

RCQ3-434-ACT

Wireless Actuator for Home Automation

Wireless actuator for home automation, composed by a TX unit controllable via RS232 serial interface and by one or more ACTUATOR units with the possibility to switch from a minimum of 4 up to a maximum of 256 devices (relays). This wireless control system is designed for the most varied requirements in the field of Home automation, it can be used to activate all kinds of lighting, as other applications, for example heating / cooling, electric gates, automatic doors and industrial controls. The TX unit can be controlled by a normal PC by a Raspberry device or by an Arduino microcontroller. It is possible to have a "point to point" configuration (No.1 TX unit - No.1 ACT unit) or a "point-multipoint" configuration (No. 1 TX unit more ACT units) up to the possibility of switching 256 users (relays).

RCQ3-434-ACT Actuator board

This board allows to drive 4 relays both in monostable and bistable mode. It is possible use commercial relay board. Must be powered at 5Volt.

RCQ3-434-DK Gateway board

The TX unit is equipped with a USB-serial adapter (chip Prolific PL2303), this allows it to be used immediately connecting it to a standard PC or a Raspberry device and then sending simple RS232 commands.

Main characteristics :

- Bidirectional systems
- Sending via Rs232 of a switch command to the ACT unit, to switch N.4 relay in monostable or bistable mode.
- For each switch command sent the Gateway receive a feedback from the ACT.
- It is possible to know the state of the individual relay of a specific ACT unit anytime.
- It is possible to manage more ACT unit.
- Request the RSSI value
- Request the remote configuration and remote battery value.
- Request the remote Temperature value.

This product is an application of the module RCQ3-XXX for more information you can consult :

<https://www.radiocontrolli.com/files/datasheets/RCQ3-XXX.pdf>.

This device can be work also in Long Range Mode (LRM) that is a particular encoding technique that trades data rate for sensitivity gains. These gains are achieved by digital coding.

For more information you can consult this document : <https://www.ti.com/lit/an/swra642/swra642.pdf>

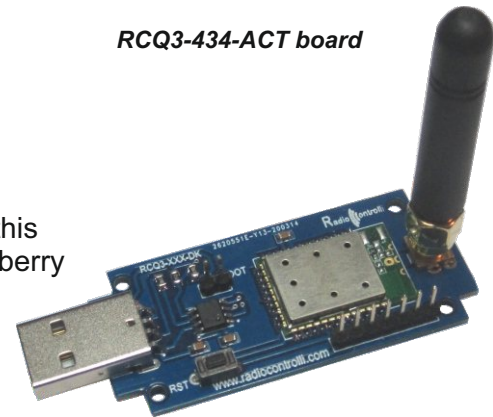
This application work with this frequency parameters :

| | |
|--------------------|----------------------------|
| Data Rate | 2.5 kbps |
| Modulation | 2-GFSK |
| Deviation | 5KHz |
| Frequency Channels | Programmable see datasheet |
| RF Power Output | Programmable see datasheet |

The Long Range Mode Functionality allows to reach distances > 1000meters in open field.

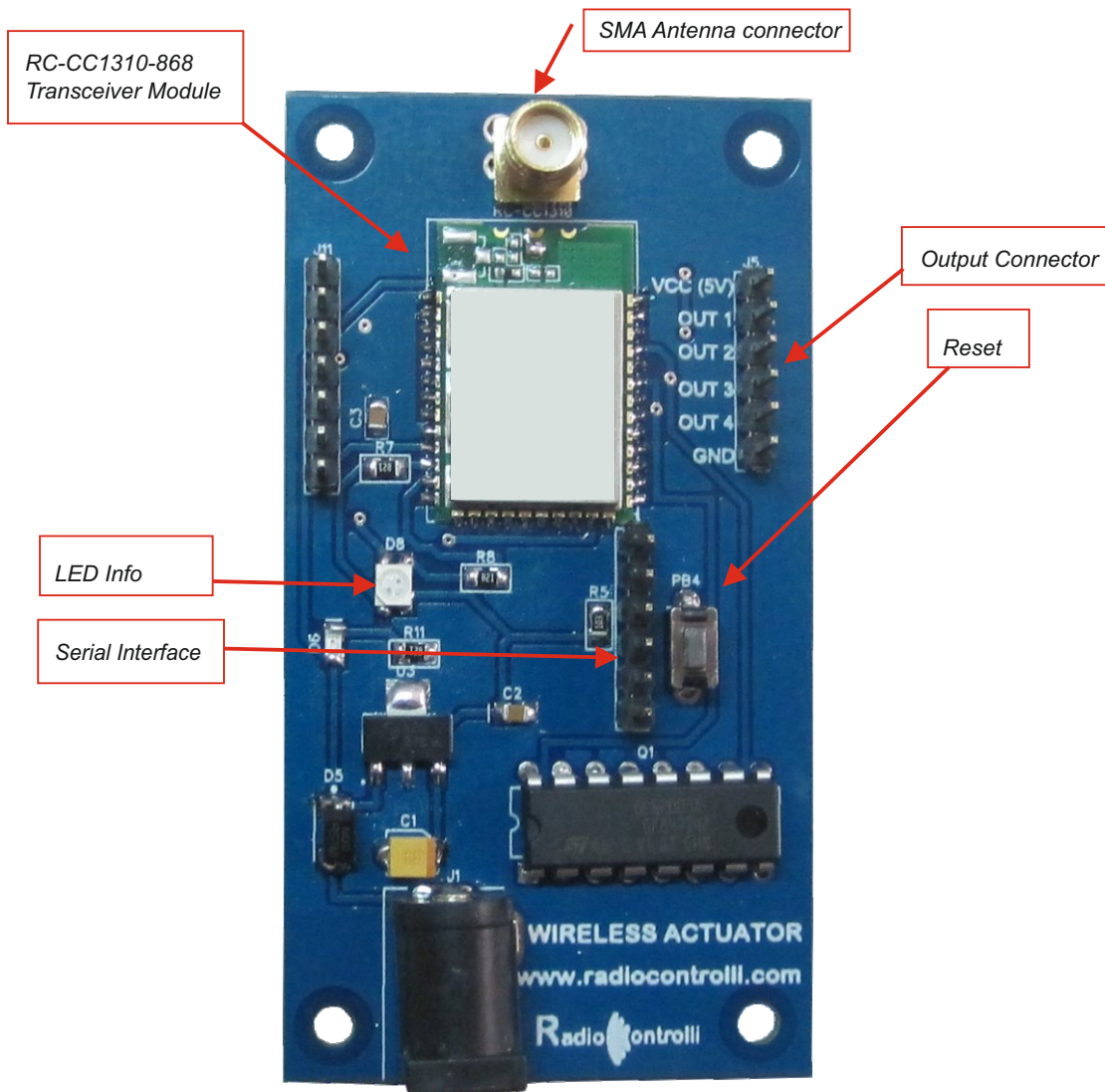


RCQ3-434-ACT board



RCQ3-434- DK board

1.0 Description of the board



+VIN 5 Volt

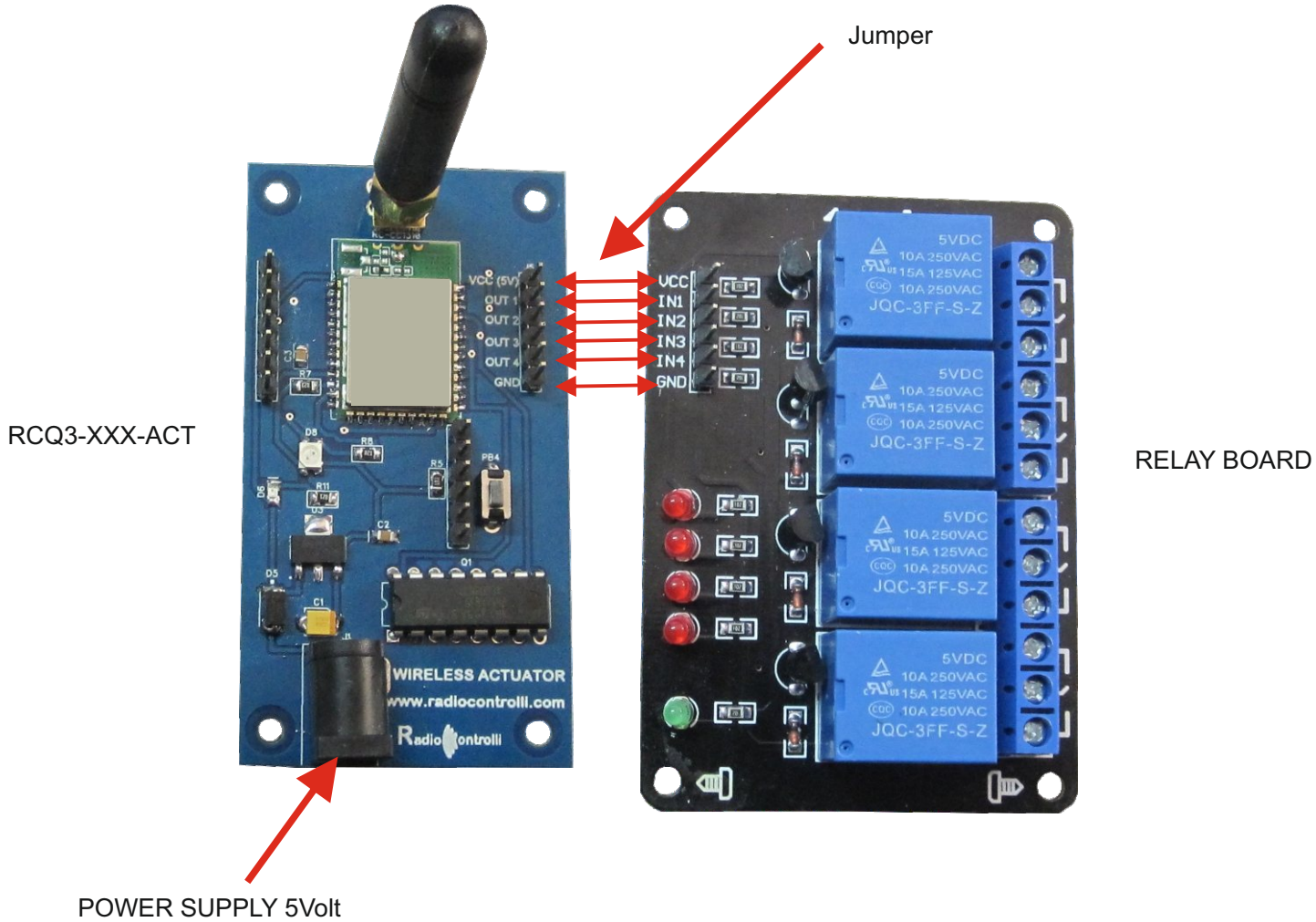
RESET
Switch to reset the board

RC-CC1310-434
This application is realized using the module RC-CC1310-434 from RadioControlli.

RS232 Connector
With this connector is possible (using the appropriate cable) to configure the device (Local Address / Remote Address).

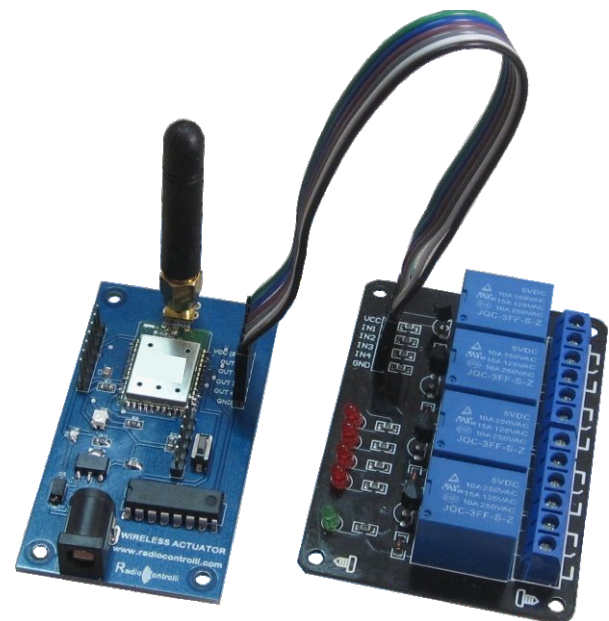
Output Connector
using jumpers you can connect this connector to a 4-channel commercial relay board (see picture below).

1.1 Connection with Relay Board

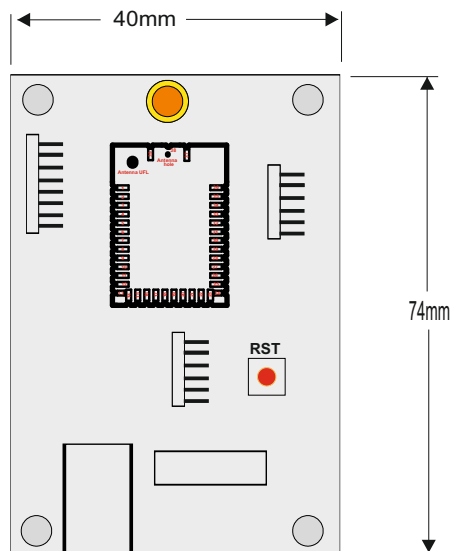


- The Board denominated RCQ3-XXX-ACT must be powered at 5Volt.
- Using normal jumper it is necessary to make the following connections :

| <u>RCQ3-XXX-ACT</u> | | <u>RELAY BOARD</u> |
|---------------------|---------|--------------------|
| VCC (5V) | ←-----→ | VCC |
| OUT 1 | ←-----→ | IN1 |
| OUT 2 | ←-----→ | IN2 |
| OUT 3 | ←-----→ | IN3 |
| OUT 4 | ←-----→ | IN4 |
| GND | ←-----→ | GND |



2.0 Mechanical Dimensions



Max height (without Antenna) = 22mm

3.0 Technical Characteristics

Technical Characteristics

| Characteristics | MIN | TYP | MAX | UNIT |
|-----------------------------|-----|--------|-----|------|
| Supply Voltage | 4.5 | 5.0 | 5.5 | VDC |
| Supply Current Standby Mode | | 15 | | mA |
| Supply Current MAX (*) | | 300 | | mA |
| Operative Frequency | | 433.92 | | MHz |
| RF Power Output 50ohm | | +10 | | dBm |
| Type of Modulation | | 2GFSK | | |
| Operative Temperature | -30 | | +75 | °C |

(*) With all the 4 relay activated

4.0 Wireless Actuator Functionality

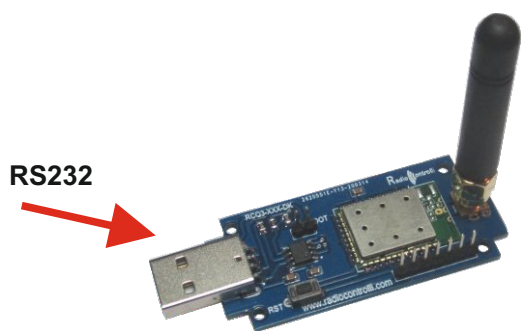
Wireless actuator for home automation, it is possible to use 1 unit as Transmitter (controllable via Rs232 serial interface) and by one or more RX units with the possibility to switch 4 channels in bistable or monostable mode for every RX units.

The unit denominated used ad Transmitter can be controlled by a normal PC by a Raspberry device or by an Arduino microcontroller. It is possible to have a "point to point" configuration (No.1 TX unit - No.1 RX unit) or a "point-multipoint" configuration (No. 1 TX unit more RX Unit).

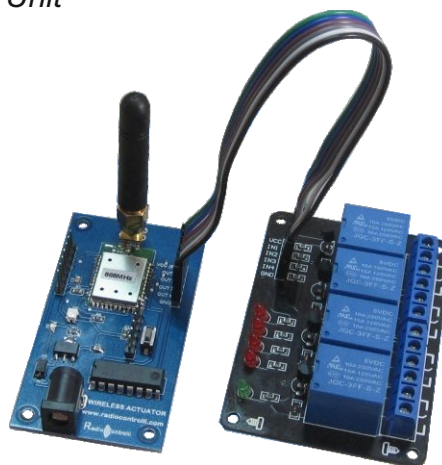
LIST COMMAND TO SEND BY RS-232 port

| Command Sent from RS232 | Description |
|-------------------------|---|
| 1 ##0x0 | Set the Output «x» to Low Level («x» can be 1,2,3,4) |
| 2 ##0x1 | Set the Output «x» to High Level («x» can be 1,2,3,4) |
| 3 ##?M | Request Monostable or Bistable State |
| 4 ##?O | Request Output State |
| 5 ##?RS | Request RSSI value |
| 6 ##?B | Request remote battery Value |
| 7 ##?T | Request Temperature Value |
| 8 ##?C | Request remote Configuration |
| 9 ##?V | Request remote Software version |

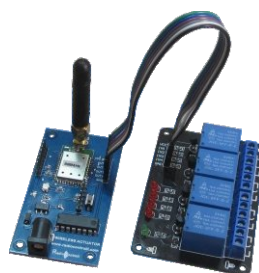
With simple Rs232 command you control «n» Remote Unit



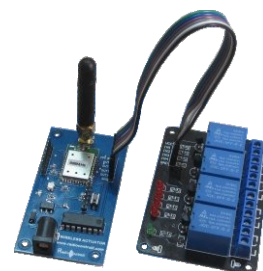
Gateway Unit



UNIT A



UNIT B



UNIT n

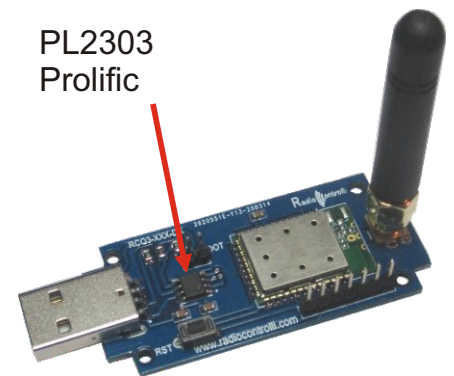
5.0 GATEWAY UNIT

The GATEWAY unit is the interface between the wireless ACTUATOR (RECEIVER) and the external control logic. The management of the ACTUATORS is made by an external application placed on an embedded system (PC, Raspberry, Arduino) via RS232 serial interface.

5.1 USB GATEWAY UNIT

This type of Gateway unit is equipped with a USB-RS232 adapter (chip Prolific PL2303) in order to be ready to use.

May be necessary to install the driver for the USB-RS232 converter PL2303 (consult Prolific website).



5.2 GATEWAY UNIT using RCQ3-ACT-XXX board

It is possible use a board denominated RCQ3-ACT-XXX also as a Gateway to drive other Actuator board.

You can use the Serial connector (see below) to drive the gateway with your microcontroller. (It is necessary to connect a 3Volt serial port).

The ACTUATOR board must not be powered,



- CTS
- RX
- TX
- +3VOLT
- RTS
- GND

you can find more details in the electrical schematics inside this document.

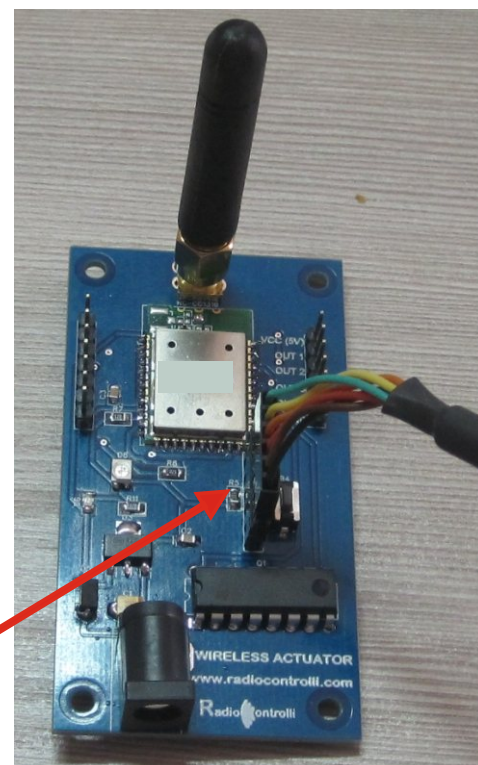
5.3 GATEWAY UNIT using RCQ3-ACT-XXX board and USB/RS232 cable

It is possible to use a cable USB-RS232 (supplied by RadioControlli) to drive your ACTUATOR boards.
It is necessary to make the connection as in the picture, respecting the polarities.
The ACTUATOR board must not be powered,
It is necessary to make the installation about the Cp2102 driver on your Windows PC.



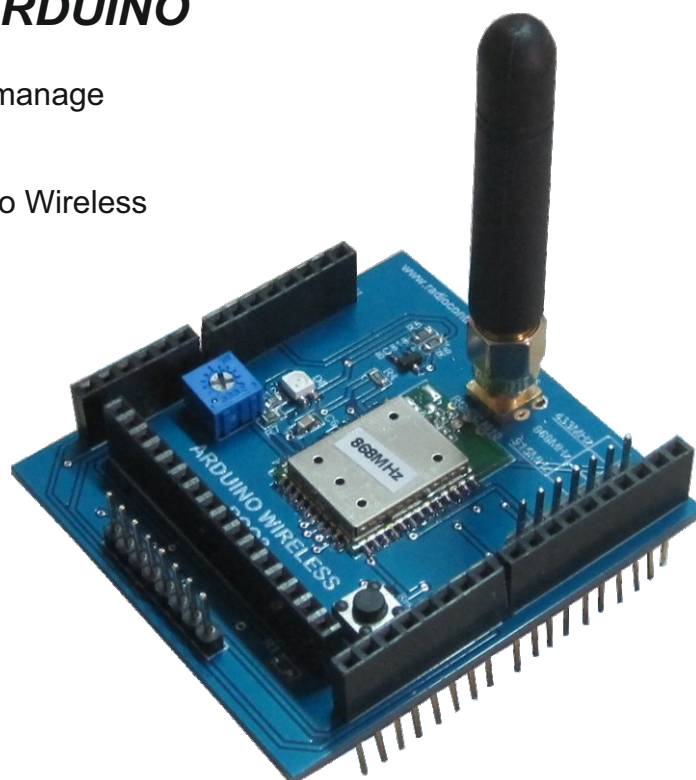
USB - RS232 RadioControlli Adapter

Respect this polarity
(wire black = GND)



5.4 GATEWAY UNIT USING ARDUINO

It is possible to use ARDUINO microcontroller to manage your ACTUATOR boards.
Below you can see the Arduino shield.
See the complete documentation on the Arduino Wireless Radiocontrolli website.



6.0 CONFIGURATION UNIT (Gateway and Actuator)

On each device (both gateway that actuator) it is necessary to set the following parameters:

LOCAL ADDRESS It is its address
DESTINATION ADDRESS It is the address of the device with whom you want to connect

Every device is pre-configured with a default address «7E 7E 7E 7E» this address can be modified during the configuration session.

When the device receives the data via RF, the first operation that is made is to check the address header and compare it with its address, if the two addresses coincide the microcontroller processes the data, otherwise all the data are discarded.

For example in the configuration below :
For default the Gateway is connected to the DEVICE A.

I can change the Destination Address (of the GATEWAY) to 03 03 03 03 to make the connection with the device B.

I can change the Destination Address (of the GATEWAY) to 04 04 04 04 to make the connection with the device C.

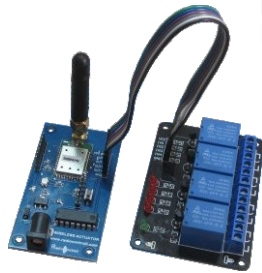
Local Address : **01 01 01 01**
Destination Address : 02 02 02 02

GATEWAY



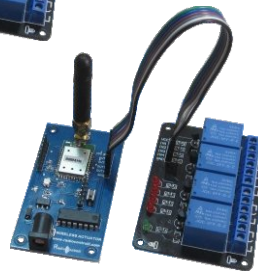
Local Address : **02 02 02 02**
Destination Address : 01 01 01 01

DEVICE A



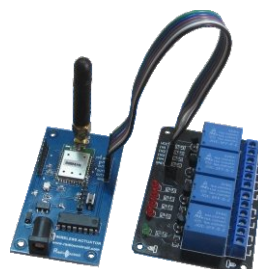
Local Address : **03 03 03 03**
Destination Address : 01 01 01 01

DEVICE B



Local Address : **04 04 04 04**
Destination Address : 01 01 01 01

DEVICE C



Wireless Actuator
for Home Automation

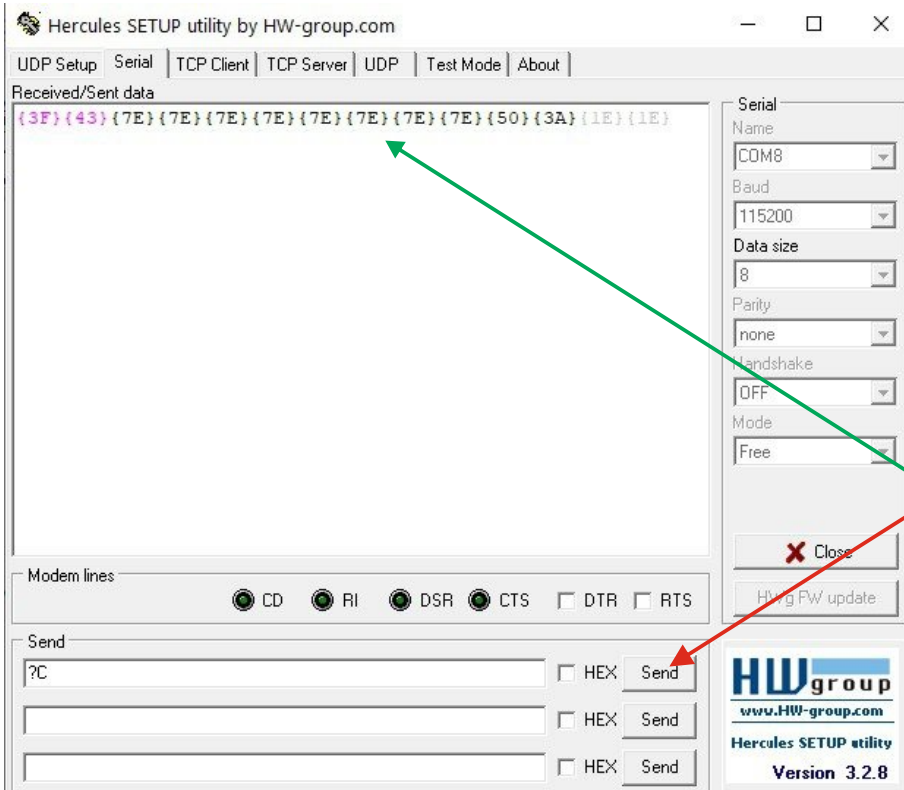
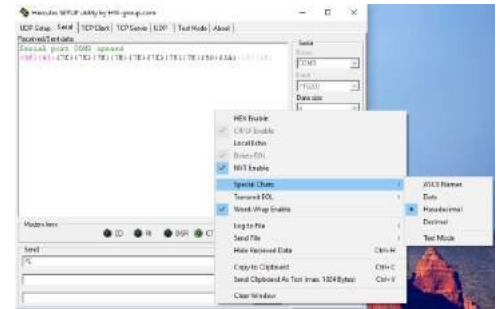
6.2 Example of Configuration Address (Command ?C / ^C)



Software used : Hercules SETUP utility (free use)

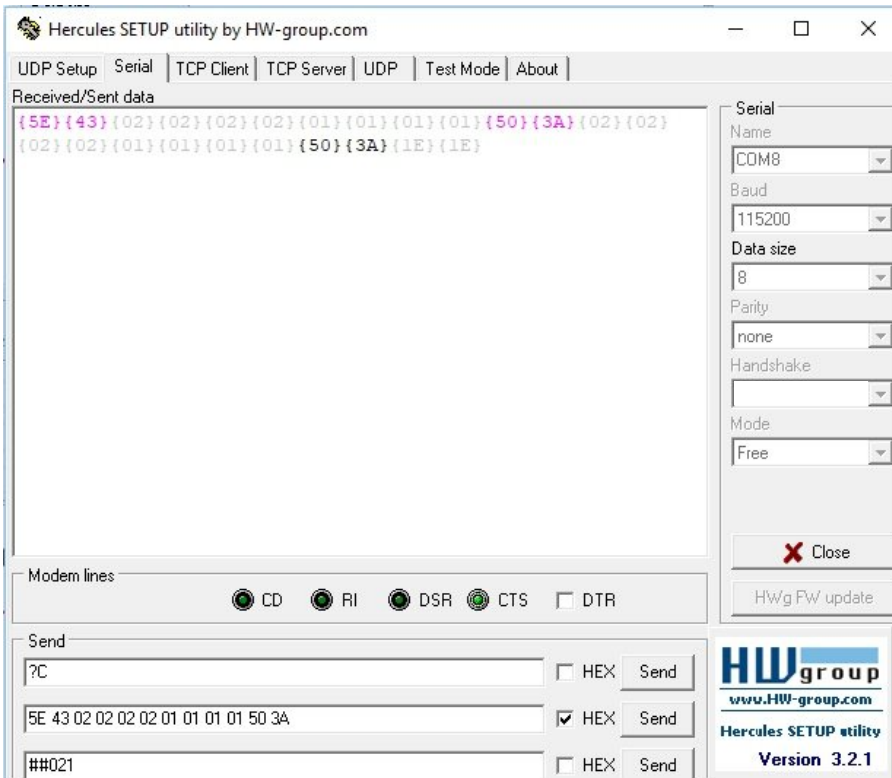
Open the serial port with this parameters

Set the Hercules software to receive hexadecimal character (press the right mouse button and :
- In the Special Chars menu choose HEX
- Choice HEX Enable



Push this button, in this mode the string “?C” is transmitted (request of configuration)

The module responds by sending the default configuration parameters 7E 7E 7E 7E 7E 7E 7E 7E 50 3A 1E 1E

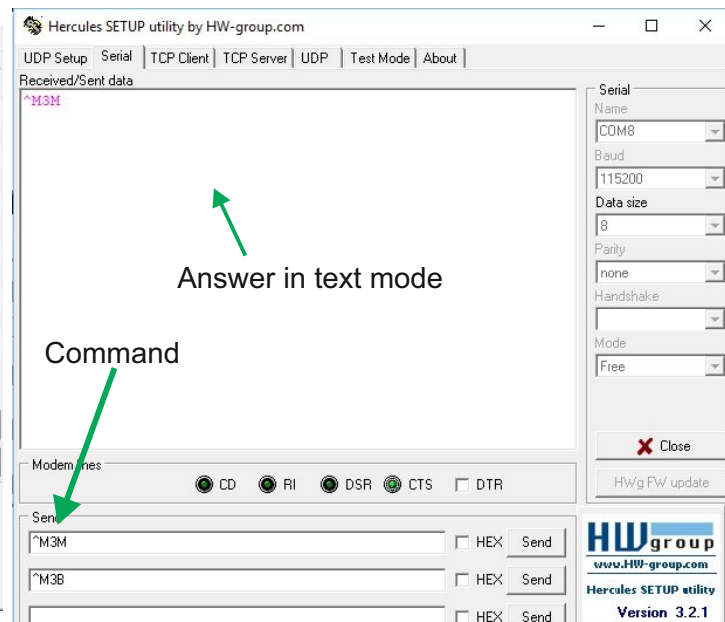
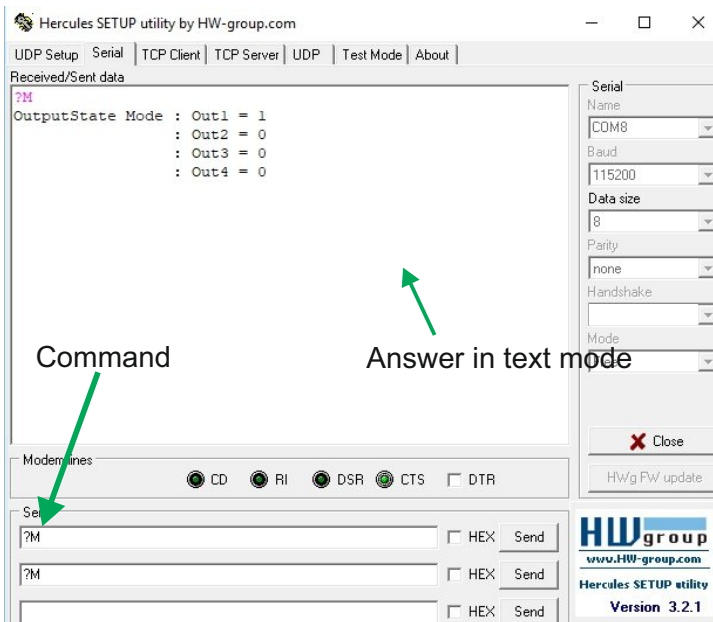


Push this button, in this way we sent the new Configuration String 02 02 02 02 01010101 50 3A (hexadecimal string) We have changed the parameters in red :

01 01 01 01 Destination address

The module answer confirming the new configuration :
02 02 02 02 01 01 01 01 50 3A

6.3 Example of Configuration Output Monostable/Bistable



«?M» returns information on how the channels were previously set :
 OUT1=1= Monostable mode
 OUT2=0= Bistable mode
 OUT3=0= Bistable mode
 OUT4=0= Bistable mode

«^M + xM or xB» set the channel in M (monostable) or B (bistable) .
 Example :

^M1M set the channel 1 in Monostable Mode
 ^M2B set the channel 2 in Bistable Mode

These operation can be done also using the software denominated RCQ3 Configuration.exe.

To change the «time» of the monostable mode consult the datasheet of the RCQ3-XXX module.

7.0 OPERATION MODE

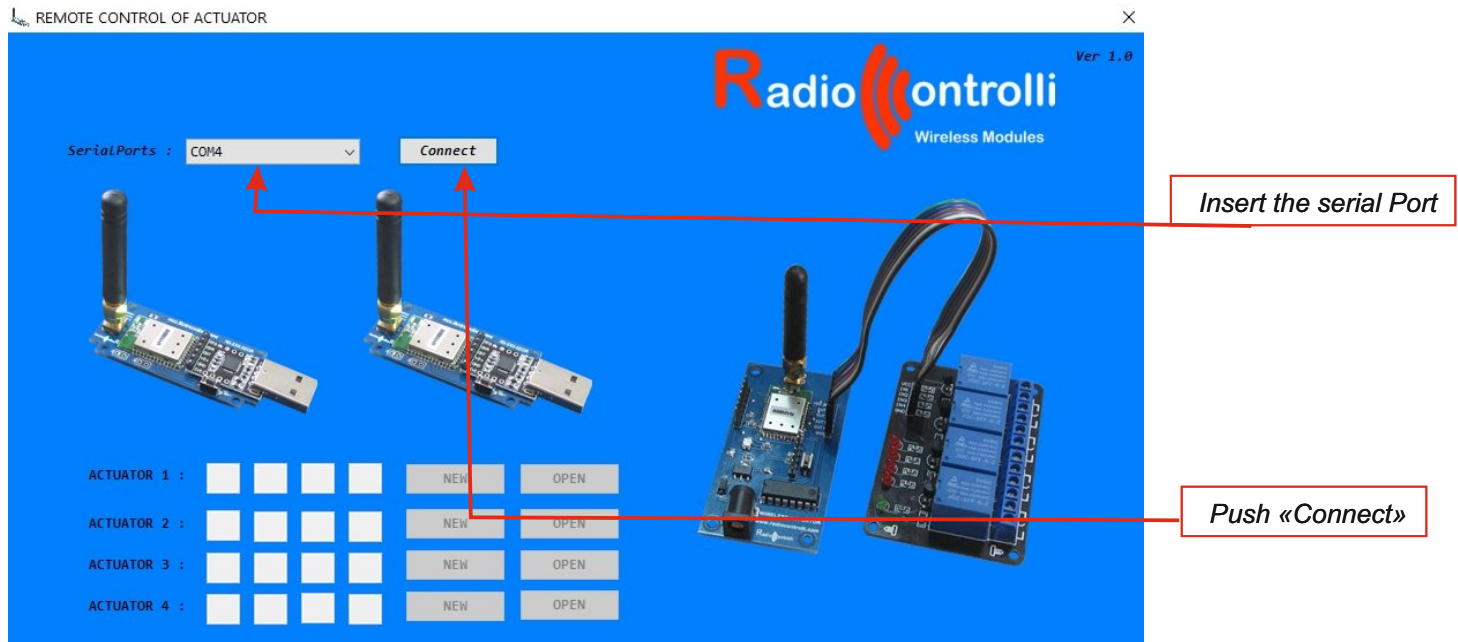
7.1 Operation using the software Remote Control»

It is possible to make the download of this application on the website www.radiocontrolli.com.

This application has been development to provide an example of the use of RadioControlli devices. Connect the module RCQ3-XXX-DK on the USB port of your computer.

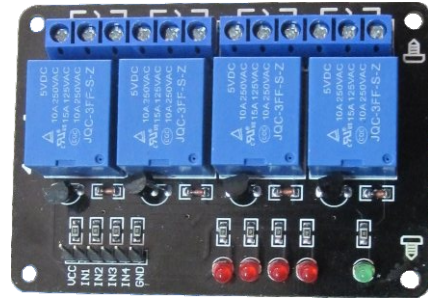
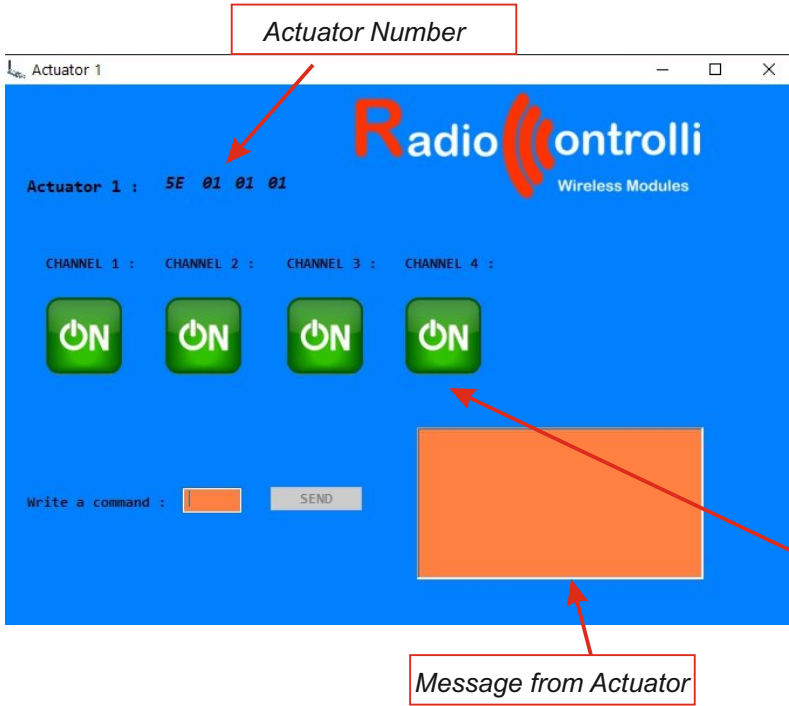
Power ON the board RC-ACT-XXX

After the software installation and having launched the program, the following screen will appear :
(This application can be used for N.4 relay).

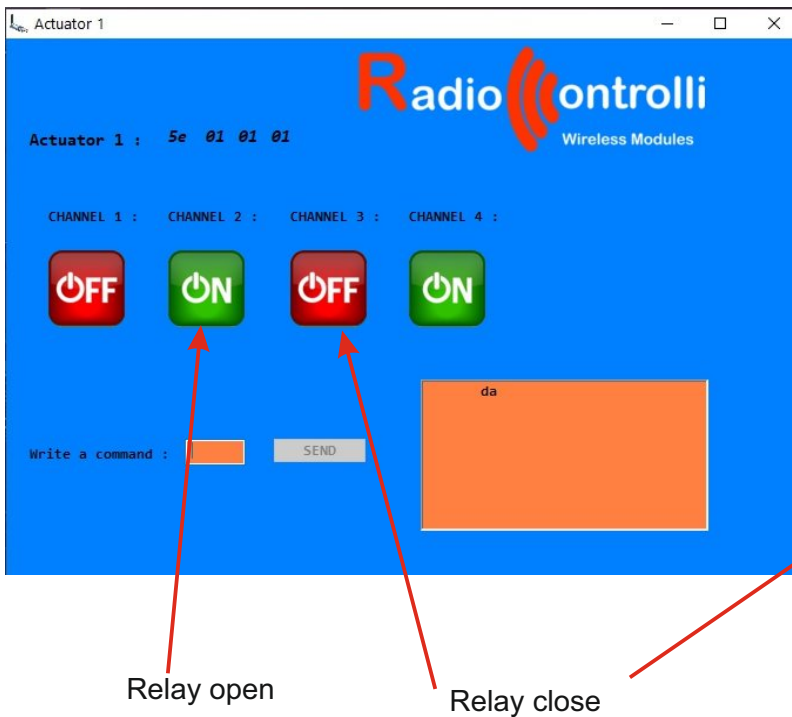


Wireless Actuator for Home Automation

The following new window will open :
Will be possible to open contemporaneously N.4 window with N.4 Actuator board.



Pressing the Channel1 button will activate relay N.1.
Pressing the Channel2 button will activate relay N.2.
Pressing the Channel3 button will activate relay N.3.
Pressing the Channel4 button will activate relay N.4.

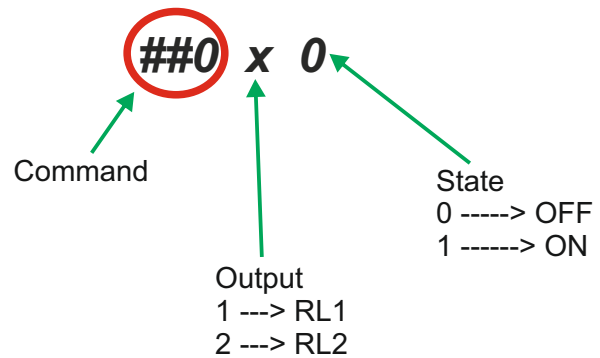
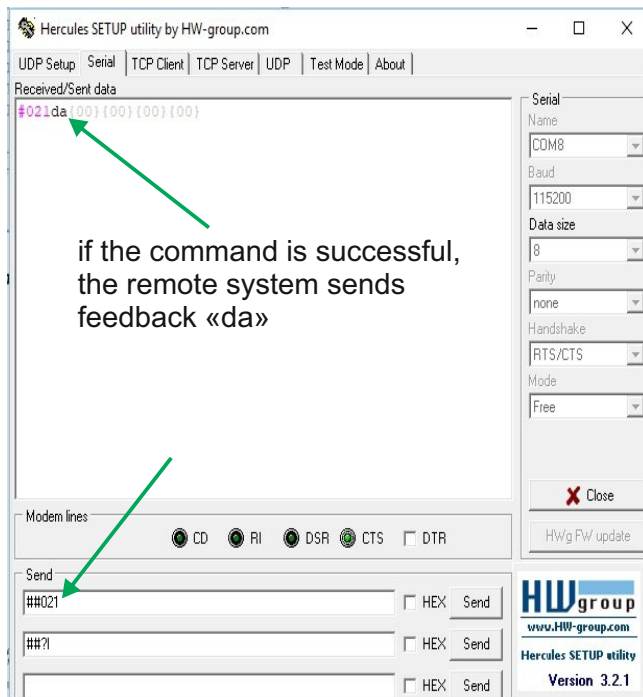


In this case the relay 1 and the relay 3 are closed, instead the relay 2 and the relay 4 are open.

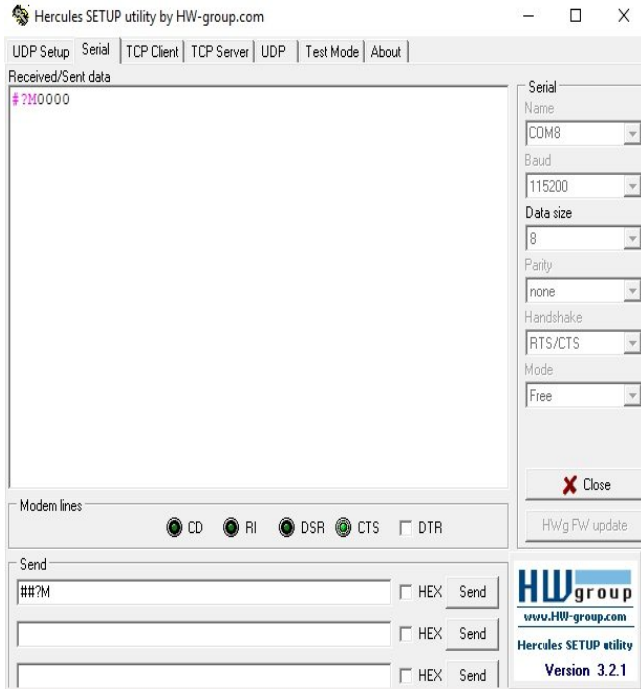
7.2 Operation mode through serial command

| Command Sent from RS232 | Description |
|-------------------------|--|
| 1 | ##0x0 Set the Output «x» to Low Level («x» can be 1,2,3,4) |
| 2 | ##0x1 Set the Output «x» to High Level («x» can be 1,2,3,4) |
| 3 | ##?M Request Monostable or Bistable State |
| 4 | ##?O Request Output State |
| 5 | ##?RS Request RSSI value |
| 6 | ##?B Request remote battery Value |
| 7 | ##?T Request Temperature Value |
| 8 | ##?C Request remote Configuration |
| 9 | ##?V Request remote Software version |

7.2.1 ##0x0 and ##0x1 Remote Relay ON/OFF



7.1.2 «##?M» Monostable state

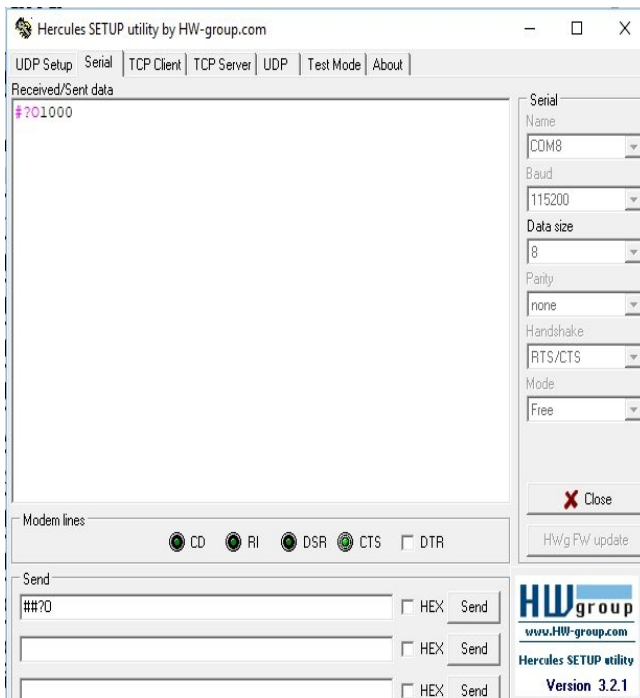


In this case all the 4 Output are setted in bistable mode.

0= Bistable

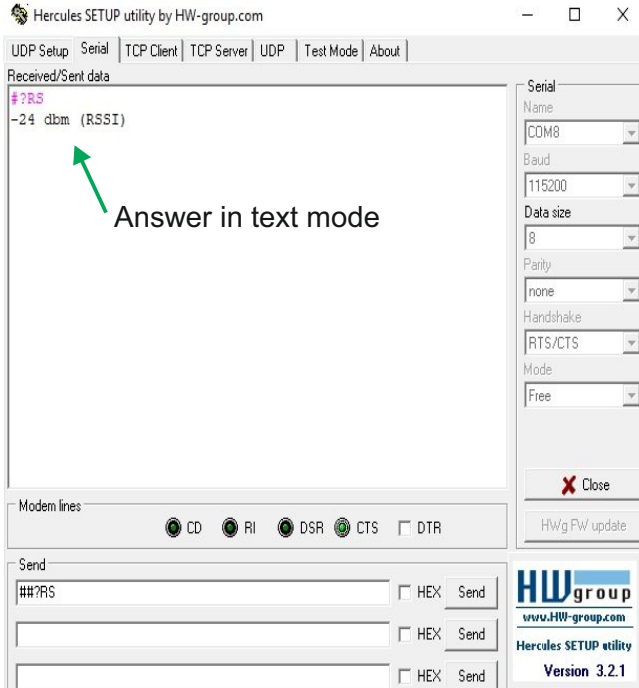
1= Monostable

7.1.3 «#?O» Command

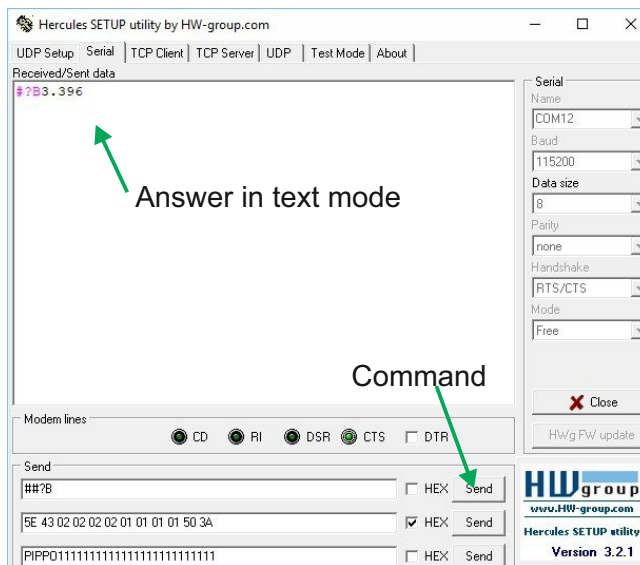


"1000" means that the output RL1 is active and ,RL2,RL3,RL4 they are not activated.

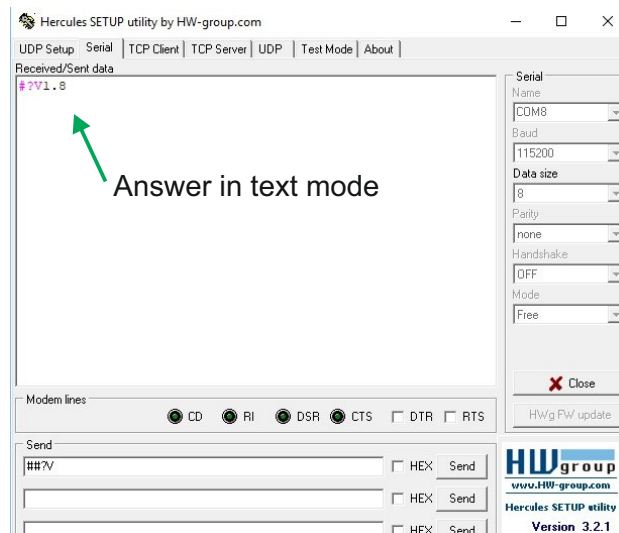
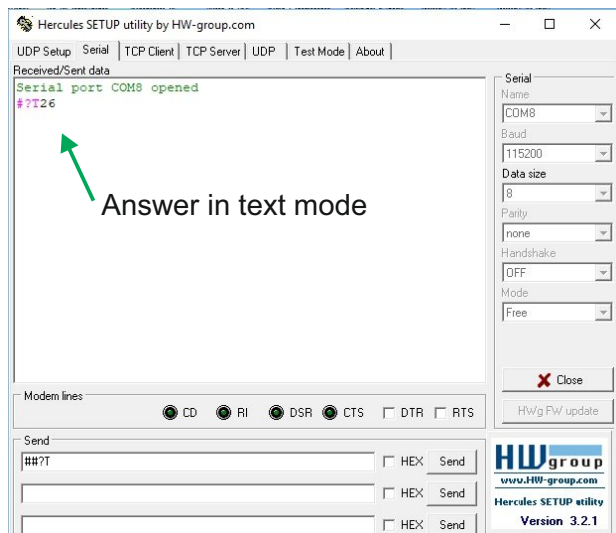
7.1.4 «##?RS» Command



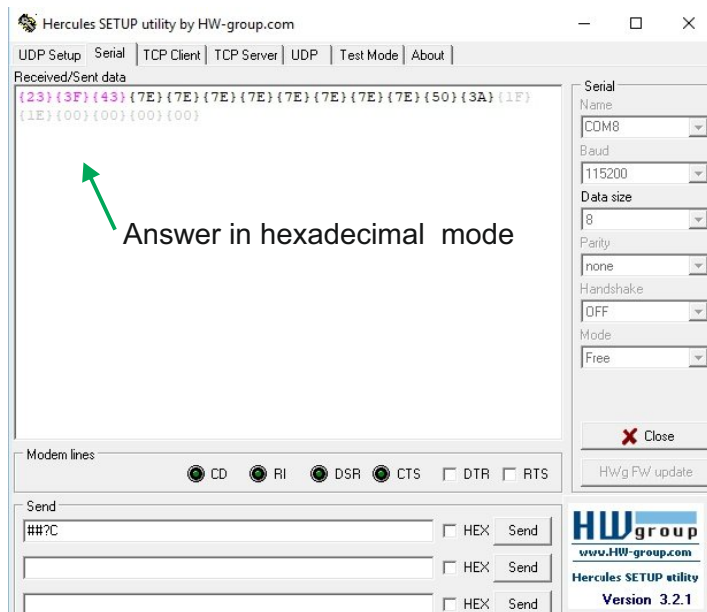
7.1.5 «##?B» Command



7.1.6 «##?T» and «##?V» Commands



7.1.7 «##?C» Command



8.0 Electrical schematics ACT Board

