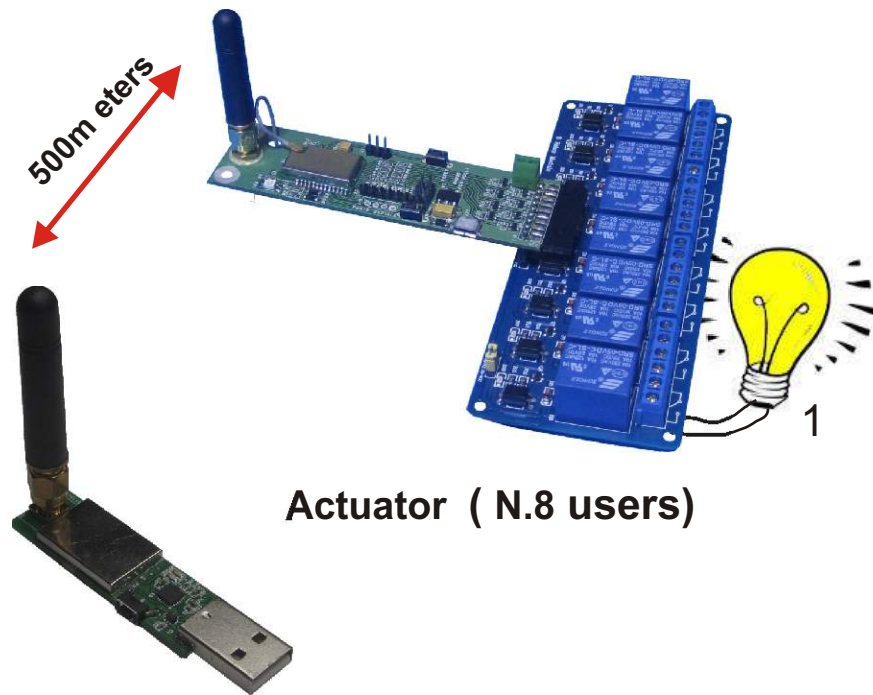


Wireless actuator for home automation,

composed by a SEND unit controllable via RS232 serial interface and by one or more ACTUATOR units with the possibility to switch from a minimum of 8 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 unit denominated "SEND" 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 SEND unit - No.1 ACTUATOR unit) or a "point-multipoint" configuration (No. 1 SEND unit more ACTUATOR units, max 32) up to the possibility of switching 256 users (relays).



Actuator (N.8 users)

SEND
(controllable from : P.C. , Raspberry, Arduino)

The SEND unit is equipped with a USB-serial adapter (chip Silicon Labs CP2102), this allows it to be used immediately connecting it to a standard PC or a Raspberry device and then sending simple RS232 commands.

Arduino's users can use the SEND unit to make direct connections on the serial interface RS232 (warning !! RadioControlli board operates at 3.3Volt).

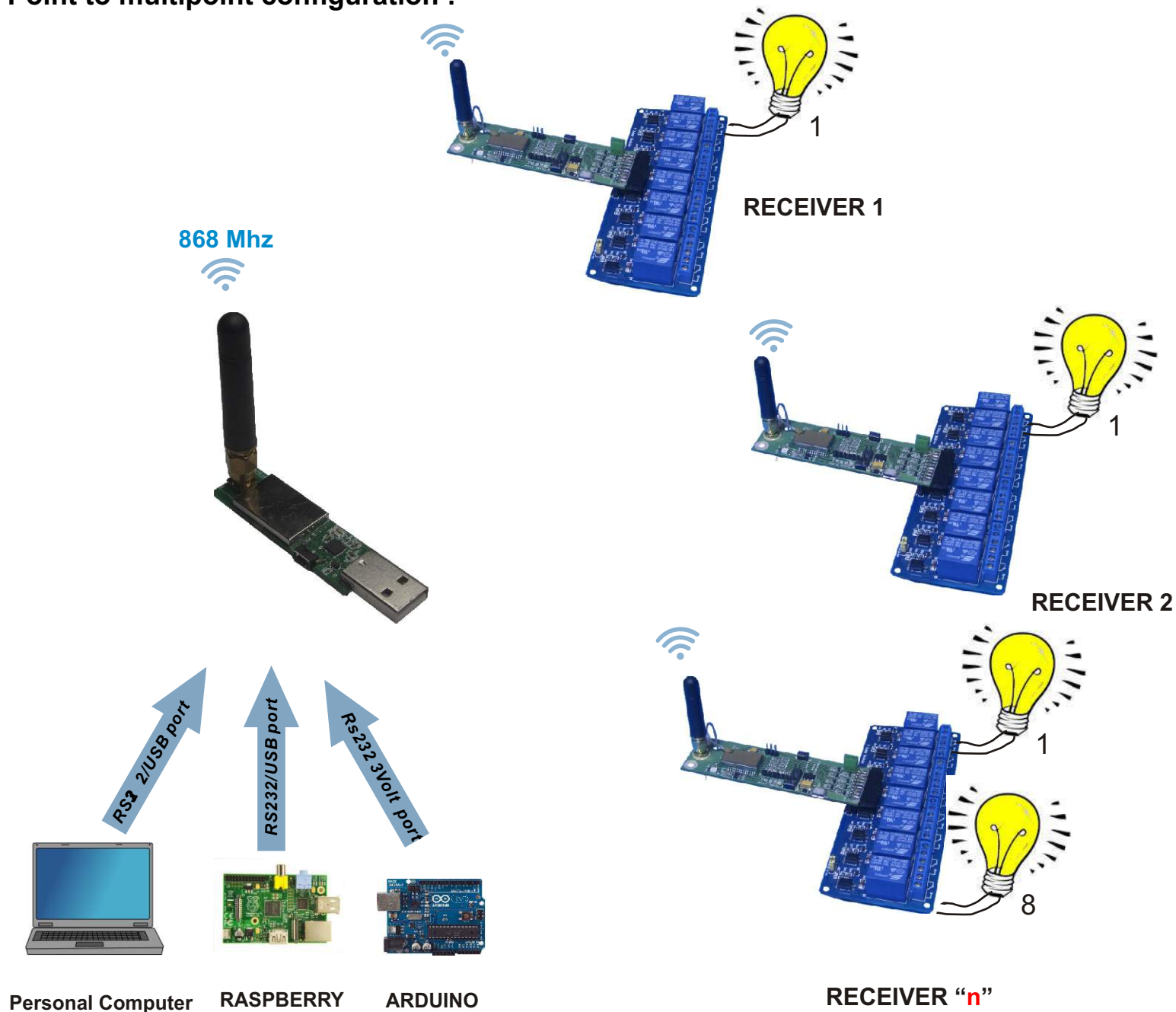
The ACTUATOR units are powered using a normal 5V power supply and can control relay boards (Relay Commercial Board) or solid-state actuators board (designed and produced by RadioControlli).

Main characteristics :

It is a bidirectional system that allows the following operations:

- Sending via RS232 of a switch command to the Actuator unit, to switch 1 of the 8 relays or a relays combination.
- For each switch command received, the Actuator unit sends a feedback .
- It is possible to know the state of the individual relays of a specific ACTUATOR unit anytime.
- You can send commands to switch more ACTUATOR units simultaneously (broadcast function).
- Each ACTUATOR unit periodically sends to its SEND unit reference, a word containing the status of the outputs (wake up timer); this time by default is set at 30 seconds but it can be changed and even canceled.
- Each ACTUATOR unit has on-board an temperature sensor, it is possible, by sending a command, to know the temperature's value of the ACTUATOR unit.

Point to multipoint configuration :



Features :

- Possibility to control N.32 ACTUATOR units (up to 256 users/relays).
- GFSK 19.2Kbps Modulation - Frequency 869.5MHz - Power Output = +20dBm (100mW)
- Distance: up to 500meters in open field with maximum transmission power (distance between SEND unit and ACTUATOR unit).
- Possibility to know the temperatura value for every ACTUATOR units.
- Possibility to transmit a command to all ACTUATOR units (broadcast).
- Ability to send / receive serial commands (TX 16ch - RX 24ch) to each ACTUATOR units.

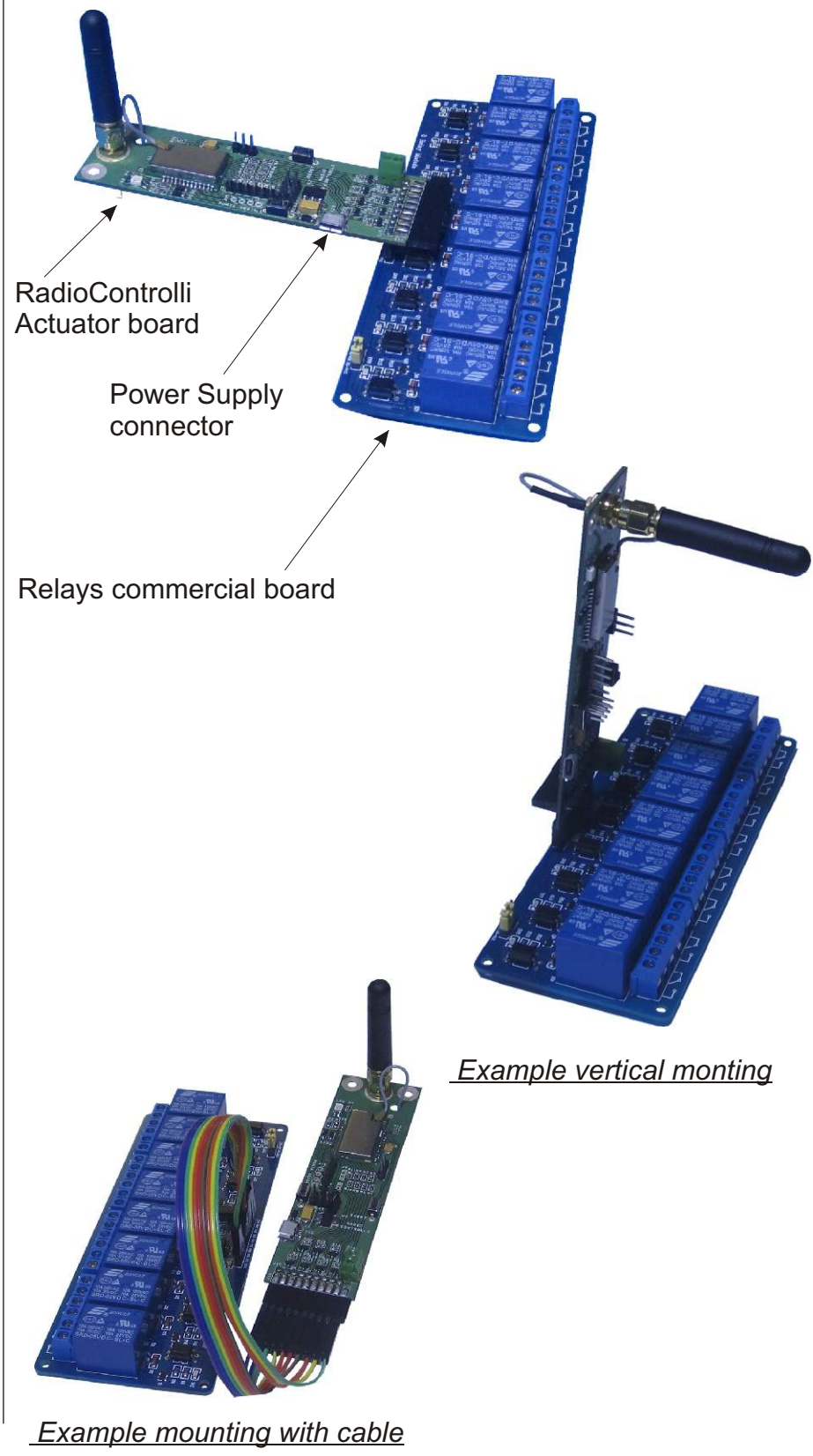
You can control everything..... everywhere

SEND



RadioControlli SEND board

RECEIVER



RadioControlli Actuator board

Power Supply connector

Relays commercial board

Example vertical mounting

Example mounting with cable

Wireless actuator for home-automation

Controllable from P.C., Raspberry and Arduino

Rev.3.0

You can control everything..... everywhere

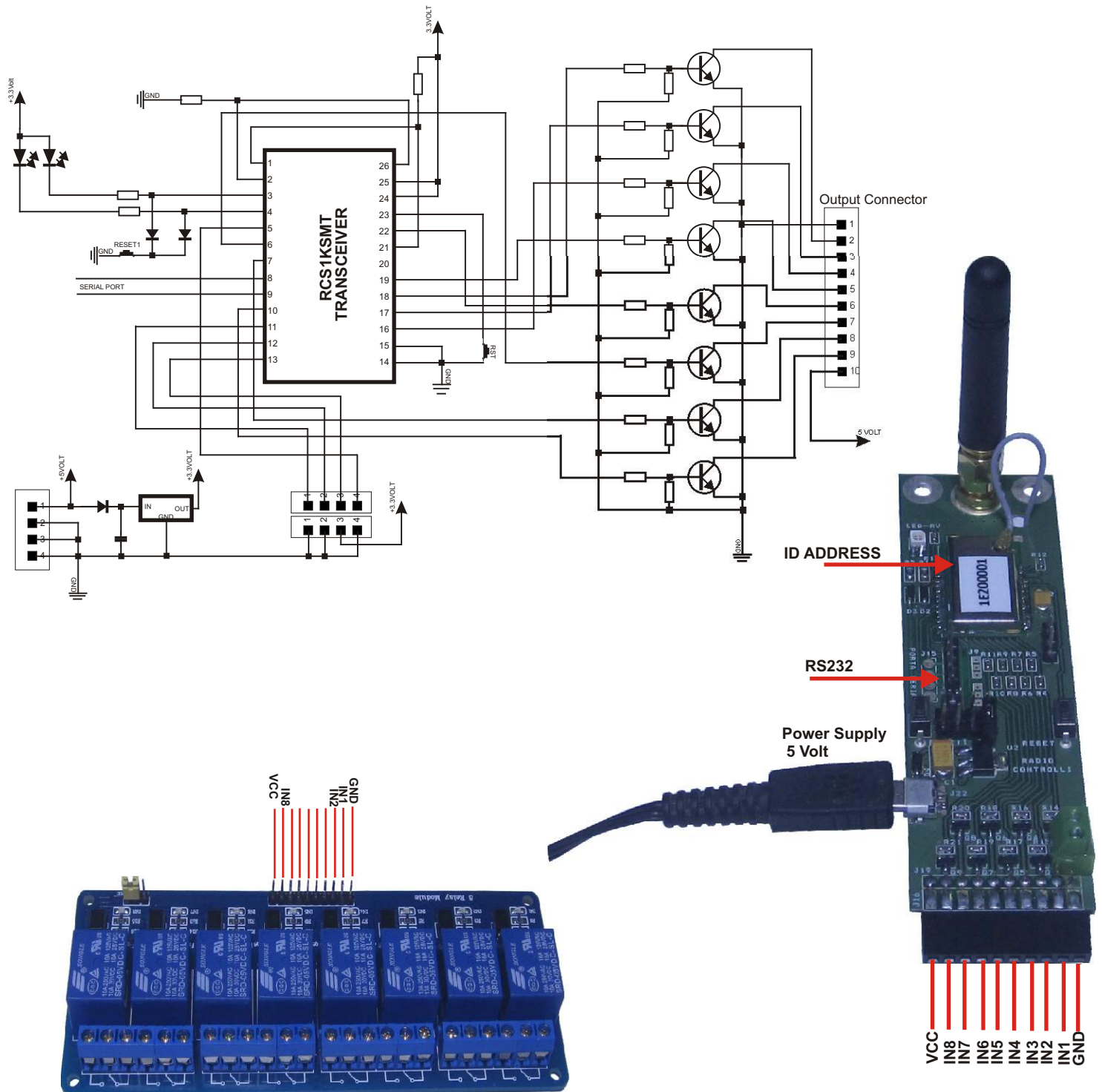
RadioControlli ACTUATOR Board

The ACTAUTOR unit, are powered by a normal 5V power supply and can control relay boards (Relay Commercial Board) or solid-state actuators board (designed and produced by RadioControlli).

Each ACTUATOR can manage 8 users / relays.

Each ACTUATOR is supplied from the factory with its own unique and unchangeable ID Address (4byte).

The ACTUATOR unit is equipped with an RS232 serial interface.



RadioControlli SEND USB Board

The unit denominated SEND 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.

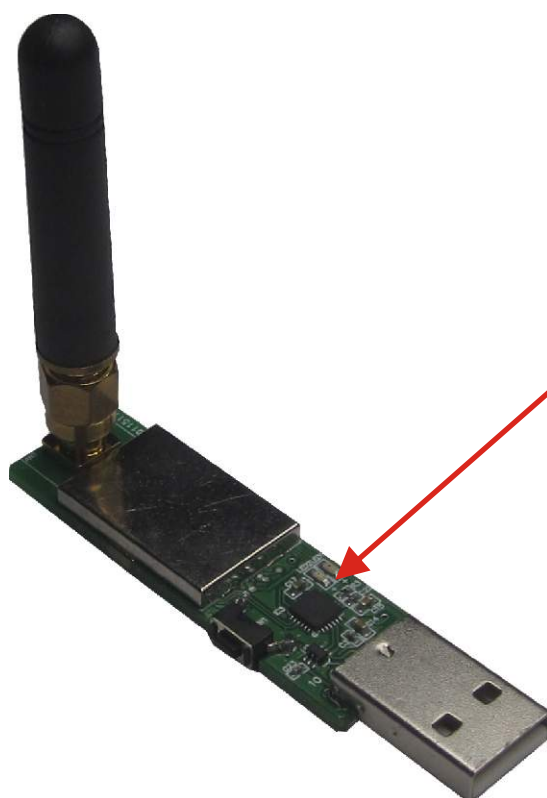
The unit denominated SEND is supplied from the factory with its own unique and unchangeable ID Address (4byte).

Each SEND unit is equipped with a USB-serial adapter (chip Silicon Labs CP2102) in order to be ready to use.

You need to install the driver for the USB-Serial converter CP2102, this driver is contained in the package provided by RadioControlli or can be downloaded from the following hyperlink:

<https://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx>

(Versione x Windows)



CP2102
Silicon Labs

String Commands to be sent via Rs232

ON / OFF Command ("o" command - "O" command)

Serial interface to configure in the following mode : 115200 baud rate, 8 data size, none parity, RTS/CTS handshake, data mode

String = " ; " + " ID address ACTUATOR unit + "Command"

ON / OFF single users / single relays

Example:

- Relay N.1 ON ACTUATOR unit N. 1E200001
(text) :-----> ;1E200001o1
(hex) :-----> 3B 1E 20 00 01 6F 01
- Relay N.1 OFF ACTUATOR unit N. 1E200001
(text) :-----> ;1E200001o81
(hex) :-----> 3B 1E 20 00 01 6F 51
- Relay N.4 ON ACTUATOR unit N. 1E2000A1
(text) :-----> ;1E2000A1o4
(hex) :-----> 3B 1E 20 00 A1 6F 04

Command "o"		Relay	
Text	1=On 81=Off	HEX value	Description
o	1	6F 01	Relay 1 ON
o	81	6F 51	Relay 1 OFF
o	2	6F 02	Relay 2 ON
o	82	6F 52	Relay 2 OFF
o	3	6F 03	Relay 3 ON
o	83	6F 53	Relay 3 OFF
o	4	6F 04	Relay 4 ON
o	84	6F 54	Relay 4 OFF
o	5	6F 05	Relay 5 ON
o	85	6F 55	Relay 5 OFF
o	6	6F 06	Relay 6 ON
o	86	6F 56	Relay 6 OFF
o	7	6F 07	Relay 7 ON
o	87	6F 57	Relay 7 OFF
o	8	6F 08	Relay 8 ON
o	88	6F 58	Relay 8 OFF

ON / OFF multiple users / relays. Examples:

- All relays ON ACTUATOR unit N. 1E200001
(text) :-----> ;1E200001O255
(hex) :-----> 3B 1E 20 00 01 4F FF
- All relays OFF ACTUATOR unit N. 1E200001
(text) :-----> ;1E200001O0
(hex) :-----> 3B 1E 20 00 01 4F 00
- Simultaneous switch relay N.1 e N.2 ACTUATOR unit N. 1E2000A1
(text) :-----> ;1E2000A1O3
(hex) :-----> 3B 1E 20 00 A1 4F 03
- Switch OFF relay N.1 e N.2 --->1E2000A1
(text) :-----> ;1E2000A1O0
(hex) :-----> 3B 1E 20 00 A1 4F 003

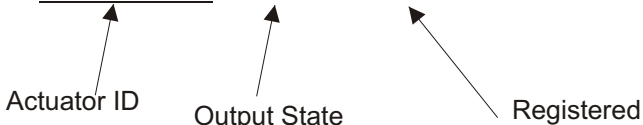
ON / OFF relay single

At every switch ON/OFF the ACTUATOR unit sends to the SEND unit a string (ACK) showing the puntual state of the 8 users/relays :

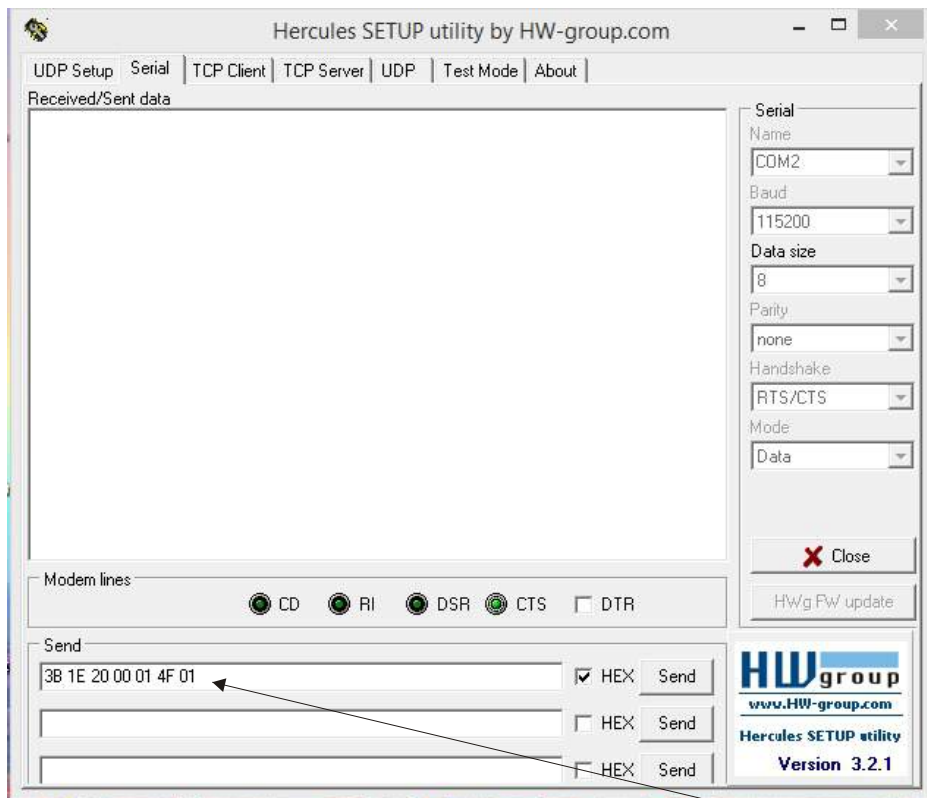
"O" Command								Relay		Description
1	2	3	4	5	6	7	8	Command	Hex	
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	O + 00	4F 00	All relays OFF
ON	ON	ON	ON	ON	ON	ON	ON	O + 255	4F FF	All relays ON
ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	O + 01	4F 01	Relay 1 ON
ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	O + 03	4F 03	Relay 1 e 3 ON

Switch ON/OFF multiple relays

1E 20 00 01 O 01 00 00 R



Example: simple switch using a serial port terminal software



Software used: Hercules SETUP utility (FREEWARE) (this utility is located in the package supplied by RadioControlli or you can download from the site www.hw-group.com).

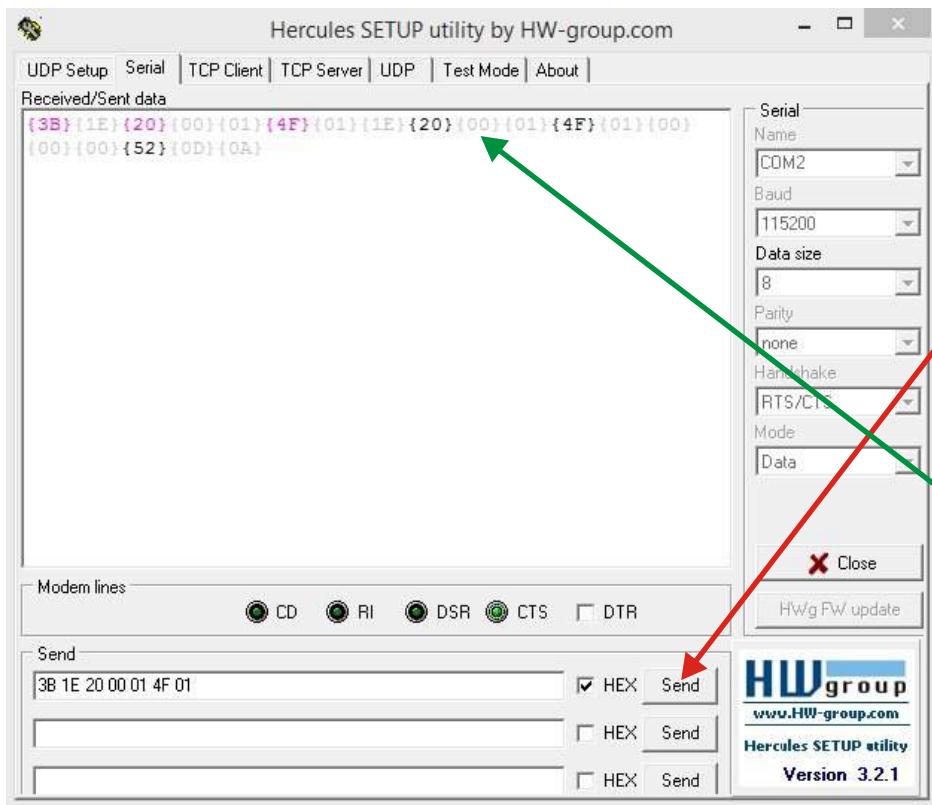
Open the serial port in this mode :

Set the Hercules software to receive hex characters

press the right mouse button on the main window, tick the Enable Hex.

Find the menu denominated "Special Chars" and choose Hexadecimal.

Hexadecimal string to be sent



When you press this button you send (HEX) the following word :

3B 1E 20 00 01 4F 01 (hex)

; 1E200001 o 1 (text)

In this way the il Relay N.1 of the ACTAUTOR N. 1E200001 is ON.

The Actuator N. 1E200001 after _executing the command, answer in the following way:

1E 20 00 01 4F 01 00 00 52 0D 0A

ID Actuator Relay state

Command String to send via Rs232

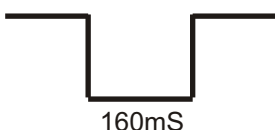
Impulsive Command ("p" command)

String = " ; " + " **Actuator ID address** " + "**Command**"

With "p" command is possible to send a switch ON impulse (duration equal to 160ms) to the single relay.

Example:

1) Switch ON relay N.1 ACTUATOR N. 1E200001
 (text) : -----> ; 1E200001p1
 (hex) : -----> 3B 1E 20 00 01 70 01



Command "p"		
Text	HEX value	Description
p	70 01	Relay 1
p	70 02	Relay 2
p	70 03	Relay 3
p	70 04	Relay 4
p	70 05	Relay 5
p	70 06	Relay 6
p	70 07	Relay 7
p	70 08	Relay 8

State request Command ("3" command)

The command "3" sends to the ACTUATOR unit a request to know the state of the single relay's output.

Example:

SENT Command ACTUATOR N. 1E200001
 (text) : -----> ; 1E2000013
 (hex) : -----> 3B 1E 20 00 01 33

Received Command

(text) : -----> ; 1E200001 O 01 00 00 R
 (hex) : -----> 1E 20 00 01 4F 01 00 00 52 0D 0A

↑ ID Actuator
 ↑ O Relays state
 ↑ 00= all OFF
 ↑ FF= all ON
 ↑ R= Registred
 ↑ Line terminator

Temperature measurement command (command "2")

The command "2" sends to the Actuator unit a request to know the temperature's value.

Example:

SENT command Actuator N. 1E200001
 (text) : -----> ; 1E200001 2
 (hex) : -----> 3B 1E 20 00 01 32

Received Command

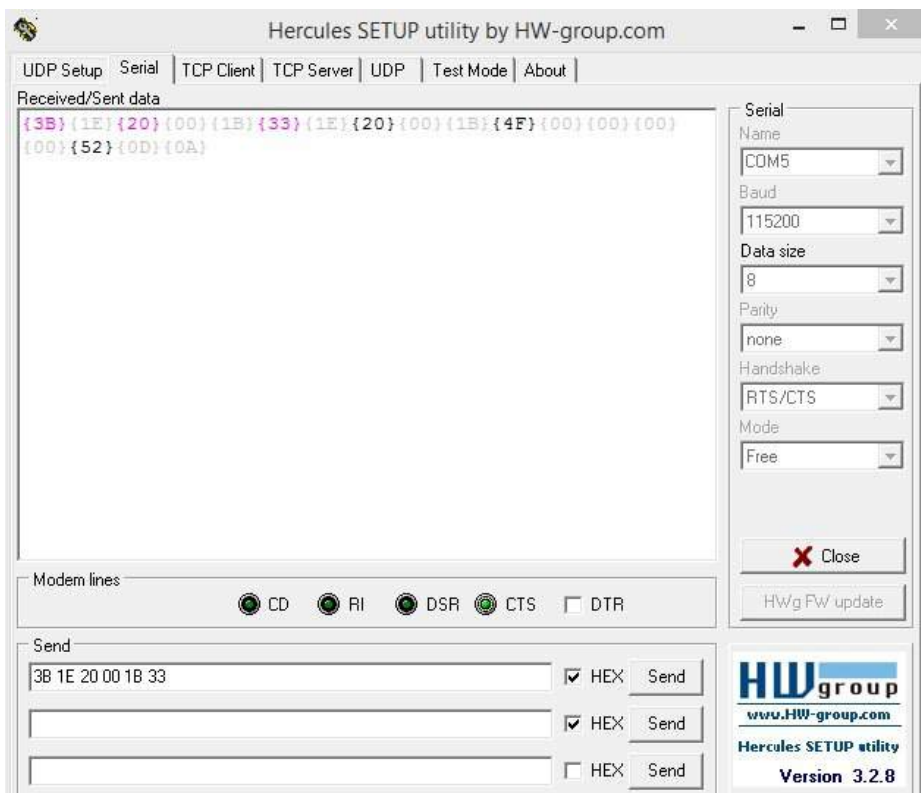
(text) : -----> ; 1E200001 T 0287 0272 R
 (hex) : -----> 1E 20 00 01 54 02 87 02 72 0D 0A

↑ ID Attuatore
 ↑ T
 ↑ Value T
 ↑ Offset
 ↑ Terminatore di linea

To turn the read value (hexadecimal) into the temperature value °C consult the document on the following link pag. 19/20 :

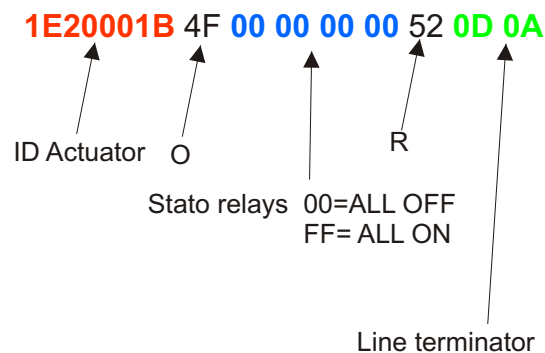
[SENSONET User Manual.pdf](#)

Example: status request command (command 3)

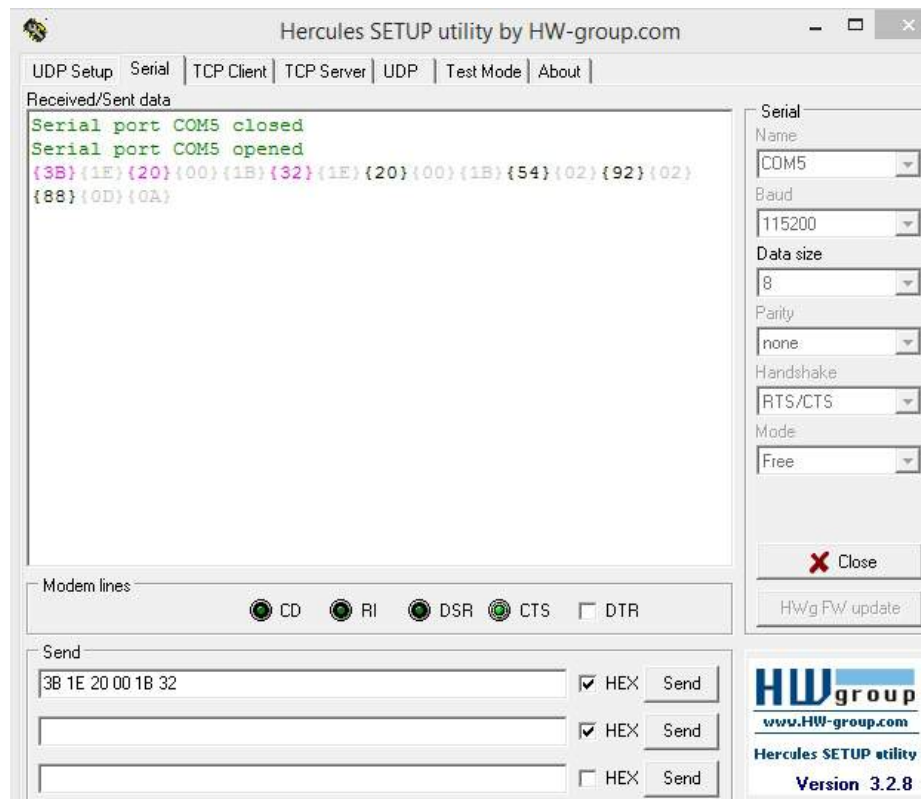


Command sent :
3B 1E 20 00 1B 33 (HEX)
; 1E20001B 3

Answer received :
1E20001B :

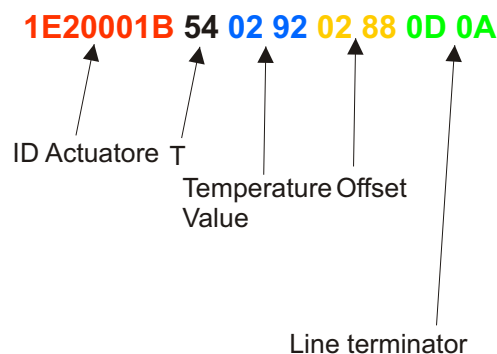


Example: temperature measurement command (command 2)



Commans sent :
3B 1E 20 00 1B 32 (HEX)
; 1E20001B 2

Answer recived :
1E20001B :



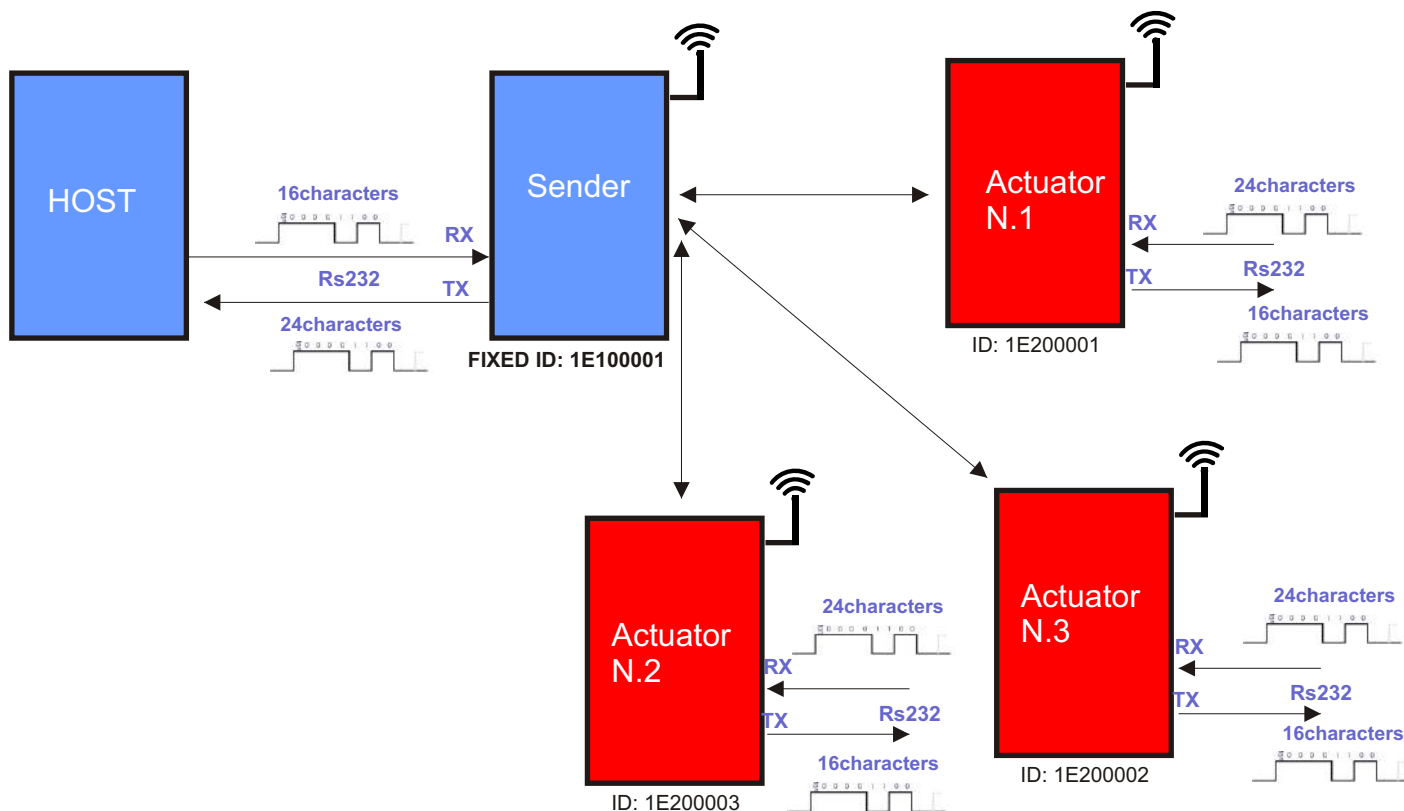
Management Serial Interface Actuator unit ("Y" command)

Every Actuator units is equipped with a (RS232) serial port interface configurate in the following mode : 38400,8,n,1. The Host (embedded system, PC, Raspberry or Arduino) can send (via SEND unit) to each Actuator max 16ch, using the "Y" command..

The Actuator unit, if connected to an embedded system it can answer sending max 24ch .

In this way is possible to realize a centralized radiomodem.

It is possible to send the "Y" command even in broadcasting modality, the same command has sent simultaneously to all the Actuator (Actuator's network).



The "Y" command sends to the Actuator unit via Rs232 interface, 16ch.

Example:

Sent command "prova_invio_16ch" ----> ACTUATOR N. 1E200001

(text) :-----> ;1E200001 prova_invio_16ch

(hex) :-----> 3B 1E 20 00 01 59 70 72 6F 76 61 5F 69 6E 76 69 6F 5F 31 36 63 68

"Broadcasting" Modality

It is possible to send every command in "broadcasting" modality. This means that all the commands are sent simultaneously to all the ACTUATOR unit (Actuator's network).

It is necessary to send the command to the following address : 7E7E7E7F

Example:

1) Switch ON relay N.1 on all Actuator's network

(text) :-----> ;7E7E7E7F o 1

(hex) :-----> 3B 7E 7E 7E 7F 6F 01