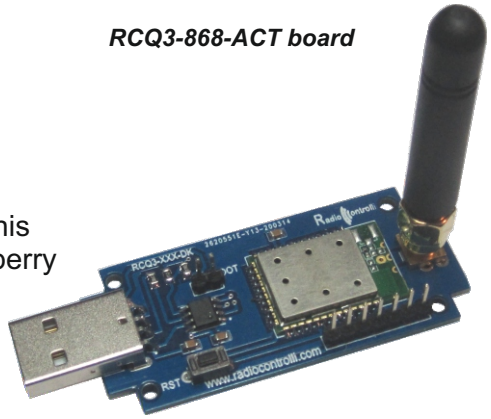
RCQ3-868-ACT

Wireless Actuator for Home Automation

RCQ3-868-ACT board

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).

RCQ3-868-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.



RCQ3-868- DK board

RCQ3-868-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 si 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.

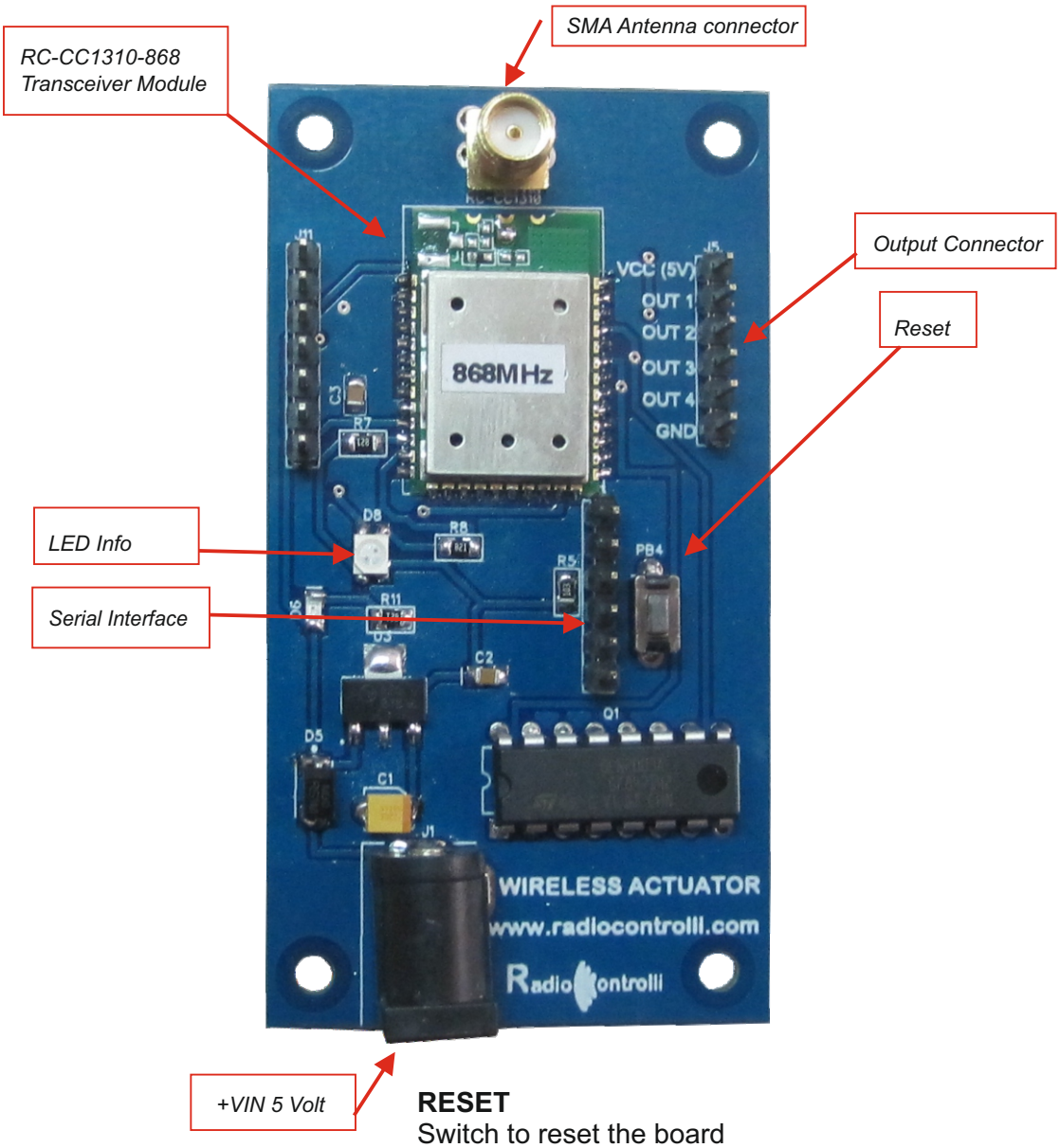
This device can be work also in Long Range Mode (LRM) that is a particulary encoding technique that trades data rate for sensitivity gains. These gains are achieved by digital coding.
For more information you can consult this document : https://www.ti.com/lit/an/swra642/swra642.pdf

wThis application work ith 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.

1.0 Description of the board



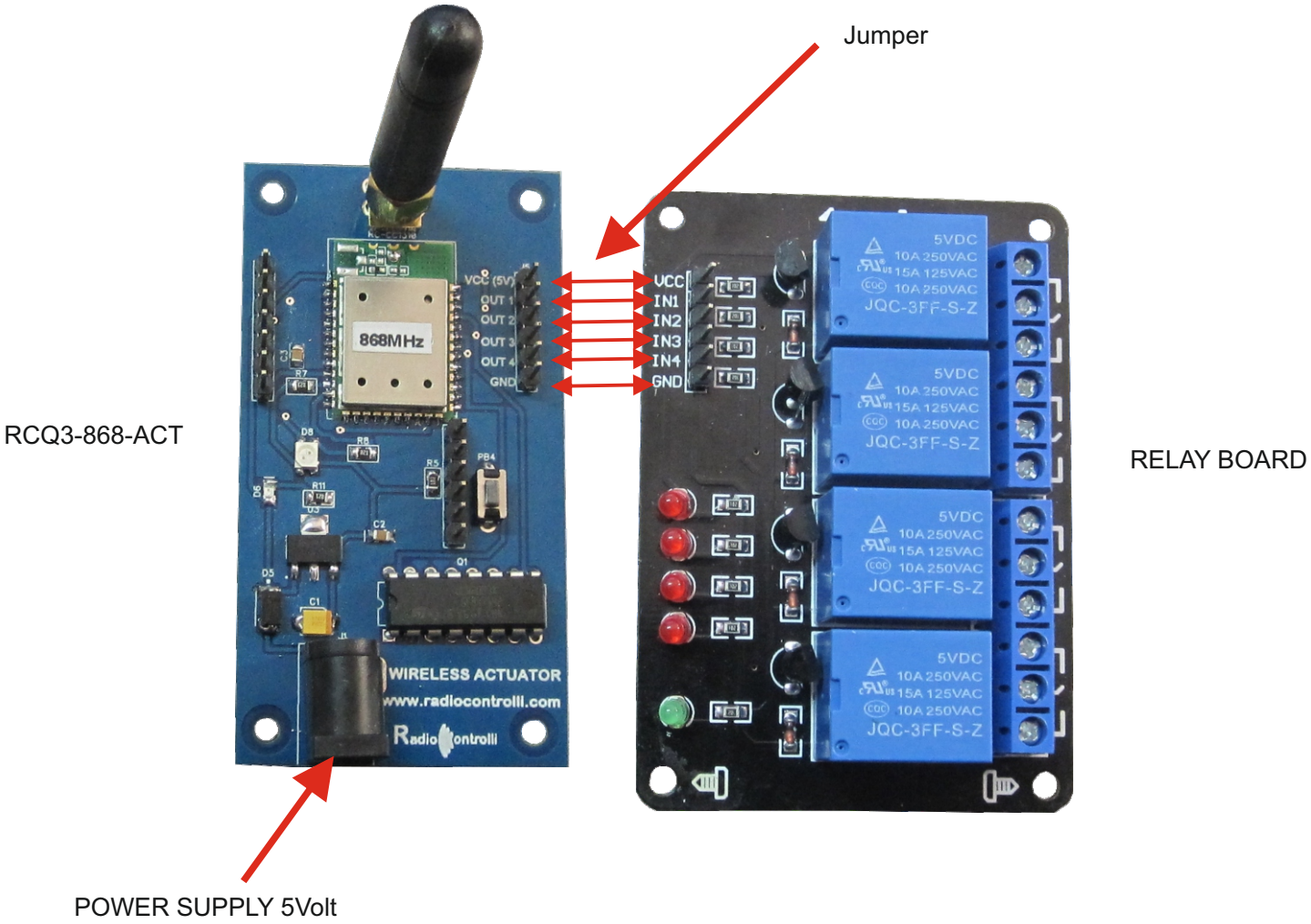
RESET
Switch to reset the board

RC-CC1310-868
This application is realized using the module RC-CC1310-868 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).

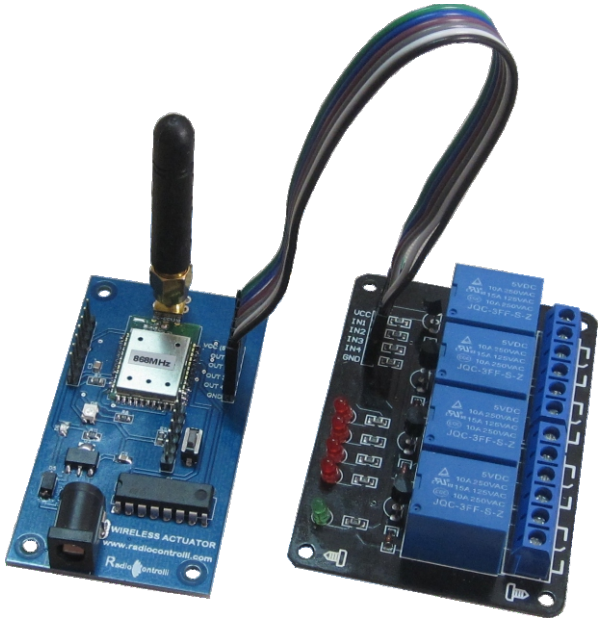
1.1 Connection with Relay Board



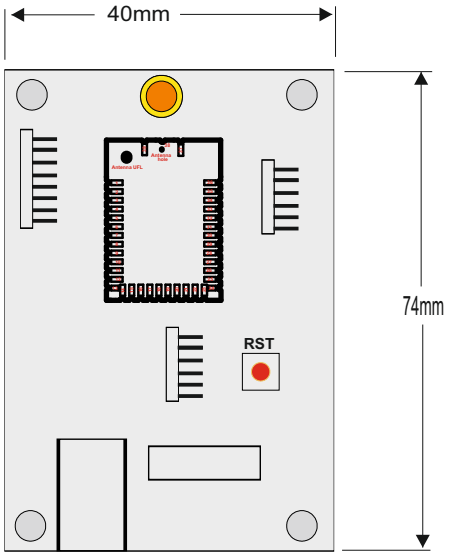
- The Board denominated RCQ3-XXX-ACT must be powered at 5Volt.

- Using normal jumper it is necessary to make the following connections :

RCQ3-868-ACT		RELAY BOARD
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		868		MHz
RF Power Output 50ohm		+10		dBm
Type of Modulation		2GFSK		
Operative Temperature	-30		+75	°C

(*) With all the 4 relay actived

4.0 Wireless Actuator Functionality

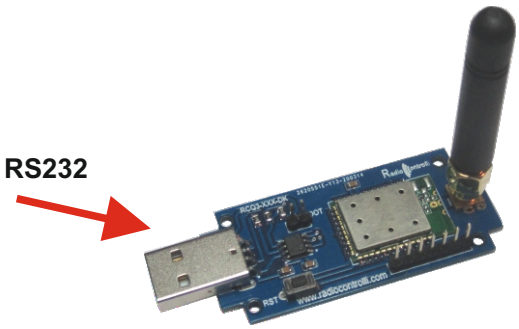
Wireless actuator for home automation, it is possible to use 1 unit as Transmitter (controllable via Rs232 serial interface) and by one or more RX units with the possibility to switch 4 channels in bistable or monostable mode for every RX units.

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

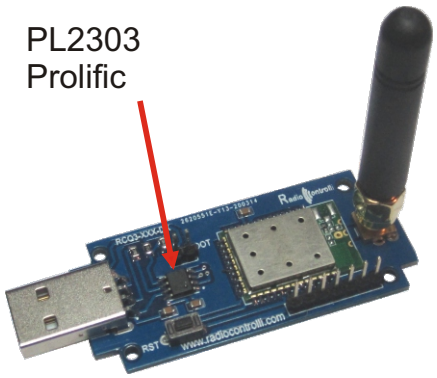
5.0 GATEWAY UNIT

The GATEWAY unit is the interface between the wireless ACTUATOR (RECEIVER) and the external control logic.

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).

PL2303
Prolific



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 defaul 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.

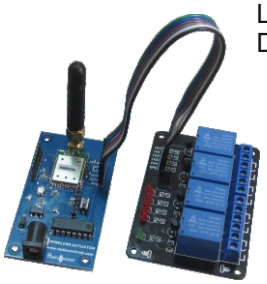
For example in the configuration below :
For default the Gateway is connected to the DEVICE A.

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

DEVICE A

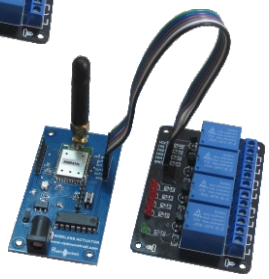


Local Address : **01 01 01 01**
Destination Address : 02 02 02 02

GATEWAY

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

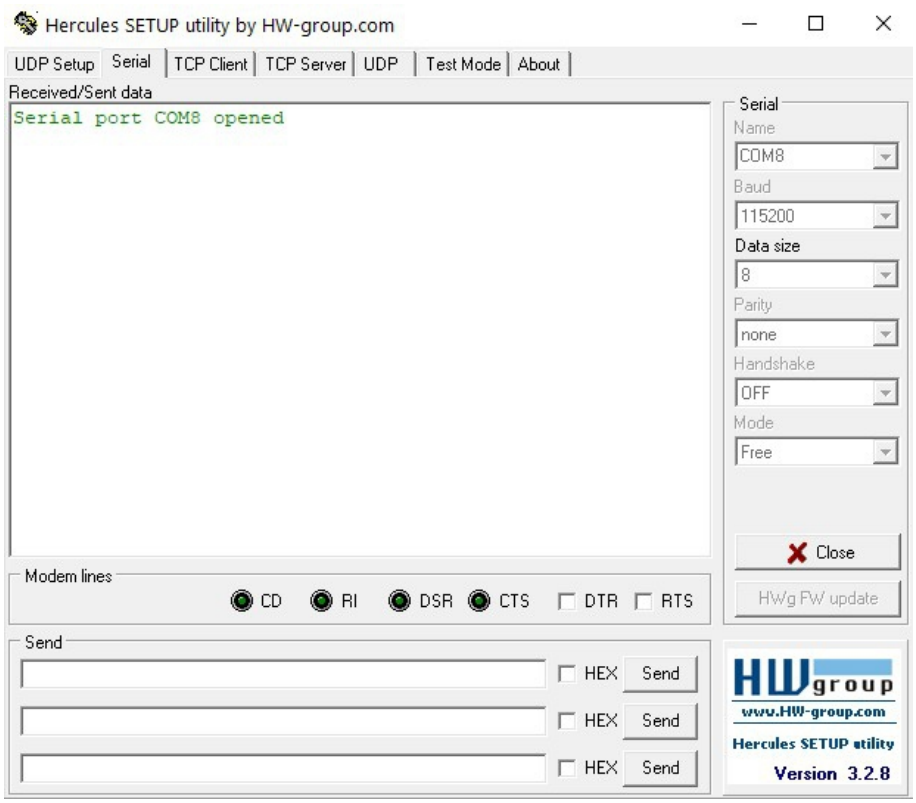
DEVICE B



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

DEVICE C

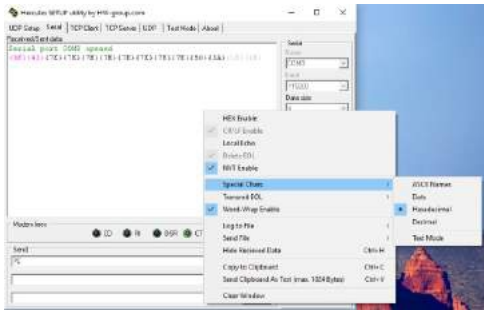
6.2 Example of Configuration Address (Command ?C /^C)

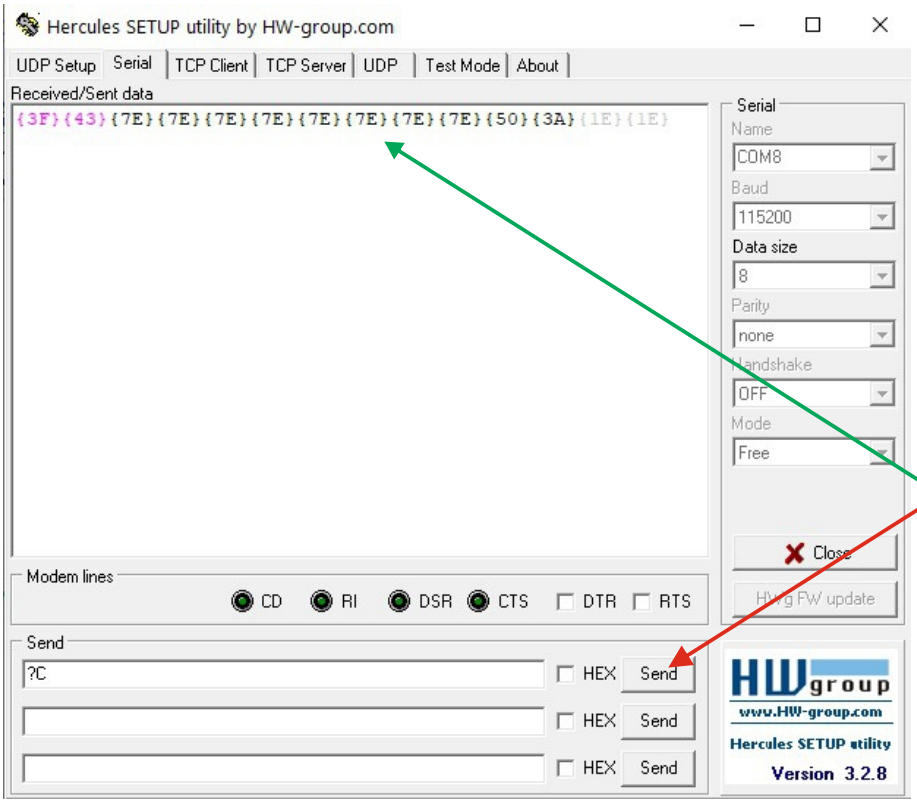


Software used : Hercules SETUP utility (free use)

Open the serial port with this parameters

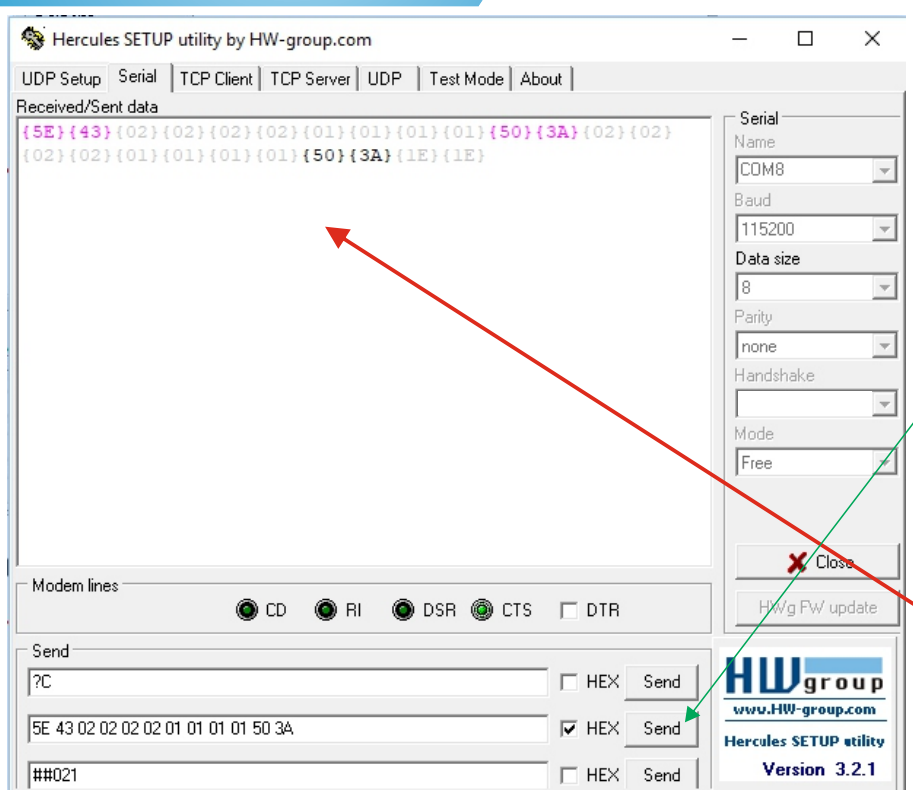
Set the Hercules software to receive hexadecimal character (press the right mouse button and :
- In the Special Chars menù choise HEX
- Choice HEX Enable





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

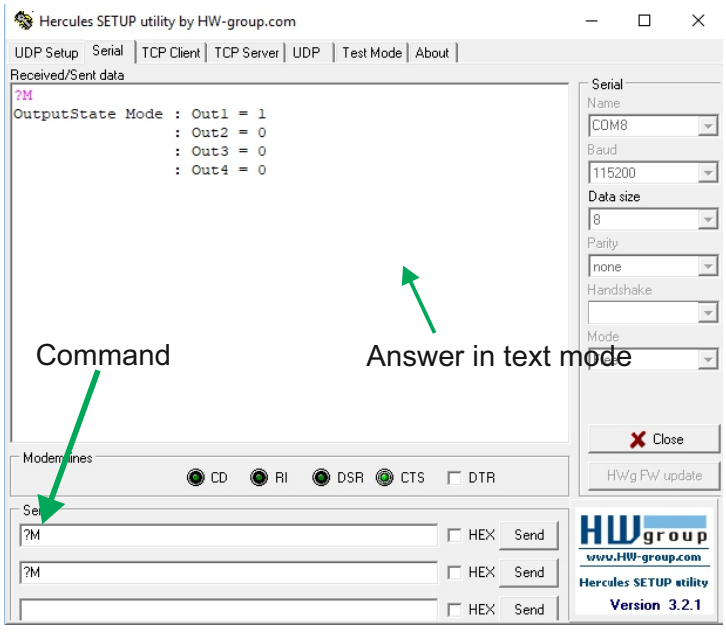


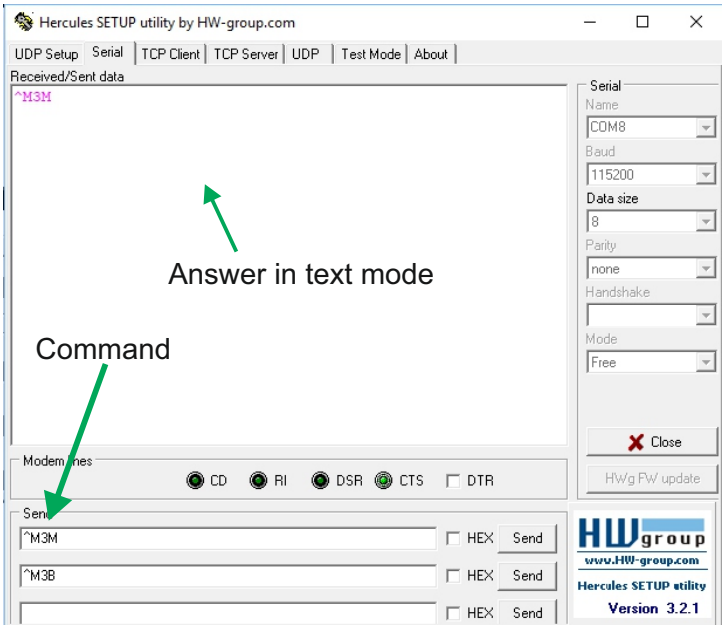
Push this button, in this way we sent the new Configuration String 02 02 02 02 **01010101** 50 3A (hexadecimal string)
We have changed the parameters in red :

01 01 01 01 Destination address

The module answer confirming the new configurazion :
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 :

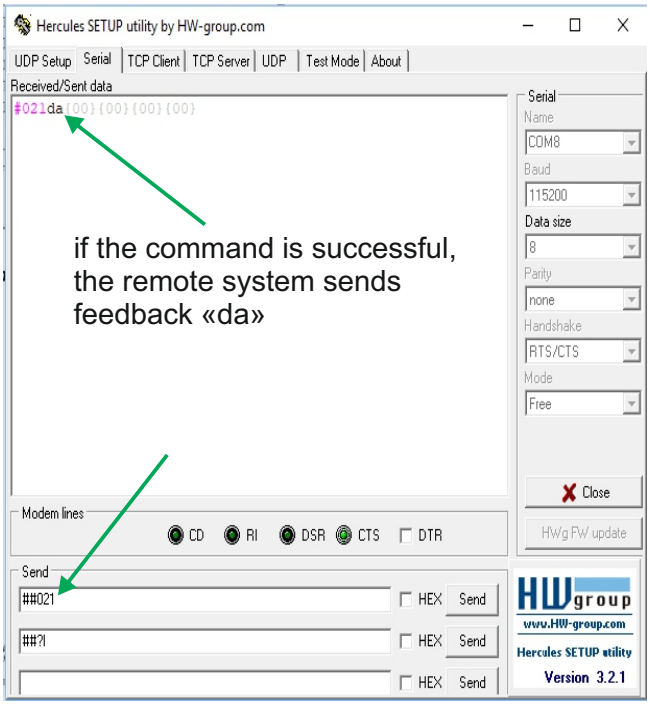
^M1M set the channel 1 in Monostable Mode
^M2B set the channel 2 in Bistable Mode

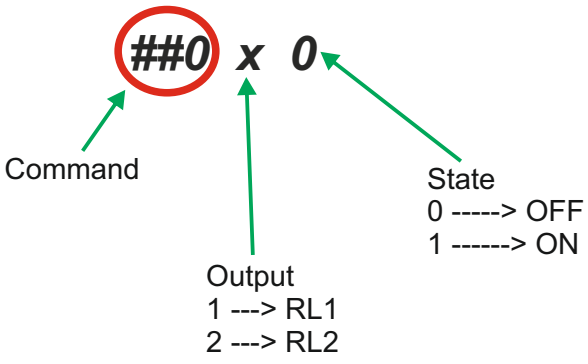
To change the «time» of the bistable mode consult the datasheet of the RCQ3-XXX module.

7.0 OPERATION MODE

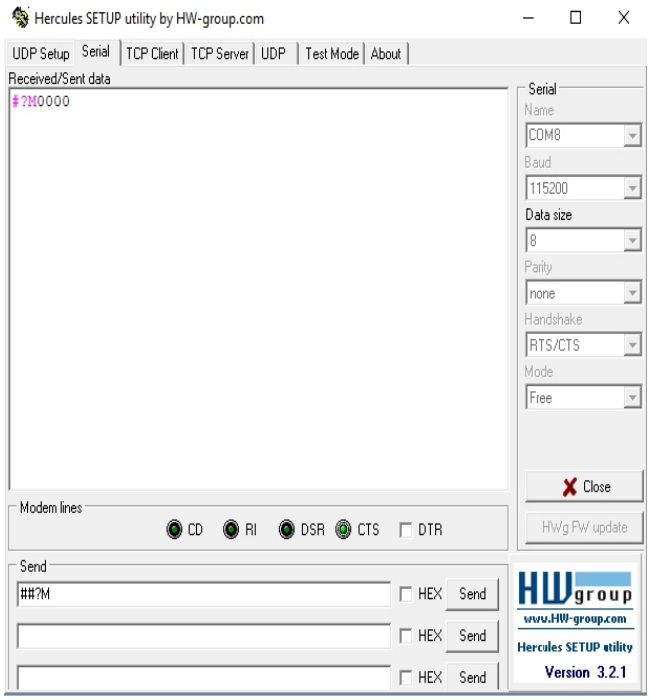
	Command Sent from RS232	Description
1	##0x0	Set the Output «x» to Low Level (»x» can be 1,2,3,4)
2	##0x1	Set the Output «x» to High Level (»x» can be 1,2,3,4)
3	##?M	Request Monostable or Bistable State
4	##?O	Request Output State
5	##?RS	Request RSSI value
6	##?B	Request remote battery Value
7	##?T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

7.1 ##0x0 and ##0x1 Remote Relay ON/OFF



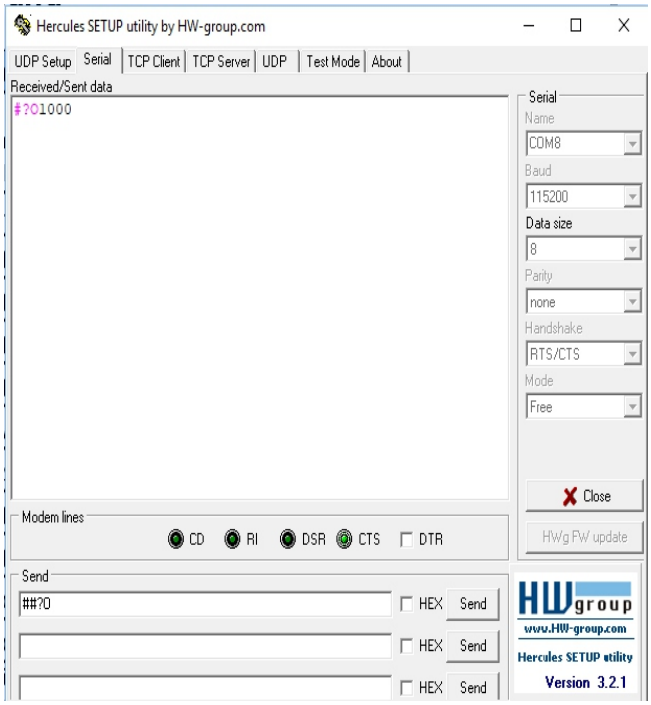


7.1.2 «##?M» Monostable state



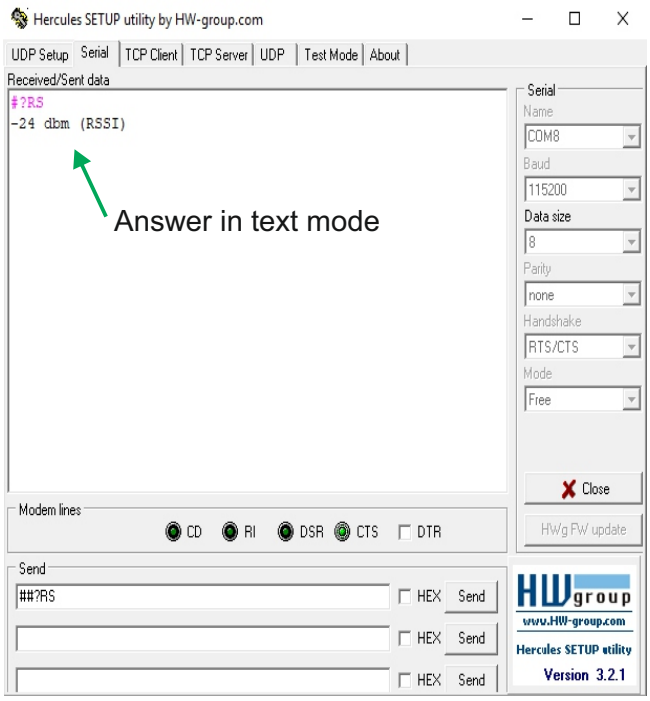
In this case all the 4 Output are setted in bistable mode.
0= Bistable
1= Monostable

7.1.3 «#?O» Command

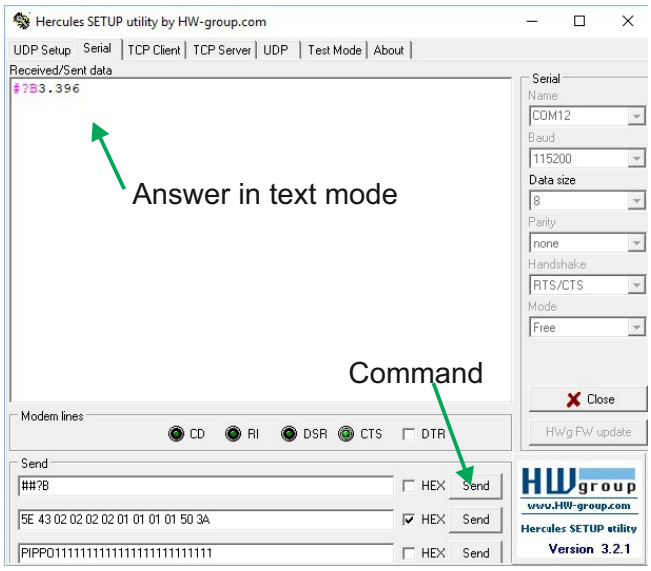


"1000" means that the output RL1 is active and ,RL2,RL3,RL4 they are not activated.

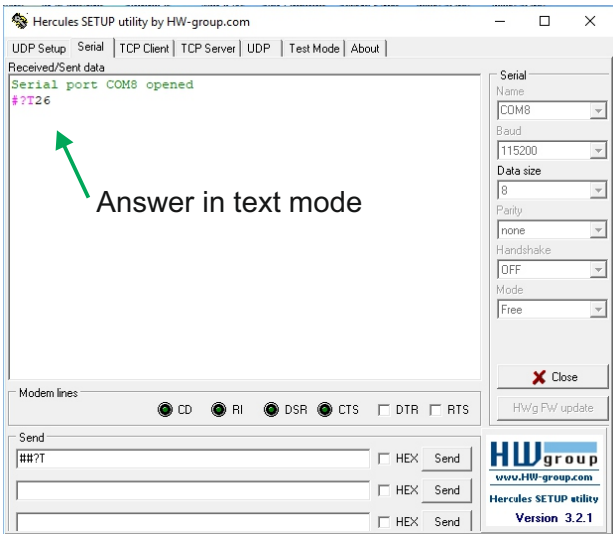
7.1.4 «##?RS» Command

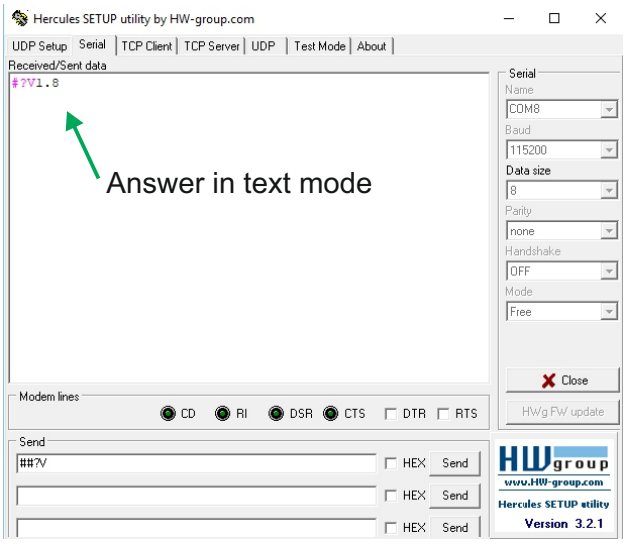


7.1.5 «##?B» Command

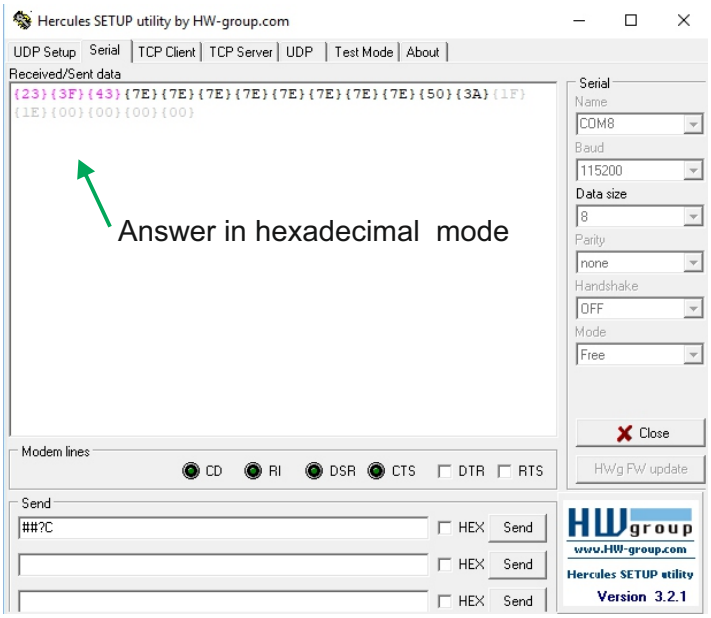


7.1.6 «##?T» and «##?V» Commands





7.1.7 «##?C» Command



8.0 Electrical schematics ACT Board