# LinTronic

## RadioFrequency Signals (RF)

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With 30 years of experience in remote control, we have a wide knowlegde of the advantages and problems in wireless control.

For domestic control, there are many different frequencies used to control a device by RadioFrequency, for example: 27 MHz, 318/416/433 MHz, 868/918 MHz, 2.4 Ghz and more.

Different transmission (modulation) techniques are beeing used: OnOffKeying (OOK), FrequencyShiftKeying (FSK), AmplitudeShiftKeying (ASK), PhaseShiftKeying (PSK) and more - an various open or closed protocols are offered, offering repeaters or mesh-networking: Zigbee, Zwave, etc.

Often, RF products do not transmit very far as they are often battery driven and user do not want to replace battery all the time.

It is very easy for a manufacturer to select one combination of frequency, modulation and number of commands suitable for his particular product, but it is virtually impossible (at least very expensive) to create a unit being able to transmit commands on all frequency and modulation combinations.

Low cost systems typically work on 433 MHz using from 4 to 16 bits to specify a command. This only gives a few available commands but also makes the system sensitive to interference and unwanted behaviour, as the 433 MHz band has been on the market for many years, and has widely been used by light dimmers, temperature sensors, door bells, baby-alarms, central-locking in cars, etc. etc.

The 433 MHz-band alone, covers 34 channels on the frequencies from 433.05 up to 434.79 MHz, so you need to know on which of these channels you are expecting data. 433,92 MHz is the most popular but also the most crowded and noisy channel, offering a lot of interference challenges. In USA, 318 MHz is used instead of 433 MHz.

Newer, professional and expensive systems typically work on the regulated and therefore less used 868 MHz-band using a high number of bits offering millions of commands, but also use a mathematical algorithm rotating code system, which changes the code every time the remote is activated. Reverse-engineering or piracy-copying a 868 MHz code and use it to work with its original product, is therefore almost impossible. In USA, 915 MHz is used instead of 868 MHz.

In order to receive an RF signal, the antenna must have the right length and proper groundplane. Especially in handheld products, you often see that the antenna is integrated and even shortened which together cuts the range dramatically.

Working with wireless products, you have absolutely no control of disturbing signals, interference, jamming or piracy (copy of code). RadioFrequency signals may travel a relatively long distance and even reflect on buildings, etc. Interference can be almost impossible to locate and correct. And the world is being filled with more and more wireless products everyday.

**CONCLUSION**

When we designed the LinTronic IR RF Computer Interface (LIN-433), we wanted a long-range product not restricted to any particular protocol and decided to work on 433.92 Mhz, in order to be able to combine as many existing products as possible. We work with an optimized integrated antenna and a fully integrated radio chip. This gives us many many possibilities. See the next pages. Also see the manual for the LIN-433 product.

X10 panels


The 433-x-LIRFCI can be controlled by and control a large range of RF products working on 433.92 Mhz.

Lights

Relay

RS-232

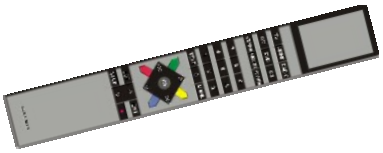
motion detectors, door bells, remote controls, alarms, etc.

X10 motion detector

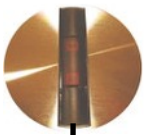

LIN-433

IR

remote controls



IR



RS-232

Relay

LRF

Relay

RS-232

LIN-433

LIN-433

IR

LRF = LinTronic RF code

IR