing of a key.

9 Delete transmitter / press for 10s= delete all transmitter / 30s = factory settings
With a short push of the Enter key a transmitter can be deleted during 20s (see page29).

10 Receiver settings
With the rotary switch you can use between the following options. As soon as the rotary switch points to the wished position the function-OK LED displays the currently mode. To change the mode you need to press the Enter key for 10s. The function will then be activated/ deactivated.

| Relay rotary switch | Display | Description | LED = off; (factory settings) | LED = on |
|---|---|---|---|---|
| 1 | automatically frequency chosen | Page 30 | activated | deactivated |
| 2 | multi receiver | Page 31 | deactivated | activated |
| 3 | internal antenna | Page 31 | activated | deactivated |
| 4 | radio data rate | Page 31 | 19.2kBit/s | 2.4kBit/s |
| 5 | external input | Page 32 | deactivated | activated |

A Impulse extension
With a short push of the Enter key, the programming of the impulse extension will start (see page 26).

B Reset keys
Two independent reset keys can be defined. It can be defined, which relays turn off when each key is pushed. With the relay rotary switch you can choose reset key 1 or 2. The learning process can be started with the Enter key (see page 27).

C Not assigned yet, for coming development

D Not assigned yet, for coming development

E Radio frequency channel
Displays the used channel at the function-OK LED. The amount of flashing between two breaks equals the channel number (1 to 14). With the Enter key you can choose the channel number manually. With each key push the channel number increases by one. By holding the key for 10s, you can start the radio link test mode (see page 32).

# Programming

The programming of the receiver involves the following steps:

- Defining the relay function (impulse, toggle or on/off function)
- Defining a priority group (none, one or two groups)
- Registering the transmitter at the receiver
  (The identification of the transmitter will be saved)
- Defining or modifying the key assignment (assign the transmitter keys to the relays)
- Inhibit the rotary switch (lock position)

## *1. Defining relay function*

The parameterization of the relay function serves to define, how the relay should behave when a key assigned to a registered transmitter is pressed. When it is meant to be active only as long as the key is pressed, only the **impulse** function can be used. If the relay must be activated when the key is pressed, and deactivated when it is pressed again, you must select the **toggle** function. However, if you want the relay to be activated by one specific key and deactivated by another key, you will need to set the **on/off** function.

The relay function is the same for all registered handheld transmitters, without regard to the key allocations that may be programmed later. If the relay function is changed, that change will apply for all registered handheld transmitters.

**If the relay function is changed from impulse or toggle to on/off, all saved transmitters will be deleted. The same applies if you change the programming from on/off to impulse or toggle; in that case the function-OK LED will flash 10 times.**

a) Set the function rotary switch on the requested relay function (1: impulse, 2: toggle, 3: on/off).
b) Set the relay rotary switch on the requested relay (1-4: relays 1 to 4, 5: all relays) and press the Enter key briefly. The function-OK LED will light up for a short moment to confirm.
c) If you want to modify several relay functions, repeat the steps 1a) and 1b) for each additional relay.

## *2. Defining priority groups*

This is an optional function. It is intended to protect the engine from a switch from forward run to backward run or the reverse. Only one relay can be activated in a priority group. Relays, which must not be activated together, must be assigned to the same priority group. A relay can also be allocated to both groups, which means that the two groups can have an intersection.

a) Set the function rotary switch on the requested priority group (4: group 1, 5: group 2,).
b) Set the relay rotary switch on the requested relay and press the Enter key briefly.
   The function-OK LED will light up for a short moment to confirm.
c) Repeat the steps 2a) and 2b) for each additional relay.

### 2.1 Settings for priority groups

This setting defines, which command is executed in case two keys are pushed at the same time or shortly after each other. Thereby either the first pushed or last pushed key has priority.

“1st pressed”: It is checked, if already a relay in the same priority level is activated. If this is the case, the new command will not be executed.

“Last pressed”: An already pressed key with the same priority level will be deactivated. The relay for the new given command will be operated.

a) Set the function rotary switch on the requested priority group (4: Group 1, 5: Group 2) and relay rotary switch on position 0.
b) Press the Enter key 30s to switch. As a confirmation the function-OK LED will flash shortly (1 flash= “1st pressed”, 2 flashes = “last pressed”).

## *3. Registering transmitter with receiver*

To make sure that the handheld transmitter is recognised by the receiver, it has to be registered. The registration process must be carried out for each handheld transmitter that is used for the first time for a given receiver. This process requires that the transmitter and the receiver are close to each other (< 2m) and no further handheld transmitter may be active.

a) Set the function rotary switch on position 6 and briefly press the Enter key. The function-OK LED will turn on.
b) Within the next 20 seconds press any key on the transmitter for about 4 seconds[9] until the transmitter's LED lights up in green. The function-OK LED will flash shortly to confirm the registration.

After completion of step 3, the receiver is in normal functioning mode again. As from now pressing a key on the transmitter will attract the assigned relay on the receiver (it is the key allocation, which has been created or modified last that will be active).

If the relays already work as you want them to, step 3a) and 3b) can be skipped. If not, the instructions in 4.1 must be followed. If all transmitters already have the right key assignment and are registered, the programming can be finished.

## *4. Defining or modifying the allocations*

The key allocations define, which key belongs to which relay. In that way they virtually represent the "wiring" of the transmitter key with respect to the relay. Each relay can be used with any key. A key can be assigned to several relays. It is also possible that one relay is assigned to several keys. This covers all cases that may arise in practice.

Before the first use, you must define a new key allocation as described in section 4.1. There is no allocation at the factory settings. For the same receiver the same key assignment can be used with all transmitters. There is also the possibility of having new key allocations.
If you want to change an existing key allocation, proceed as described in section 4.2.

### 4.1 Defining new key allocations

As soon as a new handheld transmitter has been registered, it will automatically receive the latest programmed key allocation. If several transmitters get registered, one after the other, you only need to define the allocations for the first one. The following transmitters will take over that allocation.
If a transmitter is to receive different key allocations, then just define the new allocations. From now on all registrations will be done using the new key assignment. The allocations defined previously will be saved.

Example of use:

- For a new receiver several transmitter should have the same key allocation.
- For an already existing receiver a new transmitter with a new key allocation shall be registered. Thereby, the key allocation of the already registered transmitters shall not be changed.

#### *4.1.1 Relay with impulse or toggle function*

a) Set the function rotary switch on position 7 and briefly press the Enter key. The function-OK LED will start lighting up.
b) Set the relay rotary switch on the requested relay and press the key on the transmitter, which is to be allocated to that relay. The extinction of the LED for a short moment will confirm you this allocation.
c) Step 4.1.1b) above can be repeated until all allocations have been programmed. If you don't press any key for 20 seconds or change the setting of the function rotary switch, the key allocation process will be terminated and saved. To establish more allocations, the key allocation can be changed by following step 4.2.

[9] 2.4 kBit/s: 14s

#### *4.1.2 Relays with on/off function*

a) Set the function rotary switch on position 7 and briefly press the Enter key. The function-OK LED will start lighting up.
b) Set the relay rotary switch on the requested relay and press the **ON** key on the transmitter which is to be assigned. The extinction of the LED for a short moment will confirm you this allocation.
c) Afterwards, press the **OFF** key. The LED will extinguish twice to confirm this allocation.
d) The steps 4.1.2b) and 4.1.2c) above can be repeated until all allocations have been programmed. If you don't press any key for 20s the setting of the function rotary switch, the key allocation will be saved and the process will be terminated.

### 4.2 Changing existing key allocations

If you want to change an existing key allocation, all keys will have to be reallocated. If a key is not pressed or allocated respectively, it will have no function later.
A change must be done with a transmitter that already has the new key allocation. The new key allocation will then apply for all newly registered transmitters and transmitters that had the same key allocation.

Example of use:
- The key allocation of one already registered transmitter will be changed, so that the key allocation of all already registered transmitters is changed.

#### *4.2.1 Relay with impulse or toggle function*

a) Set the function rotary switch on position 8 and briefly press the Enter key. The function-OK LED begins to light up.
b) Set the rotary switch on the requested relay and press the allocated key on the transmitter. The extinction of the LED for a short moment will confirm the allocation.
c) Step 4.2.1b) can be repeated until all allocations have been programmed. If you don't press any key for 20 seconds or change the setting of the function rotary switch, the key allocation process will be saved and terminated. The change will then affect all previously registered handheld transmitters, which previously used the same key allocation.

#### *4.2.2 Relays with on/off function*

a) Set the function rotary switch on position 8 and briefly press the Enter key. The function-OK LED begins to light up.
b) Set the rotary switch on the requested relay and press the ON key you want to assign to it on the transmitter. The extinction of the LED for a short moment will confirm the allocation.
c) Afterwards, press the OFF key. The LED will extinguish twice for a short moment to confirm the allocation.
d) The steps 4.2.2b) and 4.2.2c) can be repeated until all allocations have been programmed. If you don't press any key for 20 seconds or change the setting of the function rotary switch, the key allocation will be saved and process will be terminates. The change will then affect all previously registered handheld transmitters, which previously used the same key allocation.

## *5. Locking rotary switch, lock position*

For both rotary switches, 0 is used as lock position. After programming is completed, the switch should be set to this position, so as to avoid an involuntary manipulation or change of programming carried out. In the lock position the keys Test and Enter have no effect.

a) Set the relay rotary switch and the function rotary switch on position 0.

# Impulse extension

The impulse extension can hold the switching process for a time span between $^1/_{10}$ s and max. 27 minutes. The impulse extension is just programmable on relays these are set on “impulse function“. It is directly allocated to the relay and therefore to every key that controls this relay.

## *Retrigger*

When using the retrigger you will start the timer interval again with every keystroke, even if one timer interval is not fully over.

With retrigger:
- The timer starts as soon as you **release** the transmitter keys.
- If a key is pressed before the timer time runs out, the timer is started again.

Without retrigger:
- The timer starts as soon as you **push** a transmitter key.
- If the timer time runs out but the key is still pushed, the relay deactivates shortly, but goes back to its previous position immediately.
- The timer time has to run out before the timer can be started again.

## *Programming impulse extension*

a) Set the function rotary switch on position B and briefly press the Enter key. The program for impulse extension starts and the function-OK LED lights up for the process.

The programming steps cannot be interrupted for more than 20s, because then the program will terminate without saving. In this case the whole programming has to be done again.

b) The impulse extension can be programmed for several relays in one step. Those have to be activated like this: Choose relays with the relay rotary switch and push the test key. The relay will be activated. Do the same for all relays you want to program. If a relay is chosen for a second time, it will be deactivated.

c) When the relays are activated, you can choose the time factor with the relay rotary switch. This switch helps to shorten the time of programming. For an exact programming a time factor of 1 is recommended.

| | | |
|---|---|---|
| Relay rotary switch on | position 0 | time factor = 1 |
| | Position 1 | time factor = 10 |
| | Position 2 | time factor = 100 |
| | Position 3 | time factor = 1000 |
| | Other Positions | time factor = 1 |

The time for the impulse extension can be programmed by pushing the Enter key for the respective time. Thereby following formula can be used:

“Impulse time” = “Time of pushed key” x “time factor”

After releasing the Enter key, the short extinction of the function-OK LED will confirm the new programming.

d) Afterwards, the retrigger function can be set.

| | |
|---|---|
| Without retrigger function: | relay rotary switch on position 1 |
| With retrigger function: | relay rotary switch on position 2 |

The retrigger function can be programmed by pushing the Enter key. The function-OK LED will confirm the new programming (1 flashing = retrigger function deactivated; 2 flashings = retrigger activated).

Information about how to delete the impulse extension can be found on page 29.

### *Changing relay functions*

If the relay function is changed (to toggle- or on/off- function), the settings for the impulse extension will be deleted!
If the relay function is changed back to impulse relay, the impulse function has to be programmend again.

## Reset keys

The reset key on the transmitter can be used to turn off chosen relays of the receiver with the push of a single key (off = safe status). Two independent reset keys can be defined.

### *Programming reset keys*

a) Set the function rotary switch on position C and choose the reset key with the relay rotary switch[10].
position 1 reset key 1
position 2 reset key 2

By pushing the Enter key, the allocation is started (all activated relays become deactivated).

b) Choose relays that should deactivate when the reset key is pushed
- Set relay rotary switch on wished relay (position 5 equals all relays)
- Activate relays by using test key (can be deactivated by pushing the key again)

Repeat step b) until all required relays are changed. Confirm your selection with the Enter key afterwards. The function-OK LED will extinguish once. The allocation process will be terminated without saving if no key is pushed for 60s.

c) Assign a reset key to a transmitter key:
Press the key on the transmitter that should be the reset key later. Just one key can be pushed on the transmitter, otherwise the selection will not be accepted. If the ▽-key is chosen as reset key, its two contacts will be connected, so that it works like one key (even if STOP-function is activated). As soon as a transmitter key is chosen, the allocation process will be terminated (all relays deactivate and function-OK LED extinguishes.) The allocation process will be terminated without saving if no key is pushed for 60s.

Advise: If the OneKeyLock function is activated, just the key that was pushed first will be transmitted. The STOP function has to be activated on the receiver, so that the reset key and another key can be pushed at the same time. Thereby, the ▽-key gets the highest priority. If then the reset function is assigned to the ▽-key, a reset can even be carried out, if another key is pushed. See “STOP function ▽-key” on page 12.

Information about how to delete the reset key can be found on page 29.

[10] Operation with Slave module: Master relay rotary switch

## Checking relay parameters (test key)

This key serves for testing the currently programmed function of the relays, including the priority groups and pulse extensions without using the handheld transmitter. This is important in connection with the on/off function, because incautious behaviour may result in the loss of the whole programming (see also subsection *defining the relay functions* in the programming section).

### *Relay functions*

**Warning: The relays get activated. It might be necessary to remove the plug-in terminals beforehand, as the *priority groups are not taken into consideration*.**

Set the function rotary switch on the relay function you want to be tested (1: impulse, 2: Toggle, 3: on/off) and then set the relay rotary switch on the requested relay (1-4: relay 1 to 4, 5: all relays) and press the test key. As long as the key is held, all relays corresponding to the relay function selected with the function rotary switch will be activated. After releasing the key, all relays will be deactivated.

### *Priority groups*

**Warning: The plug-in terminals must be removed beforehand.**
**All relays within a same priority group will be activated.**

Set the function rotary switch on the priority group to be tested (Position 4 or 5) and then set the relay rotary switch on the requested relay (1-4: relay 1 to 4, 5: all relays) and press the test key. As long as the key is held, all relays corresponding to the selected priority group will be activated. If there is no relay in the priority group, then no relay will be activated. After releasing the key, all relays will be deactivated.

# Deleting functions

## *Deleting priority groups*

Set the function rotary switch on the priority group, which you want to delete (position 4 or 5) and press the Enter key for about 10 seconds. After releasing the key, the function-OK LED will flash for confirmation. The priority groups on all slaves are deleted!

## *Deleting impulse extension*

Set the function rotary switch on position B. Use the relay rotary switch to choose the relay, of which you want to delete the impulse extension (position 5 = all relays).
Press the reset key for 10s. The function-OK LED will flash 10 times for confirmation.

## *Deleting reset key*

Set the function rotary switch on position C. Choose the relays you want to delete by using the relay rotary switch[11].

| | |
|---|---|
| Position 1 | reset key 1 |
| Position 2 | reset key 2 |
| Position 5 | reset key 1 and 2 |

If the right key is chosen, you need to press the Enter key for 10s. After releasing the key, the function-OK LED will confirm the deleting by flashing 10 times.

## *Deleting individual transmitter*

Set the function rotary switch on position 9 and press the Enter key briefly. The function-OK LED will start to light up. Then, within a time span of 20 seconds, any key on the transmitter can be pressed for deletion of the transmitter corresponding to that key. The LED will flash 10 times to confirm that the transmitter has been deleted.

## *Deleting all registered transmitters*

Set the function rotary switch on position 9 and press the Enter key for 10 seconds. After releasing the key, the function-OK LED will flash 10 times to confirm that all registered transmitters have been deleted.

## *Restoring factory settings*

This involves deleting all transmitters, all key allocations, impulse extensions, receiver settings, reset keys and both of the priority groups.
The relay functions will be set back on the impulse mode, and the receiver settings will be restored to the factory settings.

Set the function rotary switch on position 9 and press the Enter key for 30 seconds. The function-OK LED starts to light up, together with the relay-OK LED.
After releasing the key, the function-OK LED will flash 10 times simultaneously with the relay-OK LED to confirm, that the factory settings have been successfully restored.

[11] Operation with slave module: Master relay rotary switch

# Receiver settings

## *Automatically frequency selection*

The Cobra narrow band system uses 14 of the 17 available frequency channels of 100 kHz width in the 433 MHz band. The 100 kHz grid allows a fast radio communication with a very short response time thanks to the 19.2kBit/s.

Most wide band transmitters use the band centre of 433.92 MHz. Therefore, this span is not used by the Cobra system.

| | | | | | | | | Not used | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **channel** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| **frequency [MHz]** | 433.1250 | 433.2250 | 433.3250 | 433.4250 | 433.5250 | 433.6250 | 433.7250 | 433.8250 | 433.9250 | 434.0250 | 434.1250 | 434.2250 | 434.3250 | 434.4250 | 434.5250 | 434.6250 | 434.7250 |

If interferences are caused by an external radio system or two Cobras accidently choose the same frequency, the system automatically searches for a new, interference free frequency. Therefore, an interference free radio transmission can be guaranteed under nearly all circumstances.

Most often a frequency change takes places unnoticed during the active state of the transmitter. There is also the possibility of a short interruption of 0.3s[12] while the relays deactivate.

In case of a total radio link loss, the system starts to search for a new frequency after 3s[13]. The transmitter has to stay active through the whole process. If the transmitter still displays no radio link after 5s[14], you should go closer to the receiver and press a transmitter key. If the receiver and the transmitter are both turned on, the system will find a new radio link.

Are several transmitters allocated to one receiver, and the system carries out a frequency change with one transmitter, the other transmitter will not work until the new frequency is found. This happens automatically at the first use, but the transmitter has to be active for more than 3s[13] to start a frequency scan. Once the radio link is established, the transmitter will work as usually.

If two Cobra systems are working on the same frequency, the system will change the frequency within 3s[13] automatically.

### Deactivating automatic frequency search

The automatic frequency search can be turned off. Set the function rotary switch on position A, the relay rotary switch on position 1 and press the Enter key for 10s. The function-OK LED will flash to confirm (1 flashing = „automatic frequency activated“; 2 flashings = „automatic frequency deactivated“).

To check the settings, you can set the function rotary switch on position A and the relay rotary switch on position 1. By lighting up, the function-OK LED will confirm that the Multi-Receiver function is inactive. If the LED is not lighting up, the function is active.

The frequency can also be set on a specific channel by using the manually frequency change. Even with high interferences the system will not change the frequency.

[12] 2.4 kBit/s: 0.5s
[13] 2.4 kBit/s: 10s
[14] 2.4 kBit/s: 20s

## *Multi-Receiver*

Normally one transmitter is assigned to one receiver. If you want to assign a transmitter to more than one receiver, the „multi-receiver mode“ has to be activated. After that, only the receiver with turned on relays will respond. It is recommended to deactivate the automatic frequency search when working with this mode and change all receivers to the same frequencies manually (especially with a frequency data rate of 2.4 kBit/s).Thereby, the transmitter does not have to search a new frequency, when changing between receivers.

For a reliable radio link, you have to ensure that each key has a function on only one receiver.

Set the function rotary switch on position A, the relay rotary switch on position 2 and press the Enter key for 10s. The function-OK LED will flash to confirm (1 flashing = „deactivated“; 2 flashings = „activated“).

To check the settings, you can set the function rotary switch on position A and the relay rotary switch on position 2. By lighting up, the function-OK LED will confirm that the multi-receiver function is active. If the LED is not lighting up, the function is inactive.

## *Disconnection of the internal antenna*

This function gives you the possibility to disconnect the internal antenna if an external antenna is used. This is only necessary in exceptional cases as for example if there are strong interferences at the location of the receiver, or if the receiver is integrated in a highly shielded switch cabinet.

Set the function rotary switch on position A, the relay rotary switch on position 3 and press the Enter key for 10s. The function-OK LED will flash to confirm (1 flashing = „activated“; 2 flashings = „deactivated“).

The radio-LED will indicate, whether the internal antenna is activated or deactivated.
A single flashing for inactive state indicates that the internal antenna is activated. If the LED flashes up twice it means, that the internal antenna is deactivated.
You can also check the setting by when you set the function rotary switch on position A and the relay rotary switch on position 3. By lighting up, the function-OK LED will confirm that the internal antenna is inactive. If the LED is not lighting up, it is active.

If the internal antenna has been deactivated and no external antenna is connected, then the radio range is heavily reduced. This may be intentional if you deliberately want to limit the radio range.

## *Radio data rate*

The radio data rate is set on 19.2 kBit/s according to the standard. Thereby, the receiver will execute commands instantaneously. If the radio range is insufficiently, the radio data rate can be changed to 2.4kBit/s taking in account that the system’s response time will be longer. A frequency search for example will also take more time. For that reason we recommend to turn off the automatic frequency search if several transmitters are assigned to one receiver.
To change the radio data rate, set the function rotary switch on position A, the relay rotary switch on position 4 and press the Enter key for 10s. The function-OK LED will flash to confirm (1 flashing = 19.2 kBit/s; 2 flashings = 2.4 kBit/s).

All chosen transmitters and receivers must have the same configuration. Therefore, the radio data rate has to be changed at the transceiver as well (see page 11).

The setting of the radio data rate will be displayed, if you set the function rotary switch on position A and the relay rotary switch on position 4. The function-OK LED will display the radio data rate (turned on = 2.4 kBit/s; turned off = 19.2 kBit/s).

### *External input*

The receiver has an external input, where a potential-free contacts can be connected. The contact status can be checked with the transmitter. If the contact is closed, the LED on the transmitter will start to light up (see page 11).

To activate or deactivate the external input, set the function rotary switch on position A, the relay rotary switch on position 5, and press the Enter key for 10s. The function-OK LED will flash to confirm (1 flashing = „deactivated“; 2 flashings = „activated“).

To check the settings, you can set the function rotary switch on position A and the relay rotary switch on position 5. By lighting up, the function-OK LED will confirm that the external input is active and stay. If the LED is not lighting up, the external input is inactive.

## Changing channel manually / radio link test mode

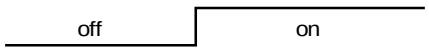
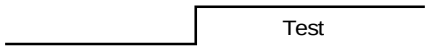
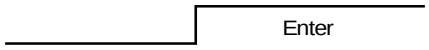
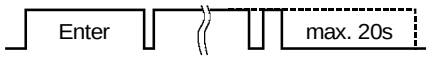
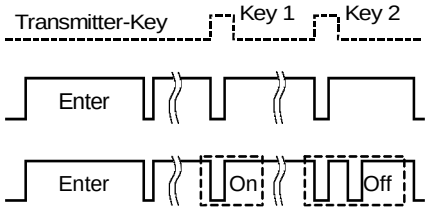
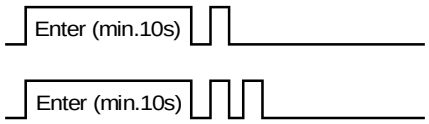
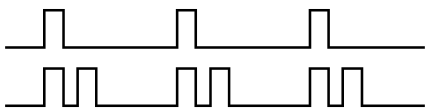
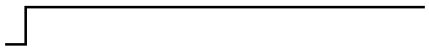
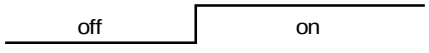
This function can display the currently used frequency channel and change this manually. Therefore, you need to set the function rotary switch on position F. The function-OK LED will start flashing. The amount of flashing between two breaks equals the channel number (1 to 14).

Each push of the Enter key increases the channel number by 1. The „changing of the channel number manually“ was mostly designed for tests and demonstrations. Even if this function is turned on, the automatically frequency search will be still active.

You can turn off the automatically search for channels additionally (see page 30).

If the Enter key is pressed for 10s, the radio link test mode is started, with which the radio communication can be tested. There are 3 different modes. Mode 1 and 2 (relay switch on 0 or 1) are needed as compatibility modes for older models. With the CS4S mode 3 should be used (relay rotary switch on position 2). More information about the radio link test mode, see page 13.

## Flashing codes receiver

| LED | LED status | Description | Particularities |
|---|---|---|---|
| *Relay-1 to 4* |  | Display of the relay status | |
| *Relay-OK* |  | The test key is pressed | |
| |  | Parameters of the factory settings | Together with the LED for function-OK |
| *Function-OK* |  | The Enter key is pressed | |
| |  <br>  | Definition of the relay function or priority group<br>Change from impulse/toggle to on/off and reverse | Short flashing<br>All transmitters will be deleted in this case |
| |  | Register a transmitter | Mode ends after each transmitter |
| |  | Store a key allocation<br>impulse / toggle function<br>on/off function | Mode ends 20 seconds after the last pressing of a key. |
| |  | Disconnection of the antenna<br>Internal antenna is active<br>Internal antenna is inactive | The current status is displayed by the radio LED. |
| |  | Deleting all transmitters or priority groups | |
| |  | Deleting a transmitter | This mode ends after 20 seconds |
| |  | Factory settings | Together with the LED for relay-OK |
| |  <br>flashes 30 times<br>(approx. 3 seconds)<br><br>flashes 100 times<br>(approx. 10 seconds) | Error<br>- Deleting not carried out.<br>- Switch of antenna has not been carried out<br>- Key number > 31<br>- EEPROM is full | |
| *Radio* |  | No transmitter is active<br>Internal antenna is active<br>Internal antenna is inactive | Pause flashing for inactive state |
| |  | Registered transmitter is active | Data transmission |
| |  | Unregistered transmitter is active | |
| *Power* |  | Power supply display | Power supply available |

# 5. Receiver - Slave module (optional)

## Characteristics

The Cobra radio system can be extended with up to seven slave modules, so that it has max. 32 relays. The basic version has 4 relays with the master module. With additional slave modules, the system can be extended in a row of four relays, up to 32.

## Operation

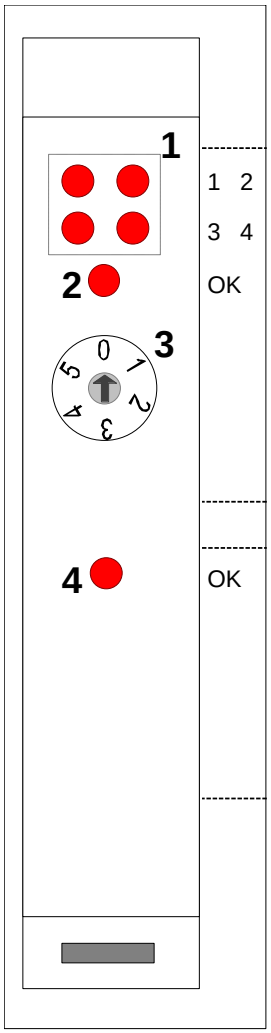
The slave module has a relay rotary switch, where the programming relays can be chosen. The programming takes place through the master module.

*1* Status display for the relay
*If the LED is on, that means, that the corresponding relay = on.*

*2* Relay-OK LED (Status test key)
*Lights up if the test key (master module) is pressed.*

*3* Relay rotary switch
*Pos 0 = lock position*
*Pos 1 to 4= select a single relay*
*Pos 5 = select all relays*

*4* Function-OK LED (Status functions)
*Lights up if the Enter key (master module) is pressed and gives acknowledgements during programming. Refer to the table of flash codes*



# Programming

The programming of the Cobra system is done by a master module. In the following, just differences to the standard programming will be explained.

### *1. Defining relay function*

The relay function can be defined on all modules at the same time. If a relay function changed from a module, its function-OK LED will flash shortly.

### *2. Defining priority groups*

For relays with the same priority group, just one relay can be activated. The priority function **does not extend** to other modules, just to the 4 relays within a module. The same priority group can be defined for more than one module. The deleting of priority groups take in **all modules**. That means, if a priority group is deleted on the master module, it will be deleted on all slave modules (see page 29). If a relay is added to a priority group, the function-OK LED for the respective mode will flash shortly.

### *3. Registering transmitter at the receiver*

The transmitter will be registered at each module at the same time. Therefore, the function-OK LED has to light up on all modules after pressing the Enter key. If the transmitter is recognized, the function-OK LED will start flashing.

### *4. Creating or changing keyboard assignment*

Keyboard assignments will be saved separately in each master and slave module. After pressing the Enter key, the function-OK LED will start to light up on all modules. The connection will be established separately for each module. Choose the connecting relay for the first module- set the relay rotary switch from all other modules on position 0- and press the transmission key you would like to choose. A successful connection will be confirmed by the short extinguishing of the function-OK LED of the relevant module. After that, set the relay rotary switch of the first module on position and start the connection for the next module. Thereby, you do not have to follow a special order.

Advise:
When a transmitter is registered, the latest keyboard assignment will automatically be chosen. The keyboard assignments cannot be deleted. If you want to register transmitters that do not have connections to all four relays of the module, follow the steps below.
Register all transmitters before you create a keyboard assignment. When all transmitters are registered, you need to create a keyboard assignment for each transmitter (see „Keyboard assignment“ on page 24).

### *5. Lock relay rotary switch*

Set the relay rotary switch on position 0.

### *Impulse extension*

The impulse extension function can be programmed as described on page 26. Thereby, the impulse extension can be programmed for all chosen relays on master and slave. Also additional relays for the slave module can be chosen in b).

### *Reset key*

The reset key can be programmed as described on page 27. Thereby, the reset key can be programmed for all chosen relays on master and slave. Also additional relays for the slave module can be chosen in b).

### *Deleting functions*

See page 29.

# 6. Examples for programming

In this chapter it will be tried to explain the programming by displaying some simple examples. The examples will be explained step by step. To have the same settings as used in the following, please restore your transmitter to factory settings. If the system is using a radio data rate of 2.4 kBit/s, the radio data rate has to be changed back to 2.4 kBit/s after this programming (see page 31).

## *Simple relays selection*

### *Task*

A system should be programmed that activates one relay for one push of a key from the handheld transmitter. The relay should stay activated as long as the key is hold.

### *Definition*

The assignment of the relays / keys is described in the following:

Relays 1 / Key 1
Relays 2 / Key 2
Relays 3 / Key 3
Relays 4 / Key 4

How the keys are indicated can be freely selected by the user.
(The 1:1 assignment of the keys and relays simplifies the example.)

### *Procedure*

- Restore factory settings
- Register the handheld transmitter at the receiver
- Define the key allocations
- Set the rotary switches on the lock position

### *Programming steps for the transmitter*

No external functions are needed (all DSW off).
Extended functions of the transmitter are listed on page 8.

### *Programming steps for the receiver*

Restore factory settings of receiver:
- Set the function rotary switch on position 9
- Press Enter key for at least 30s
- After releasing, the function-OK LED and the relay-OK LED flashes 10 times for confirmation

Registering handheld transmitter:
- Set the function rotary switch on position 6
- Press Enter key (LED lights up)
- Press any key of transmitter for 4s[15] until the LED of the transmitter displays green light (function-OK LED flashes once)
  (If within 20 seconds no key is being pressed, the registering process ends)

Keyboard assignment:
- Set the function rotary switch on position 7 (create a new keyboard assignment)
- Press Enter key (LED lights up)
- Set the relay rotary switch on position 1 (relay 1)
- Press key 1 on transmitter (LED goes off to confirm)
- Set the relay rotary type on position 2 (relay 2)
- Press key 2 on transmitter (LED goes off to confirm)
- Again for key 3 / relay 3 and key 4 / relay 4
  (If within 20 second no key is being pressed, the mode ends)

Finally turn the rotary switches to lock position:
- Set function and relay rotary switches on position 0 (lock position)

[15] 2.4kBit/s: 14 seconds

## *Engine control with priority groups*

### *Task*

A motor has to be turned on for a transport band. The motor with two rotational directions should be turned on as long as a key is hold. Therefore, the relays are put on impulse operation.
It must be ensured, that it is not possible to operate forward and backward motion at the same time. For this reason, both relays will be assigned to the same priority group.

### *Definition*

The assignment of the keys / relays:

| | | |
|---|---|---|
| Forwards motion: | key 1 / relays 1 | priority group 1 |
| Backwards motion: | key 2 / relays 2 | priority group 1 |

### *Procedure*

- Restore factory settings
- Set priority groups (if not already programmed so)
- Register the handheld transmitter at the receiver
- Define the key allocations
- Set the rotary switches on the locking position

### *Programming steps for the transmitter*

No external functions are needed (all DSW off).
Extended functions of the transmitter are listed on page 8 (e. g. lock keys).

### *Programming steps for the receiver*

Restore factory settings of receiver:
- Set the function rotary switch on position 9
- Press Enter key for at least 30 s
- After releasing, the function-OK LED and the relay-OK LED flash 10 times for confirmation

Defining a priority group
- Set the function rotary switch on position 4 (priority group 1)
- Set the relay rotary switch on position 1 (relay 1)
- Press enter key (LED flashes once)
- Set the relay rotary switch on position 2 (relays 2)
- Press enter key (LED flashes once)

Registering handheld transmitter:
- Set the function rotary switch on position 6
- Press Enter key (LED lights up)
- Press any key of transmitter for 4s[16] , until the LED of the transmitter displays green light (function-OK LED flashes once)
  (If within 20 seconds no key is being pressed, the registering process ends)

Keyboard assignment:
- Function rotary switch on position 7 (create a new keyboard assignment)
- Press Enter key (LED lights up)
- Set the relay rotary switch on position 1 (relay 1)
- Press key 1 on transmitter (LED goes off to confirm)
- Set the relay rotary switch on position 2 (relay 2)
- Press key 2 on transmitter (LED goes off to confirm)
  (If within 20 second no key is being pressed, the mode ends)

Finally turn the rotary switches to lock position:
- Set function and relay rotary switches on position 0 (lock position)

[16] 2.4kBit/s: 14 seconds

## *Relay with on/off function*

### *Example for pump command*

The pump is to be activated with one key and deactivated with another key. On the handheld transmitter you should label one key with ***Pump On*** and the other key with ***Pump Off.***

### *Definition*

The keys are allocated to the relays as follows:

On: key 1 / relay 1
Off: key 2 / relay 1

### *Procedure*

- Restore factory settings
- Set relay 1 on on/off function
- Register the handheld transmitter at the receiver
- Define the key allocations
- Set the rotary switches on the locking position

### *Programming steps for the transmitter*

No extended functions are required (all DSW set on OFF).
Extended functions of the transmitter are listed on page 8.

### *Programming steps for the receiver*

Restore factory settings of receiver:
- Set the function rotary switch on position 9
- Press Enter key for at least 30 s
- After releasing, the function-OK LED and the relay-OK LED flash 10 times for confirmation

Define the relay function:
- Set the function rotary switch on position 3 (on/off)
- Set the relay rotary switch on position 1 (relay 1)
- Press the Enter key (LED flashes once)

Registering handheld transmitter:
- Set the function rotary switch on position 6
- Press Enter key (LED lights up)
- Press any key of transmitter for 4s[17], until the LED of the transmitter displays green light (function-OK LED flashes once)
  (If within 20 seconds no key is being pressed, the registering process ends.)

Keyboard assignment:
- Function rotary switch on position 7 (create a new keyboard assignment)
- Press Enter key (LED lights up)
- Set relay rotary switch on position 1 (relay 1)
- Press key 1 on transmitter (LED goes off to confirm)
- Press key 2 on transmitter (LED goes off to confirm)
  (If within 20 second no key is being pressed, the mode ends.)

Finally turn the rotary switches to lock position:
- Set function and relay rotary switches on position 0 (lock position)

[17] 2.4kBit/s: 14 seconds

## *Registering a new handheld transmitter*

### *Task*

A further handheld transmitter is to be integrated in an existing Cobra radio system, which has already been programmed. The new handheld transmitter should use the same keyboard assignment as the transmitter, which has been saved the last time i.e. behave exactly the same way as the handheld transmitter, which has already been saved.

### *Procedure*

- Register the handheld transmitter at the receiver
- Check if the relays switch as usual
- If it is not the case, new key allocations have to be defined
- Set the rotary switches to the locking position

### *Programming steps for the transmitter*

If the new handheld transmitter behaves identical to already registered handheld transmitters, other expanded and activated sending functions (DIP switch settings, handheld transmitter options and key settings) might have to be set up.

### *Programming steps for the receiver*

Now you should register the handheld transmitter at the receiver.

Registering handheld transmitter:
- Set the function rotary on position 6
- Press Enter key (LED lights up)
- Press any key of transmitter for 4s[18], until the LED of the transmitter displays green light (function-OK LED flashes once)
  (If within 20 seconds no key is being pressed, the registering process ends)

Now check if the relays are switching as usual. If everything works as expected, the section "keyboard assignment" below can be omitted.

Keyboard assignment:
- Set the function rotary switch on position 7 (create a new keyboard assignment)
- Define the key allocations as described on page 24

Finally set the rotary switches to the locking position:
- Set function and relay rotary switch on position 0 (lock position)

[18] 2.4kBit/s: 14 seconds

# 7. Security

The security related behaviour of the Cobra radio control system corresponds with the performance level B/C of EN13849 and is therefore suited for all applications, where a defect or erroneous behaviour of the radio control system does not lead to dangerous or life-threatening situations or high material damage.

The security at the level of radio technology and redundancy is very high. However, the used standard relays and key elements are not redundant and therefore not set out for safety critical applications. Through considering the precautions below, you can increase the safety of blackouts from the elements. This suffices for most applications.

With the handheld transmitter CS4S, a resistive keyboard monitoring key supervision can be activated. This raises the safety additionally (more information on page 12).

We define the security standard of this product as follows:

1 During the design and development procedures for error recognition and error remedy have been applied. This guarantees that a command sent by the transmitter will either be executed correctly and without falsification or not at all. The receiver cannot activate a switch function on the basis of accidental signals or interferences nor on the basis of foreign radio transmitters.

2 The applied security measures are such as to provide for usage with all applications, which are such that they neither involve direct or indirect risks for human life nor risks of provoking situations, which could in case of malfunctioning endanger human life. Furthermore, the Cobra system is not suited for applications, where malfunctioning could lead to very high material damages.

3 Quality controls have been carried out both at the stage of development and at the stage of production.

4 Radio control systems in general are based on the principle that a radio channel must be available to enable the control commands to reach the receiver. While the system itself is searching for a free channel, the success of this process cannot be guaranteed under all conditions. Owing to this consideration, the application must switch to a safe condition in cases, where the radio link breaks off or cannot be established.

5 The Cobra system itself does not recognize faulty components in the transmitter or receiver. This consideration implies that the consequences of the error conditions described below must be treated within the framework of a risk analysis process.

**Error conditions and possible protective measures**

| Error condition | Protective measure |
|---|---|
| A relay sticks in the On or Off position | Using an additional, second relay in series.<br>Connection set on impulse function will provoke a further interruption of the control circuit if a key is released. |
| A failure on one or several transmitter keys activates an unwanted control command | Use DoubleclickLock or DoubleclickExtension, so that a command can only be executed with a double click.<br>Two key or two relays respectively should be switched in series i.e. both relays must switch correctly for the radio controlled installation to react.<br>Activate resistive keyboard monitoring key supervision. This reduces the risk of a faulty activation extremely. |
| A control command is not executed as a result of a faulty key | The radio controlled installation must stay in a safe mode as long as no control command is active. Use the impulse function only. |
| The radio link is suddenly lost during operation | Only use the impulse function given that the relays will be automatically deactivated if the radio link is lost.<br>The radio controlled installation must mute to a safe state if the relays are deactivated. |

# 8. Trouble shooting

| Problem | Error type, Error search | Procedure / Cause |
|---|---|---|
| The handheld transmitter doesn't work | The LED of the handheld transmitter doesn't display when pressing a key. | Check batteries |
| | The LEDs of the handheld transmitter lights up red (and doesn't immediately go to LED 0 green). | The receiver doesn't answer. Hold key for at least 4s so the handheld transmitter can switch to the channel of the receiver |
| | The LEDs 0 and 1 flash green and red together.<br>The handheld transmitter scant all frequencies and searches the receiver in the meantime. | -No radio link with the receiver or transmitter is not registered yet.<br>-Check the internal antenna (page 31)<br>-Approach the transmitter and the receiver are on the same Radio data rate (page 11 / 31)<br>-go with the receiver closer to the transmitter, register the transmitter |
| | The Radio-LED displays an unknown transmitter. | Register the handheld transmitter |
| The handheld transmitter displays a keyboard error | Error only occasionally e. g. to low pressure on key. | For verification return to manufacturer.<br>For more details go to *resistive keyboard monitoring.*<br>(page 12) |
| The new handheld transmitter has an incorrect keyboard assignment | No error.<br>No new keyboard assignment created.<br>Previous created keyboard assignment is being allocated | Define new keyboard assignment (page 24) |
| Existing handheld transmitters has an incorrect keyboard assignment | Has the keyboard assignment been changed? | Change keyboard assignment (page 25) |
| handheld transmitter cannot be deleted | Error flashing when deleting an individual transmitter? | It could be that the transmitter has not been registered so it cannot be deleted. |
| New handheld transmitter cannot be registered | Does the LED of the handheld transmitter fail to switch to green after you have pressed a key? | A second transmitter is active during registration or the distance to the receiver is too long. |
| | Is there an error flashing for 10 s? | Storage capacity has been reached |
| Receiver does not work | Power on LED extinguished? | Check power supply on receiver |
| An individual relay doesn't react | Is the relay in order? | Check relays function (page 28) |
| | Is there an activated relay belonging to the same priority group? | Check the priority groups (page 28) |
| | Unallocated key? | Change the key allocation (page 25) |
| No relay is reacting | LED for Power on extinguished? | Check power supply |
| | Does the Radio LED display an unknown transmitter? | Register the handheld transmitter |
| | Are there key allocations? | Define key allocations (page 24) |
| Reaction from a wrong relay | Use with new handheld transmitter? | Define new key allocations (page 24) |
| | Error occurs with all existing handheld transmitters? | Change key allocation (page 25) |

# 9. Applications / appropriate use

Automation in industrial and commercial enterprises

Apportioning systems

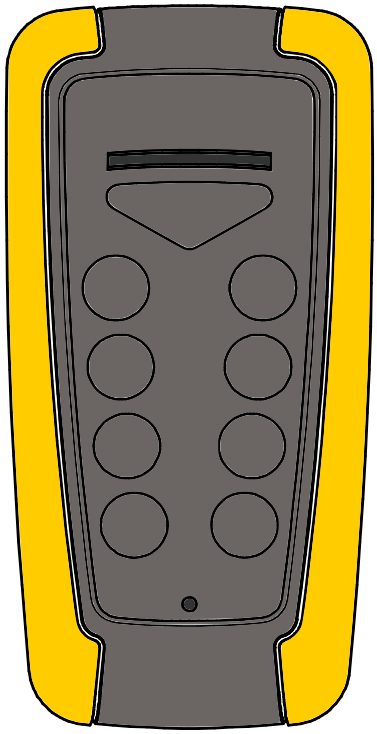
Robotics

Elevators

Pumps, lightning etc.

This product **CANNOT be used for security relevant application**, where a defect or malfunction of the product can endanger humans or material damage.

# 10. Labelling handheld transmitter and receiver

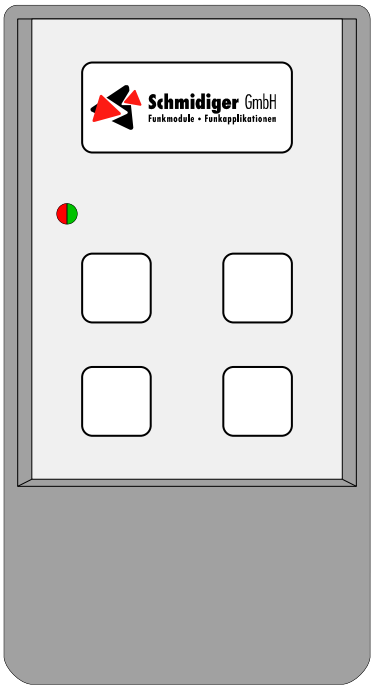


**Handheld transmitter type CS4S**

The classification is to be found on the side of the battery box together with the software version.

| Cobra-CS4S-C | Cobra-XXXX-C |
|---|---|
| S: 01/03/13 | S: nn/nn/nn |
| CobraTX4_SW01b.hex | CobraTX4_SWnnn.hex |

XXXX = Type of handheld transmitter
nn/nn/nn = Software Version



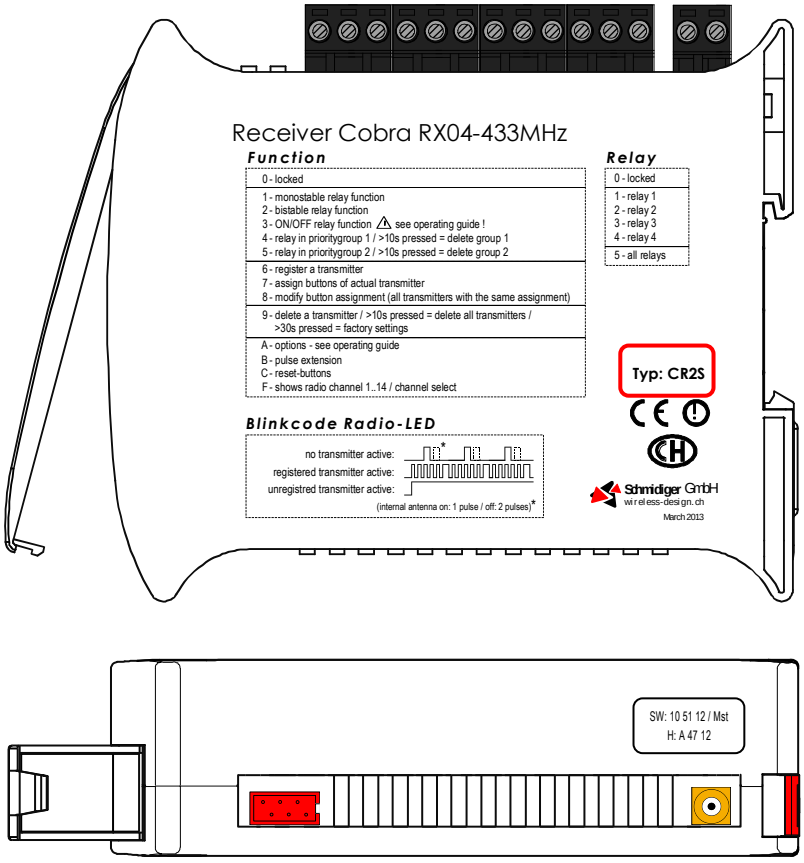

**Handheld transmitter type CS2S**

(Type not labelled)

Software version is labeled in the battery compartment.

| S: nn nn nn / yy.y | S: 05 16 08 / 19.2 |
|---|---|

yy.y = Radio data rate (19.2 / 2.4)
nn nn nn = Software Version




**Receiver type CR2S**

The classification is to be found on the side above the CE-sign.

**Receiver type CR1S**

If there is no classification above the CE-sign it is a receiver type CR1S

**Software version (CR1S and CR2S)**

The software version is labelled on the bottom of the box from the receiver.

(The receiver with the slave module is additionally labelled with software version of the slave module)

| | |
|---|---|
| **SW: 10 51 12 / Mst**<br>**H: A 47 12** | **SW: nn nn nn / aaa**<br>**H: b bb bb** |

nn nn nn = software version

aaa = master module (mst) / slave module (slv)

b bb bb = hardware code

# 11. Technical specifications

### *Receiver (master module)*

| | | | | |
|---|---|---|---|---|
| Frequency range | 433.075 MHz to 434.775 MHz / 14 frequency channels in the 100 kHz grid | | | |
| Transmitting power | +10 dBm | | | |
| Antenna | Internal antenna, which can be switched off / MCX connector for external antenna | | | |
| Programming | 2 keys / 2 rotary switches, adjustable with screwdriver | | | |
| Coding of data | Manchester coding, error detection with CRC16 | | | |
| Power supply | 12 to 24 VDC / min. 9 VDC, max. 30 VDC | | | |
| Power consumption | 125mA, all relays On (power supply = 12 VDC)<br>45mA, all relays Off | | | |
| Relays | Max. switching voltage 250 VAC / 8A | | | |
| Case | Synthetic material (PC / ABS), colour light grey, for rail mounting DIN EN 50022 | | | |
| Temperature range | -20 to +55 °C | | | |
| Dimensions | 120 x 101 x 35 mm | | | |
| Storage capacity | up to 60 handheld transmitters can be registered | | | |
| Delay after key pressure on transmitter | | 19.2 kBit/s | 2.4 kBit/s | |
| | On: | 50ms | 120ms | Incl. key debounce and relays switching time |
| | Off: | 50ms | 120ms | (typical) |
| | | 75ms | 250ms | (maximum) |
| | Timeout: | 350ms | 1.8s | (impulse function) |

### *Receiver (slave module)*

| | |
|---|---|
| Programming | 1 rotary switch, adjustable with screwdriver |
| Additional power consumption per slave | 100mA all relays On (power supply = 12VDC)<br>6mA all relays Off |
| Relays | Max. switching voltage 250 VAC / 8A |
| Case | Synthetic material (PC / ABS), colour light grey,<br>for rail mounting DIN EN 50022 |
| Temperature range | -20 to +55 °C |
| Dimensions | 120 x 101 x [35 mm (master) + 25 mm (per slave)] |
| Number of slave modules | up to 7 slave modules are possible |

### *Handheld transmitter CS4S*

| | |
|---|---|
| Frequency range | 433.075 MHz to 434.775 MHz / 14 frequency channels in the 100 kHz grid |
| Transmitting power | +8 dBm |
| Antenna | Internal |
| Number of keys | 9 rubber keys<br>up to 20 switching channels with double occupation |
| Coding of data | Manchester coding, error detection with CRC16 |
| Addressing mode | Unique 24-bit codes, permanently programmed by the factory |
| Extended transmitting functions | Double-click function (20K), key lock, double-click lock, automatic frequency |
| Power supply | 2 batteries with 1.5 V alkali manganese (AAA/LR03) |
| Power consumption in transmitting operation | 19.2 kBit/s: 15mA (Peak 36mA)<br>2.4 kBit/s: 23mA (Peak 36mA) |
| Life span of battery | 19.2 kBit/s: > 60h<br>2.4 kBit/s: > 40h<br>In permanent operation:<br>battery alkali manganese 1200 mAh |
| Case | Synthetic material ABS / TPS |
| Temperature range | -20 to +55 °C |
| Dimensions | 128 x 64 x 35 mm |

## 12. CE conformity

This system correlates the terms and regulations of the European standards R&TTE and is CE conform. For the declaration of conformity see www.wireless-design.ch/pdf/ce/ce-cobra.pdf