

User manual

System Cobra

2K/4K Narrow-band radio control system



Versionlist

Date	Version	Description
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1. Summary

The bi-directional Cobra radio control system is made up of a handheld transmitter and an intelligent receiver communicating together in both directions. 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 tactile pushbutton of high quality which is covered by a plastic sheeting offering protection against water and dust and which can be labelled. Two batteries of the type 1.5V-AA assure continuous functioning for over 150 hours thus allowing for economical operation

2. Characteristics of the Cobra system

General characteristics

- Most recent bi-directional radio transmission technology
- Shortest possible reaction period with no noticeable delay
- High range 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

- Short-stroke switch with identifiable action point
- Compact and solid body (IP65)
- Frontal plastic sheet which can be individually labelled
- Connection control and battery control via LED
- Long battery lifespan which exceeds 150 hours of continuous functioning
- Power supply via two 1.5 Volt batteries (AA / LR6)
- Integrated antenna
- Extended emitting functions can be selected using a DIP switch

Receiver

- It is very flexible and provides for simple on-site programming
- Programming can be carried out from the outside using a screwdriver without need for opening the body
- Place-saving DIN-railbox with a built-in width of only 35 mm on a DIN rail
- Plug-in terminals for ease of installation and simple servicing
- Closed body with aesthetic shape
- Integrated antenna, connection for an external antenna
- Function display via several LED's

3. Functional description

3.1 Handheld transmitter

General functions

Display

A red and a green LED are used as display for the handheld transmitter.

Each pressing of a key will be indicated by a LED. The colour of the LED indicates whether or not the transmitter has a correct link with the receiver; if the green LED is on the link is correct. If there is no current link the red LED on.

If both LED's go up alternatively (in the order red-green-red-green...) that means that the radio link is interrupted during the red phase.

If both LED's flash simultaneously (red / green on or off at the same time) that means that the system is searching for a new frequency (also see the section on automatic frequency selection).

If the battery is getting weak, the currently activated LED will start flashing regularly about twice per second.

Power supply / battery

The handheld transmitter measures the current battery voltage. If the voltage falls below 2.5 V, the LED will flash regularly about twice per second when you press a key. This is an alert that the battery should be replaced soon. At that point, the remaining battery power is less than about 20%.

If the battery power falls further and reaches a level below 2.3 V, the undervoltage control will suddenly switch off the transmitter. This implies that if battery weakness is indicated by regular flashing, the transmitter is still working but the battery should be replaced soon.

Use of rechargeable batteries

The transmitter can also be operated with NiCd or NiMH rechargeable batteries; with an appropriate battery charger these can be recharged more than a hundred times. These rechargeable batteries have a nominal voltage of 1.2 – 1.3 V which remains stable over a longer period of time as compared to alkaline batteries.

In comparison to standard batteries, rechargeable batteries have a much higher self-discharge. Therefore the use of rechargeable batteries is not advisable except for cases of very frequent use i.e. if a change of battery or reload is required once a month. In practice, owing to the low energy consumption, such cases are very rare.

In case where the two 1.5 V batteries (type R6/AA) are inserted incorrectly, a reverse battery protection prevents damage to the transmitter. However, if that happens the batteries will be discharged very quickly.

Extended transmitter functions: DIP-switch (DSW)

A DIP switch is located inside the handheld transmitter. It can be used to activate additional functions.



These additional functions complete the handheld transmitter by a protection against involuntary activation, allow for the alternative allocation of key functions with a double-click and prevent the simultaneous transmission of two channel selections.

With the factory configuration, all DIP switches are in Off position.

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

Each key transmits upon activation.

DoubleclickLock-15s (4K) 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 15 seconds, the locking will automatically be reactivated; that means then that pressing an individual key won't produce any more effect. As compared to the DoubleclickLock function, the handling is a bit easier as only the first respective key needs to be pressed twice.

As long as the transmitter is activated, the red LED will flash shortly in intervals of one second.

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

DoubleclickLock (4K) 1: On, 2: On, 3: X, 4: X

Each key can only be used with a double-click. This function differs from DoubleclickLock-15s in so far as that the keys are locked immediately after release and not only 15 seconds later. Therefore the protection provided is slightly higher as compared to the DoubleclickLock-15s function.

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

DoubleclickExtension (8K) 1: Off, 2: On, 3: X, 4: X

The usual 4 command channels are increased to 8 which means that two alternative functions are allocated to each key. A normal single pressing of a key transmits the command channels 1 to 4. If you press twice (double-click) the command channels 5 to 8 will be activated.

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

OneButtonLock 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.

Locking of the key which was pressed first -> you can only transmit a single command channel.

As long as that command channel is active, all other command channels will be ignored.

Use: Example: Engine drive with forward and backward motion
Protective function, prevents carrying out both actions at the same time.

AutoFrequency

Mode 1: 1: X, 2: X, 3: X, 4: Off

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

This is the recommended standard setting.

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

If there is no acknowledgement from the receiver, after 3 seconds the transmitter starts a frequency scan but unlike Mode 1 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 receive few or no acknowledgements from the receiver. In such cases, the use of mode 1 would result in the execution of unnecessary frequency changes.

3.2 Receiver

General functions

Operation

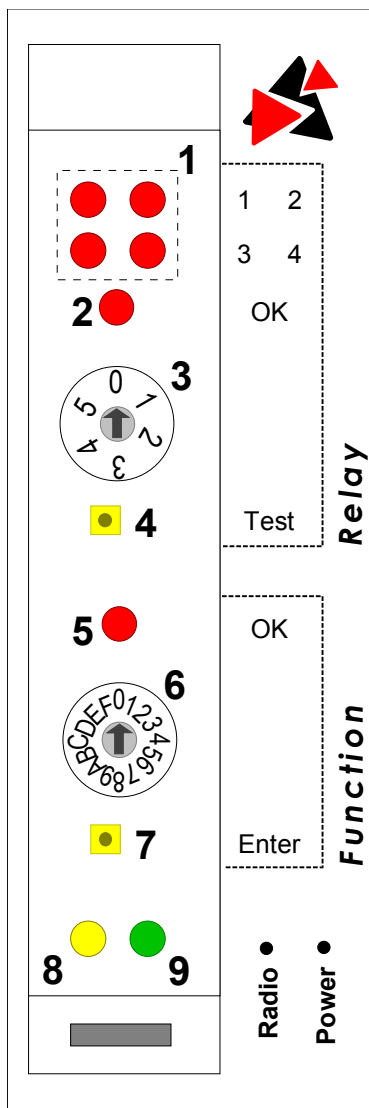
The receiver has two key buttons and two rotary type switches for programming the relays etc.

To test the relay, position the rotary type switch for the *relay* on the selected relay, then set the rotary type switch for the *function* 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 that if a relay from the same priority group is active, it can be that another relay cannot be activated.

If the relay type switch for the function 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 rotary type switch *Function* is 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!

With both of the rotary type switches, 0 is the halt position. After programming has been completed, it is this position which should be set so as 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 Rotary type switch for the relay
select one or all relays (Pos 5).
Pos 0 = Halt position.
- 4 Test key (**Warning: this key will activate all relays!**)
*activates the relays selected with rotary type switch.
This function is independent of the position of the rotary type switch Function*
- 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 Rotary type switch for the function
*selects the requested function for programming
(refer to the following page)
Pos 0 = Halt position*
- 7 Enter key
serves to program the function selected with the rotary type switch
- 8 Radio LED (Transmission activity, antenna)
*Regularly flashes if no 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.

Rotary type switch for the relay

- 0 Halt position
While in halt position you cannot activate a relay with the Test key. That 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.

Rotary type switch for the function

For programming instructions refer to page 8.



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 Halt position
In the halt 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 rotary type switch for the relay get programmed for impulse function when you press the Enter key. If you press the Test key, the relays set by the rotary type switch will be activated if they are programmed for impulse function.
- 2 Programming the relay for Toggle function
Relays set with the rotary type switch for the relay get programmed for Toggle function when you press the Enter key. If you press the Test key, the relays set by the rotary type switch will be activated if they are programmed for Toggle function.
- 3 Programming the relay for the On/Off function
Relays set with the rotary type switch for the relay get programmed for On/Off function when you press the Enter key. If you press the Test key, the relays set by the rotary type switch will be activated if they are programmed for On/Off function.
- 4 Relay for the priority group 1 pressed / >10s = Delete group 1
Relays set with the rotary type switch for the relay 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 Test key, the relays set with the rotary type 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 rotary switch for the relay 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 Test key, the relays set with the rotary switch if they have been assigned to the priority group 2.
- 6 Logging 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 a duration of about 4 seconds.
- 7 Configuring the key allocation for this transmitter
The allocation process can be started after pressing the Enter key. Each key which is pressed on the handheld transmitter will be allocated to the relay selected by the rotary type switch. The allocation process ends 20 seconds after the last pressing of a key.

- 8 Changing the key allocation (for all transmitters having the same key allocation)
The allocation process starts after pressing the Enter key. *Each key which is pressed on the handheld transmitter will be allocated to the relay selected by the rotary type switch. All keys need to be reallocated even in the case where you just want to change the allocation of a single key. The allocation process ends 20 seconds after the last pressing of a key.*
- 9 Delete one transmitter: short pressing
delete all transmitters: press for 10 seconds
restore factory setting: press for 30 seconds
With a short pressing of the Enter key an individual handheld transmitter can be deleted within 20 seconds. For detailed information refer to the section on delete functions on page 11.
- A Automatic frequency. At present there are no parameters which can be modified.
(refer to page 12 for further information on automatic frequency selection)
- E Turning the internal antenna On/Off
*To change the current parameter you must press the Enter key for 10 seconds. Thereafter the internal antenna will be activated/deactivated.
(For more information in this context refer to the section about internal antenna disconnection on page 11)*

B-D, F Not occupied and reserved for future functions.

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 with the receiver (the identification of the transmitter will be saved)
- Defining or modifying the key allocations (assign the transmitter keys to the relays)
- Inhibit the rotary type switch (halt position)

1. Defining the 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. If 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 if it is pressed again, you must select the **Toggle** function. If however 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 LED for Function-OK will flash 10 times.

- a) Set the rotary type switch for the function on the requested relay function (1: Impulse, 2: Toggle, 3: On/Off).
- b) Set the rotary type switch for the relay on the requested relay (1-4: relay 1 to 4, 5: all relays) and press the Enter key briefly. The LED for Function-OK 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 rotary type switch for the function on the requested priority group (4: Group 1, 5: Group 2).
- b) Set the rotary type switch for the relay on the requested relay and briefly press the Enter key. The LED for Function-OK will light up for a short moment to confirm.
- c) Repeat the steps 2a) and 2b) for each additional relay.

3. Registering the transmitter with the 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 and no further handheld transmitter may be active.

- a) Set the rotary type switch for the function on position 6 and briefly press the Enter key. The LED for Function OK lights up.
- b) Within the next 20 seconds press any key on the transmitter and hold it down for about 4 seconds until the transmitter's LED lights up in green. The LED for Function-OK will shortly flash up to confirm the registration.
- c) If you need to register several transmitters, repeat the steps 3a) and 3b) for each transmitter.

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).

During the registration process, the transmitter should not be at a distance of more than 2 metres from the receiver. If the distance between the transmitter and the receiver exceeds 10 metres the registration is impossible. This helps in avoiding involuntary registrations. During the registration you should watch out that no other handheld transmitter of the Cobra type is active.

4. Defining or modifying the key 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 given that no allocation exists at that stage. If required you may also define and use several different key allocations; that will come in if several transmitters with different key allocations get programmed for the same receiver. 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 key allocation of the *backup-setup*. The *backup-setup* contains the key allocations that have been last defined or modified. 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 from the *backup-setup*.

If a transmitter following the first one is to receive different key allocations then just define the new allocations. From now on all registrations will be done using the new *backup-setup*; however the allocations made previously for the respective transmitters are preserved.

If you quit the key allocation mode before all requested keys have received assignment, those keys which had already been allocated will have to be reallocated.

4.1.1 Relay with Impulse or Toggle function

- a) Set the rotary type switch for the function on position 7 and briefly press the Enter key. The LED for function-OK will start lighting up.
- b) Set the rotary type switch for the relay 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 rotary type switch for the function, the key allocation process terminates.

4.1.2 for relays with On/Off function

- a) Set the rotary type switch for the function on position 7 and briefly press the Enter key. The LED for Function-OK goes up.
- b) Set the rotary type switch for the relay 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 20 seconds or change the setting of the rotary type switch for the function, the key allocation process terminates.

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 which you have made will then apply to all already registered handheld transmitters using the same key allocation (that means to those which have been programmed with the same backup-setup).

4.2.1 Relay with Impulse or Toggle function

- Put the rotary type switch for the function on position 8 and briefly press the Enter key. The LED for Function-OK begins to light up.
- Set the rotary type 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.
- 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 rotary type switch for the function, the key allocation process terminates. The change will then affect all previously registered handheld transmitters which previously used the same key allocation.

4.2.2 for relay with On/Off function

- Put the rotary switch for the function on position 8 and briefly press the Enter key. The LED for Function-OK begins to light up.
- Set the rotary type 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.
- Afterwards press the **Off** key. The extinction of the LED for a short moment will confirm the allocation.
- 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 rotary type switch for the function, the key allocation process terminates. The change will then affect all previously registered handheld transmitters which previously used the same key allocation.

5. Inhibiting the rotary type switch, halt position

For both rotary type switches 0 is used as halt 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 halt position the keys Test and Enter produce no effect.

- Set the rotary type switch for the relay and the rotary type switch for the function to 0.

Checking the relay parameters (Test key)

This key serves for testing the currently programmed function of the relays including the priorities without using the handheld transmitter. This is important in connection with the On/Off function given that 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 rotary type switch for the function on the relay function to be tested (1: Impulse, 2: Toggle, 3: On/Off) and then set the rotary type switch for the relay 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 rotary type switch for the function 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 rotary type switch for the function on the priority group to be tested (Position 4 or 5) and then set the rotary switch for the relay 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 set 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.

Delete functions

Deleting priority groups

Set the rotary type switch for the function on the priority group which you want to delete (position 4 or 5) and press the Enter key for about 10 seconds. The LED for Function-OK will start to light up before the key is released. After the release of the key, it will flash 10 times for confirmation.

Deleting individual transmitters

Set the rotary type switch for the function on position 9 and press the Enter key briefly. The LED for Function-OK 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 rotary type switch for the function on position 9 and press the Enter key for 10 seconds. The LED for Function-OK will start lighting up before the key is released. After you released the key, the LED will flash 10 times to confirm that all registered transmitters have been deleted.

Restoring the factory configuration

This involves deleting all transmitters, all key allocations and both of the priority groups. The relay functions will be set back on the Impulse mode and the internal antenna will be activated.

Set the rotary type switch for the function on position 9 and press the Enter key for 30 seconds. The LED for Function-OK starts to light up before you release the key. After you released the key, the LED for Function-OK will flash 10 times simultaneously with the LED for Relay-OK to confirm you that the factory configuration has been successfully restored.

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.

For activation or deactivation set the rotary type switch for the function on position E. Then the Enter key must be pressed for at least 10 seconds. After you released the key, the LED for Function-OK will light up briefly; it will light up once for the activation of the antenna and twice for its deactivation.

The LED for Radio 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 that means that the internal antenna is deactivated.

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.

Automatic frequency selection

The Cobra narrow band radio system uses 14 out of 17 available frequency channels with 100kHz bandwidth in the 433MHz frequency band. The bandwidth of 100kHz provides for very fast radio communication which gives very short reaction times for switch commands from the handheld transmitter.

Most broadband radio transmitters use the midband frequency around 433.92 MHz which is the reason why that range (433.775 to 434.075 MHz) is not occupied by Cobra.

Channel	Frequency
1	433.1250 MHz
2	433.2250 MHz
3	433.3250 MHz
4	433.4250 MHz
5	433.5250 MHz
6	433.6250 MHz
7	433.7250 MHz
	433.8250 MHz
	433.9250 MHz
	434.0250 MHz
8	434.1250 MHz
9	434.2250 MHz
10	434.3250 MHz
11	434.4250 MHz
12	434.5250 MHz
13	434.6250 MHz
14	434.7250 MHz

} Not used

If there are foreign transmitters causing interferences with the Cobra or if by coincidence two Cobra systems occupy the same frequency channel, then the system will automatically select a new frequency channel without interferences. Owing to this concept a stable radio link is possible under nearly all circumstances and without intervention of the user.


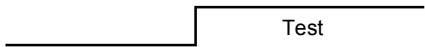


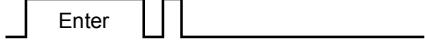

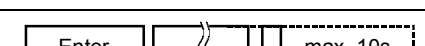
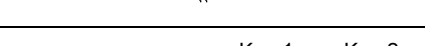

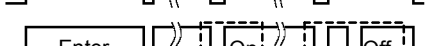
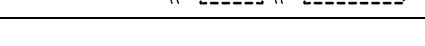

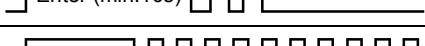
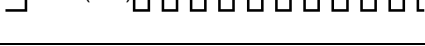




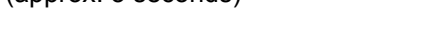


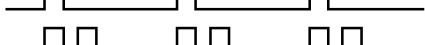
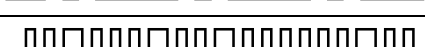
Normally a frequency change occurs unnoticed while the transmitter is active; it is however possible that there is an interruption of the impulse function of less than 0.3 seconds during which the relays become inactive for a short moment.

If the connection is completely lost, it is only after 3 seconds that the system will start a frequency search. In that case, the handheld transmitter must stay continuously activated for several seconds to be able to find a new frequency. If after about 5 seconds the handheld transmitter doesn't show a connection yet, approach the receiver with the handheld transmitter while holding a transmission key. If the receiver is on and the transmitter is registered then the system will find a connection again.

If several handheld transmitters are registered with one receiver and the system carries out a frequency change with one handheld transmitter, the other handheld transmitters will not function again until they have found the new frequency. This automatically happens at the first use; however the transmitter must have been activated for at least 3 seconds to start the frequency scan. Once the connection has been established this handheld receiver will again react as usual.

If two Cobra systems are simultaneously active on the same frequency, one of the systems will automatically switch to a new frequency channel within 3 seconds.

LED Flashing codes

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

3.3 Programming examples

Simple activating of the relay

Task

You are asked to design a system which will activate an assigned relay for each key of the handheld transmitter. The relay shall be activated as long as the corresponding transmission key is pressed.

Definition

The allocations between keys and relays are as follows:

Key 1 / Relay 1
Key 2 / Relay 2
Key 3 / Relay 3
Key 4 / Relay 4

The user may freely decide the designation of each key.
(The 1 to 1 allocations between keys and relays simplify our example.)

Procedure

- Check the settings of the relay
- Define all relays for impulse function (if not already programmed that way)
- Delete priority groups (if not already programmed that way)
- Register the handheld transmitter with the receiver
- Define the key allocations
- Set the rotary type switch to the locking position

Programming steps

Handheld transmitter

No extended functions are required (all DSW to Off position).
The extended functions of the handheld transmitter are described on page 5.

Receiver

Check the relay settings:

- This is important if the receiver is already in use or programmed and also if the current settings of the relays are not known. Also refer to page 10.
- If the relay functions and priority groups have already been pre-programmed as requested, the corresponding step can be omitted.

Defining the relay function:

- **Warning: If a relay is set to On/Off function, all transmitters will be deleted in the following cases:**
- Rotary type switch for the function set on position 1 (Impulse)
- Rotary type switch for the relay on position 5 (all relays)
- The Enter key is pressed briefly (LED flashes once)

Delete priority groups (given that no priorities are used):

- **Warning: If the receiver is already used with priorities, you must make sure that all relays may be activated at the same time.** Upon completion of this example the original priorities should be reinstated.
- Set the rotary type switch for the function on position 4 (priority group 1)
- Press the Enter key for at least 10 seconds (LED begins to light up)
(Thereafter the LED will flash 10 times -> group deleted)
- Set the rotary type switch for the function on position 5 (priority group 2)
- Press the Enter key for at least 10 seconds (LED starts to light up)
(Thereafter the LED will flash 10 times -> group deleted)

Registering the handheld transmitter:

- Set the rotary switch for the function on position 6 (Saving the transmitter)
- Briefly press the Enter key (LED starts to light up)
- Press any key on the handheld transmitter for about 4 seconds until the transmitter's LED lights up in green (the LED for Function-OK flashes once)
(if no key is pressed within 10 seconds, the registration process terminates)

Key allocation:

- Set the rotary switch for the function on position 7 (defining the key allocations)
- Press the Enter key briefly (LED begins to light up)
- Set the rotary type switch for the relay on position 1 (relay 1)
- Press key 1 on the handheld transmitter (LED will extinguish briefly for confirmation)
- Put the rotary switch for the relay on position 2 (relay 2)
- Press key 2 on the handheld transmitter (LED will extinguish briefly for confirmation)
- Repeat the above process for key 3 / relay 3 and key 4 / relay 4.
(if no key is pressed within 20 second, the backup mode terminates)

To finish set the rotary type switches to the locking position:

- Set the rotary type switch for the function and the rotary type switch for the relay to position 0 (lock))

Activating an engine using priorities

Task

The task involves activating an engine for a transport belt. The engine which has two directions of rotation is meant to be on as long as a key is pressed. For this purpose the relays will be set to Impulse mode. The possibility of activating forward motion and backward motion at the same time must be inhibited. For that purpose both relays will be allocated to the same priority group.

Definition

The allocations between keys and relays are as follows:

Forward motion:	key 1 / relay 1	priority group 1
Backward motion:	key 2 / relay 2	priority group 1

Procedure

- Check the settings of the relay
- Define all relays for impulse function (if not already programmed that way)
- Define the priority group (if not already programmed that way)
- register the handheld transmitter with the receiver
- Define the key allocations
- Set the rotary type switch to the locking position

Programming steps

Handheld transmitter

No extended functions are required (all DSW on Off position).

The extended functions of the handheld transmitter are described on page 5 (e.g. key locking).

Receiver

Check the relay settings:

- This is important if the receiver is already in use or programmed and also if the current settings of the relays are not known. Also refer to page 10.
- If the relay functions and priority groups have already been pre-programmed as requested, the corresponding step can be omitted.

Defining the relay function:

- **Warning: If a relay is set to On/Off function, all transmitters will be deleted in the following cases:**
- the rotary type switch for the function is set on position 1 (Impulse)
- the rotary type switch for the relay is set on position 1 (relay 1)
- the Enter key is pressed briefly (LED flashes once)
- the rotary type switch for the relay is set on position 2 (relay 2)
- the Enter key is pressed briefly (LED flashes once)

Defining priority groups:

- **Warning: If the receiver is already used with priorities, you should restore the original priorities after having completed this example.**
- Set the rotary type switch for the function on position 4 (priority group 1)
- Set the rotary type switch for the relay on position 1 (relay 1)
- Press the Enter key briefly (LED flashes twice)
- Set the rotary type switch for the relay on position 2 (relay 2)
- Press the Enter key briefly (LED flashes once)

Registering the handheld transmitter:

- Set the rotary type switch for the function on position 6 (Saving the transmitter)
- Briefly press the Enter key (LED starts to light up)
- Press any key on the handheld transmitter for about 4 seconds until the transmitter's LED lights up in green (the LED for Function-OK flashes once)
(if no key is pressed within 10 seconds, the registration process terminates)

Key allocation:

- Set the rotary type switch for the function on position 7 (defining the key allocations)
- Press the Enter key briefly (LED begins to light up)
- Set the rotary type switch for the relay on position 1 (relay 1)
- Press key 1 on the handheld transmitter (LED will extinguish briefly for confirmation)
- Put the rotary type switch for the relay on position 2 (relay 2)
- Press key 2 on the handheld transmitter (LED will extinguish briefly for confirmation)
(if no key is pressed within 20 seconds, the backup mode terminates)

To finish set the rotary type switches to the locking position:

- Set the rotary type switch for the function and the rotary type switch for the relay to position 0 (lock)

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

As we activate only one relay, priority groups which have already been created have no influence on this example. If priorities are already used, these don't need to be deleted.

Procedure

- Check the relay settings
- Set relay 1 on On/Off function (if it has not already been programmed that way)
- Register the handheld transmitter with the receiver
- Define the key allocations
- Set the rotary type switch on the locking position

Programming steps

Handheld transmitter

No extended functions are required (all DSW set on Off).

Extended functions of the handheld transmitter are described on page 5.

Receiver

Check the relay settings:

- This is important if the receiver is already in use or programmed and also if the current settings of the relays are not known. Also refer to page 10.
- If the relay functions have already been programmed according to your requirements, this step can be omitted.

Define the relay function:

- **Warning: If the relay is already set on the Impulse or Toggle function, all transmitters are deleted through the following steps:**
- Rotary switch for the function set on position 3 (On/Off)
- Rotary switch for the relay set on position 1 (relay 1)
- Brief pressing of the Enter key (LED flashes once)

Registering the handheld transmitter:

- Set the rotary type switch for the function on position 6 (saving the transmitter)
- Briefly press the Enter key (LED starts to light up)
- Press any key on the handheld transmitter for about 4 seconds until the transmitter's LED lights up in green (the LED for Function-OK flashes once)
(if no key is pressed within 10 seconds, the registration process terminates)

Key allocation:

- Set the rotary type switch for the function on position 7 (defining the key allocations)
- Press the Enter key briefly (LED begins to light up)
- Set the rotary type switch for the relay on position 1 (relay 1)
- Press key 1 on the handheld transmitter (LED will extinguish briefly for confirmation)
- Press key 2 on the handheld transmitter (the LED will be extinguished briefly for two times to confirm)
(if no key is pressed within 20 seconds, the backup mode terminates)

To finish set the rotary type switches to the locking position:

- Set the rotary type switch for the function and the rotary type switch for the relay to position 0 (lock)

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 shall use the same key allocations 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 with the receiver
- Check if the relays switch as usual.
- If that check fails, you must define new key allocations.
- Set the rotary type switch to the locking position.

Programming steps

Handheld transmitter

You should check if the handheld transmitters which already used are using special functions. Special functions of the handheld transmitter are described on page 5 (e.g. locking of keys).

Receiver

Now you should register the handheld transmitter with the receiver.

Registering the handheld transmitter:

- Set the rotary type switch for the function on position 6 (saving the transmitter)
- Briefly press the Enter key (LED starts to light up)
- Press any key on the handheld transmitter for about 4 seconds until the transmitter's LED lights up in green (the LED for Function-OK flashes once)
(if no key is pressed within 10 seconds, the registration process terminates)

Now you should check if the relays are switching as usual. If everything works as you expect, the section "Defining the key allocations" below can be omitted.

Defining the key allocations:

- Set the rotary type switch for the function on position 7 (Defining the key allocations)
- Define the key allocations as described on page 9

To finish set the rotary type switches to the locking position:

- Set the rotary type switch for the function and the rotary type switch for the relay to position 0 (lock)

4. Security

The security related behaviour of the Cobra radio control system is at least in conformity with the requirements for category 2 of the EN954 specification. Therefore it is suited for all applications where a default 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 and corresponds to the standards defined for category 3. However, the standard relays and the elements used for the keys are not redundant which is why they are not intended for use in security sensitive applications. Nevertheless, the measures set out below will help to improve the security in case of defaults with components so as to attain a level which is satisfactory for many applications.

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 lives nor risks of provoking situations which could in case of malfunctioning endanger human lives. 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 gets stuck in the On or Off position respectively	Using an additional, second relay in series 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. 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.
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. The radio controlled installation must mute to a safe state if the relays are deactivated.

5. Trouble shooting

Problem	Error type, Error search	Procedure / Cause
The handheld transmitter doesn't work	Does the LED of the handheld transmitter stay extinguished when you press a key? Does the LED of the handheld transmitter flash 2 times per second? Do both LED's of the handheld transmitter flash simultaneously red/green after a key has been pressed for 3 seconds? Does the Radio LED display an unknown transmitter?	– Check batteries – Check for the protective function against involuntary activation (page 5) The battery is nearly empty and should be replaced No connection with the receiver or transmitter not registered. Check the internal antenna (page 11) Approach the transmitter and the receiver and register the transmitter. Register the handheld transmitter
The new handheld transmitter has an incorrect key allocation	No error. The backup setup contains the key allocation used before the last modification.	Define new key allocations (page 9)
Existing handheld transmitters have an incorrect key allocation	Has the key allocation been changed?	Change key allocation (page 10)
Handheld transmitter cannot be deleted	Error flashing when deleting an individual transmitter?	It could be that the transmitter has not been registered which implies that 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? Is there error flashing for 10 seconds?	A second transmitter is active during registration or the distance to the receiver is too long. Storage capacity has been reached
Receiver not functioning	Power on LED extinguished?	Check power supply on receiver
An individual relay doesn't react	Is the relay in order? Is there an activated relay belonging to the same priority group? Unallocated key?	Set the rotary type switch for the relay on the relay concerned and the rotary type switch for the function on position 0. Press the Test key Check the priorities (page 10) Change the key allocation (page 10)
No relay is reacting	LED for Power on extinguished? Does the Radio LED display an unknown transmitter? Are there key allocations?	Check power supply Register the handheld transmitter Define key allocations (page 9)
Reaction from a wrong relay	Use with new handheld transmitter? Error occurs with all existing handheld transmitters?	Define new key allocations (page 9) Change key allocation (page 10)

6. Applications

Automation in industrial and commercial enterprises

Apportioning systems

Robotics

Elevators

Cargo cranes / unloading cranes

Pumps, lightning etc.

7. Technical specifications

Handheld transmitter

Frequency range	433.075 MHz to 434.775 MHz / 14 frequency channels in the 100 kHz grid
Transmitting power	+ 10 dBm
Antenna	Internal
Number of keys	2 or 4 tactile pushbuttons respectively up to 8 switching channels with double occupation
Coding of data	Manchester coding with CRC16
Addressing mode	Unique 24-bit codes permanently programmed by the factory
Extended transmitting functions	Double-click function (8K), keylock, double-click lock, automatic frequency
Power supply	2 batteries with 1.5 V 2 NiMH rechargeable batteries with 1.2 V (AA/LR6)
Power consumption	16 mA (in transmit mode)
Life span of battery	150 hours of continuous operation with an alkaline battery of 2200 mAh
Body	Synthetic material, IP65, orange colour
Temperature range	-25 to +60 degrees centigrade
Dimensions	120 x 65 x 23 mm
Compliance with standards	CE, R&TTE

Receiver

Frequency range	433.075 MHz to 434.775 MHz / 14 frequency channels in the 100 kHz grid
Transmitting power	+ 10 dBm (for the link control to the handheld transmitter)
Antenna	Internal antenna which can be disconnected / MCX socket for external antenna
Programming	2 keys / 2 coding switches, adjustable with a screwdriver
Coding of data	Manchester coding, error recognition with CRC 16
Power supply	12-24 V DC / min. 9 V DC, max. 30 V DC
Power consumption	125 mA, all relays activated (supply voltage = 12 V DC) 45 mA, all relays deactivated
Relay	Max. turn-off load 250 V AC / 8 A
Body	Synthetic material (PC/ABS), light grey colour, for DIN-rail mounting on a DIN rail according to EN 50022 specification
Temperature range	-25 to +60 °C degrees centigrade
Dimensions	120 x 101 x 35 mm
Compliance with standards	CE, R&TTE
Number of storage locations	You can register up to 60 handheld transmitters
Reaction period on key pressing at the transmitter	On: 50 milliseconds including debouncing of keys and relay switching time Off: 50 milliseconds (normally) 75 milliseconds (maximum) Timeout: 300 milliseconds (relay in Impulse function mode)

