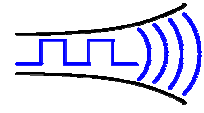


**NEW**

# Radiometrix



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Issue A, 28 February 2008

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**KDEC**

## Code-hopping receiver with up to 5 relay outputs

***KDEC is designed to provide the user with a complete receiver interface for Radiometrix transmitters such as KTX2 and KFX2. No additional parts needed to implement a complete system suitable for applications requiring high security RF remote control.***



Figure 1: KDEC board (5-relay version)

### Features

- Up to 5 relays to control mains powered devices rated up to 8A, 250VAC/30VDC
- Volt-free changeover contacts
- Learn button - remembers up to 16 different transmitters
- Remembers transmitters when switched off
- Visual indication of Learn function
- Visual indication of low supply voltage at the Transmitter
- Visual indication of activated relays
- Momentary or Latched outputs
- Basic antenna included - setup is simple as Plug-and-Play
- Receiver module on-board
- Terminal block to connect external power supply
- SMA RF connection

### Applications

- RF interface for Security and Alarm systems
- Status reporting and monitoring secure systems
- Industrial controls
- HVAC controls
- Door entry systems
- Simple On/Off switching

## General Description

KDEC uses a common PCB for different versions. KDEC can be supplied as a version that is optimised for use with KFX2 (Key-fob transmitter), where it is not possible to activate more than one output at a time and up to 5 relays are fitted, matching the number of button inputs on the KFX2 according to customer requirement.

Alternatively, the standard 4-relay version has simple output functionality, whereby new function-codes are simply fed to the relays as they are received, e.g. reception of a function-code (S0, S2) will activate relays 1 and 3 simultaneously. For both versions, momentary/latched relay action is selected by means of a jumper-link on the board.

## Visual Indications

The following status LEDs will light, depending on the status of KDEC.

LED	Function	Description
1 - 5	Relay active (Red)	Relay energised; S0-S3 Function-code output
LOW-BATT	TX Low Battery (Red)	Transmitter supply voltage <3.8V (approx.)
LEARN	Learn/Learnt (Orange)	Multi-function indicator – see below
POWER	POWER (Green)	Power supply present

## Using KDEC

### *Learning a transmitter*

For all variants of KDEC, the simple process of learning transmitters is the same. The Learn button is pressed momentarily (<1s) and a 6-second (approx.) window follows, during which the Learn LED is lit and a message received from a Radiometrix code-hopped transmitter during this period is used to Learn that transmitter into the KDEC memory. The function code used to activate the transmitter during learning is also stored in memory and when the same function code is used again from that transmitter during normal operation the Learn LED lights to indicate this. Note: if a transmitter has already been stored it is simply re-learned (with the function code updated if this is different). Upon learning a transmitter the Learn LED flashes several times to indicate success.

### *Activating output relays*

Once a transmitter has been learned its transmissions will be acted upon, i.e. the function code contained within the transmission is fed to the output relays (with extra processing in the case of the version optimised for use with KFX2, to ensure that only one relay at a time is energised).

Either momentary or toggled/latching outputs can be used. Note that this distinction applies to all the outputs, not individual relays. When Momentary Output mode is selected the output is activated for a short period (380 – 450ms) for reception of a single message. If the same message is received repeatedly the output status is refreshed during this period: in effect, the output is “held-on” whilst a user keeps the relevant function line enabled at the transmitter. When Latched Output mode is selected the decoding of a single message causes the function-code within the message to toggle the output(s).

Care should be exercised when using Latched (or more accurately ‘toggled’) mode with the standard output software; consider the following example: one function-line (S0) is taken high and held high at the transmitter. On reception of the message, Relay 1 will change state. Whilst the same message is being decoded the relay will not change state again. However, if another function-line (e.g. S1) is taken high whilst S0 is still held high, it will cause a new transmission with new hop-code and new function code (S0, S1). On reception of this message Relay 2 will change state *but so will Relay 1*, since the *new* message contains S0 and S1, which toggles Relays 1 and 2 of the KDEC.

KDEC optimised for KFX2 (being a key-fob transmitter with up to 5 buttons) deals with this issue by not responding to additional button-presses whilst one button is already pressed. However, this is at the expense of removing transparency to the function-code being received. The user may require more than one relay to be activated at once: in this case, the standard 4-relay output version should be used.

## Clearing the memory

When the memory is full, no new transmitters can be learned. To clear the memory of *all* stored transmitters, the Learn button is pressed and held for more than 3s. The Learn LED will go out and upon releasing the button it will flash once to indicate that the memory has been cleared. It is not possible to remove individual transmitters from the memory.



Figure 2: Component layout and Dimensions

**SAFETY WARNING:** *Extra care should be taken when handling the electrical connection from relay to 250AC device. Mains power should be disconnected before connecting the wires to 3-way terminal blocks to prevent electric shock. Exposed wires or terminal block should not be touched during evaluation.*

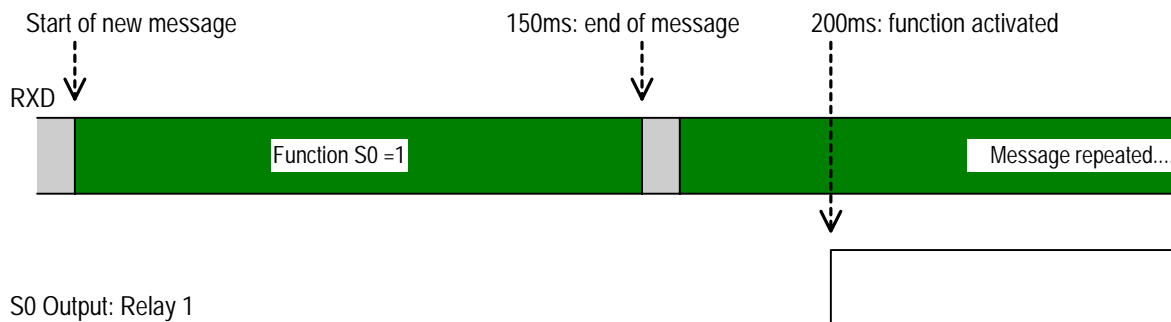
## Code-hopped messages – technical brief

Transmission format is 1250bps (nominal rate) Manchester encoding. Although the function-code is only 4 bits, total message length is 67 bits. This includes a 28-bit serial number and a 32-bit encrypted hop-code. Note that the serial number and function code data is not encrypted. The correct status of the transmission is used to validate the data. This is achieved through use of the ever changing hop-code (changes for every new message) and by synchronising the KDEC to the transmitter(s) in use. Put another way: KDEC “Learns” individual unique transmitters, as required by the user.

The hop-code is encrypted using the serial number of the transmitter plus the manufacturer code (64-bit), which is kept secret and is not transmitted. The function-code (S0-S3) appears twice in the message and forms a part of the hop-code encryption process.

If KDEC loses synchronisation with the transmitter (e.g. repeated transmitter activation whilst out of range) then the transmitter must be activated twice with valid and sequential hop-codes before KDEC will allow the control to be processed. The hop-code is only valid if it is within a *forward* window of +32768 activations. This mechanism prevents “code-grabbers” from breaking the security of the system by recording and re-broadcasting old codes. Additionally, KDEC allows up to 14 transmissions to occur whilst the transmitter is out of range before two valid sequential transmissions are required to use the system. In practice a user may not notice the latter, since human reaction to the unsuccessful attempt is simply to “press the button again”.

The level of redundancy and encryption in a message mean that, in simple terms, KDEC will only output a function-code that has been received from a properly recognised and synchronised transmitter.



*Figure 3: Timing diagram – showing action upon receiving a message with S0 = 1*

The typical time delay between a “button-press” at the transmitter and relay activation by the KDEC board is 200ms.

## Ordering Information

- KDEC-xxx-000            Standard 4 output version: any/all relays may be activated at the same time.
- KDEC-xxx-00n            “n” is a number between 1 and 5. This version is optimised for use with KFX (Key-fob transmitter with 1 – 5 buttons fitted). Only one output at a time may be activated.

(Where “xxx” is frequency band in MHz – 433 is standard.) Please contact sales for other requirements.

## Notes:

Either version will work with KTX modules or KFX Key-fob type transmitters

It is recommended that the KFX optimised version is used with 4 and 5 button Key-fobs because, for these types, a combined function-code (S0, S2) is used as the code for one of the buttons.

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### **R&TTE Directive**

After 7 April 2001 the manufacturer can only place finished product on the market under the provisions of the R&TTE Directive. Equipment within the scope of the R&TTE Directive may demonstrate compliance to the essential requirements specified in Article 3 of the Directive, as appropriate to the particular equipment. Further details are available on The Office of Communications (Ofcom) web site:

*<http://www.ofcom.org.uk/radiocomms/ifi/>*

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