

RF Transmitters

Detailed information

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2. Available RF transmitters

2.1. Standard RF transmitter

1. 310MHz Transmitter for X10 RF, X10 security and NEC codes

2.2. Standard RF transmitter with extended commands

1. 433.92MHz Transmitter for X10 RF, X10 security, Flamingo, KlikAanKlikUit, NEXA, ELRO AB600, Domia Lite, HomeEasy, Harrison and NEC codes

This unit transmits the data it receives from the RS232 receive input pin. The X10 RF, Security RF and NEC RF commands are transmitted on 433.92MHz (or 310MHz depending on the type). Ikea Koppla, KlikAanKlikUit, NEXA, ELRO AB600, Domia Lite, HomeEasy and Harrison RF commands are only useful for Europe because those systems are available with 433.92MHz only.

3. Transmitter installation in an USB module.

Disconnect the USB module completely to be sure it is powerless.
The transmitter should be plugged in into the J2 connector of the USB module.
An USB module can only have mounted:

- 1 Master receiver
- Or
- 1 Master receiver and 1 Slave receiver
- Or
- 1 Transmitter.
- Or
- 1 RS232 Serial Interface module.

4. Transmitter installation in an Ethernet module.

Disconnect the power from the Ethernet module.
The transmitter should be plugged in into the JP4 or JP6 connector of the Ethernet module.

An Ethernet module with 1 COM port can only have mounted:

- 1 Master receiver **OR** 1 Master receiver and 1 Slave receiver
- OR**
- 1 Transmitter in JP4. (4800bd only)

An Ethernet module with 2 COM ports can have mounted:

- 1 Master receiver **OR** 1 Master receiver and 1 Slave receiver
- AND**
- 1 Transmitter in JP6. (4800bd only)

5. The RS232 data format used.

- 4800bd, 8 bits data, no parity, 2 stop bits.

6. Power consumption.

Transmitter in rest	10mA
Transmitter transmitting RF	40mA

7. Hex Initialization commands.

7.1. ACK NAK responses.

The transmitter responds with an ACK if the RS232 received data is correctly processed and the RF transmission will start at that moment. The ACK is 1 byte and equal to the last byte of the init command. E.g. if the init command is F037F037 the transmitter will respond with 37. Wait for the ACK before sending the next data to the transmitter!

When data is not correct received or the full packet is not received by the transmitter within 60ms the transmitter will send a NAK (hex 5A).

7.2. For the standard RF transmitter.

Get software version

- F030F030 = return software version and reset RF modes

Mode selection commands for use of XRTS-XCTS (receiver connected)

- F031F031 = transmit block
- F032F032 = not used (version <11 = 32 bits mode)
- F033F033 = Variable Length mode
- F034F034 = 25 bits Harrison mode
- F038F038 = 24 bits Ikea Koppla mode or 11 bits Flamingo mode
- F03AF03A= 24 bits KlikAanKlikUit, NEXA, ELRO AB600, Domia Lite mode

Mode selection commands without using XRTS-XCTS (no receiver connected)

- F035F035 = transmit continuously
- F036F036 = not used (version <11 = 32 bits mode)
- F037F037 = Variable Length mode
- F039F039 = 24 bits Ikea Koppla mode or 11 bits Flamingo mode
- F03BF03B= 24 bits KlikAanKlikUit, NEXA, ELRO AB600, Domia Lite mode

Enable/disable transmit RF

- F03CF03C = enable transmission of Harrison RF in modes 32,33,36,37
- F03DF03D = enable transmission of KlikAanKlikUit, NEXA, ELRO AB600 Domia Lite RF in modes 32,33,36,37
- F03EF03E = enable transmission of Koppla or Flamingo RF in modes 32,33,36,37
- F03FF03F = disable transmission of X10 and security RF in modes 32,33,36,37

Notes:

Execute F030F030 to set the RF modes to the initial state.

The initial state is: X10 and HomeEasy enabled. All other modes are disabled.

HomeEasy can't be disabled but there is no need to disable HomeEasy because X10 commands are not translated to HomeEasy format in the transmitter.

8. RF timing.

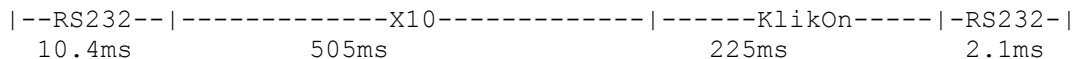
The transmitter has only a buffer for 1 command. When this command has been transmitted an acknowledge byte is send on the RS232 interface. You have to wait for this ACK before sending a new command to the transmitter!!!

The delay depends on the number of protocols enabled in the RF transmitter. Each RF packet is transmitted 5 times. Harrison is transmitted 15 times and HomeEasy is transmitted 7 times.

	Header	data Packet	inter-record gap	total RF delay
X10 lighting	13ms	48ms	40ms	505ms
X10 security	13ms	61.5ms	40ms	572.5ms
Harrison	0ms	32.5ms	10ms	212.5ms
Flamingo	0ms	41.2ms	13ms	54.2ms
Koppla	6.8ms	40.8ms	60ms	538ms
KlikAanKlikUit	1.4ms	33.6ms	10ms	225ms
HomeEasy	2.8ms	65ms	10ms	545ms

Additional to the RF delays you have the delay on the RS232 for the bytes transmitted and the received ACK. Roughly calculated if you transmit 5 bytes and receive the ACK then a delay of 12.5ms

For example, if you have only X10 and KlikAanKlikUit enabled the total delay for one command will be: 742.5ms



This timing data is for information only and can't be used in software for the timing to send data to the RS232 interface. If the handshake cable between a transmitter and receiver is used then the delay will be even be longer because if the receiver detects an RF signal it doesn't allow the transmitter to transmit.

9. KlikAanKlikUit chime command.

In X10 mode the KlikAanKlikUit unit number 8 has a special meaning. When an ON command is send then immediately after the RF command for unit 8 ON is sent a chime command is transmitted with the same house code.

10. Example of transmit data packets for an A1-off cmd

(all data is in hex format)

Version request to transmitter => F030F030
03 Transmitter version received (03)

Init cmd to transmitter => F035F035
35 ACK received
A1-Off cmd to transmitter=> 04FB06F9
35 ACK received

Init cmd to transmitter => F036F036
36 ACK received
A1-Off cmd to transmitter=> 609F20DF
36 ACK received

Init cmd to transmitter => F037F037
37 ACK received
A1-Off cmd to transmitter=> 20609F20DF
37 ACK received

Init cmd to transmitter => F039F039
39 ACK received
A1-Off cmd to transmitter=> 9A4020
39 ACK received

Init cmd to transmitter => F03BF03B
3B ACK received
A1-Off cmd to transmitter=> 140000
3B ACK received
End A1-Off cmd to transmitter=> 558780
3B ACK received

Disable KlikAanKlikUit RF Cmd to xmitter => F03DF03D.
35 ACK received

Disable KOPPLA RF Cmd to xmitter => F03EF03E.
35 ACK received

Disable X10 RF Cmd to xmitter => F03FF03F.
35 ACK received

11. Handshake signal.

The Master receiver has a Transmit Request input and a Clear to Send output connection. Those signals are used by a transmitter that operates on the same frequency as the Master receiver. Before starting the transmission, the transmitter sends a Transmit Request to the Master receiver. If the Master receiver has not received a signal for about 60ms it responds with a Clear to Send to the transmitter and stops receiving until the Transmit Request is switched off by the transmitter. On the Clear to Send signal the transmitter starts transmitting.

See the Handshake document how to connect the handshake cable between 2 RFXCOM interfaces.

12. DIY options.

12.1. *Antenna connection.*

The wire antenna can be replaced by a BNC connector. The BNC connector should be mounted on the enclosure and a thin 50ohm coax should be used to connect the BNC connector. This makes it possible to connect a 50ohm cable and antenna to the transmitter. A 70cm HAM radio antenna can be used with the 433.92MHz transmitter. A discone antenna can be used with the 310MHz transmitter.

12.2. *Create your own program for the microcontroller.*

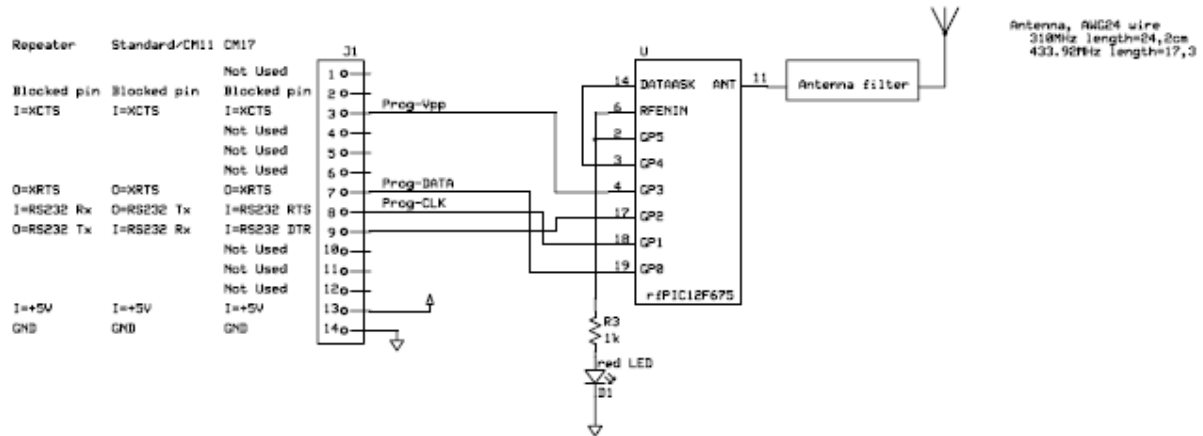
The microcontroller used on the transmitter pcb is a Microchip rPIC12F675. This microcontroller can be programmed with a Microchip PICKit 1 Flash starter kit. The 14-pins connector used on the transmitter PCB is compatible with the 14-pins connector of the PICKit 1 programmer so the transmitter PCB can be connected directly to the programmer without modification.

For more information about PICKit 1 see:

http://www.microchip.com/stellent/idcplg?IdcService=SS_GET_PAGE&nodeId=1406&dDocName=en010053

13. Schematics and connections.

13.1. RF transmitter schematics



13.2. Bus and microcontroller connections.

pin	USB RS232	prog	rfPIC 12F675	Standard or CM11 Xmitter	FireCracker CM17 Xmitter	Xmitter stand-alone
1			GP5-2	(RF enable)	(RF enable)	(RF enable)
2			GP4-3	(RF xmit data)	(RF xmit data)	(RF xmit data)
3		Vpp	GP3-4	I=XCTS	I=XCTS	(I=pushbutton)
4						
5						
6						
7		DATA	GP0-19	O=XRTS	O=XRTS	Contact 1
8	O=RS232 RTS	CLK	GP1-18	O=RS232 Tx	I=RS232 RTS	Contact 2
9	O=RS232 DTR		GP2-17	I=RS232 Rx	I=RS232 DTR	I=RS232 Rx
10						
11						
12						
13	+5V	VDD	VDD-1	VDD	VDD	VDD
14	GND	GND	GND-20	GND	GND	GND

Note: (signal used by the microcontroller but not connected to the 14-pins connector)

14. Warning:

RF signals are possible disturbed and it has not been justified for this equipment at uses in circumstances where life-threatening or dangerous situations are possible.

15. Copyright notice

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16. Revision history.

Version 10.1 – September 26, 2007

RS232 format used= 2 stop bits.

Version 11.0 – October 27, 2007

Chapter 3: RS232 module added.

Chapter 7.1 added

Chapter 7.2: transmit block and continuously commands changed to 31 and 35

Version 12.0 – January 22, 2008

CM11 and CM17 options removed.

RFXCOM Homeseer plug-in added.

Version 13.0 – February 18, 2008

HomeEasy added

Version 13.1 – April 1, 2008

Text "Hex" added at initialization commands.

Version 13.2 – April 25, 2008

Handshake information moved to handshake document.

Version 14.0 – August 8, 2008

32 bits mode no longer used

Version 14.1 – November 23, 2008

Copyright message extended.

Version 14.2 – January 1, 2009

Text changes