

## Expansion Module MAC00-FB4 (Bluetooth),FZ4 (IEEE 802.15.04) and EW4 (WLAN) overall description



The MAC00 wireless module makes wireless communication possible. 3 different technologies are available. Bluetooth, IEEE802.15.4 (part of ZigBee) and WLAN. This module is available for both the MAC-servo motor range and the MIS34x stepper motors.

Which technology to choose depends on the application and the amount of nodes in the network.

Bluetooth is commonly used for short range, high data rate but a limited number of nodes in a network. WLAN is used in a network of many nodes with a moderate data rate. This type of network can be established using standard WLAN routers and access points. Each motor is assigned an IP address and is able to communicate using both UDP and TCP packages.

For special purposes using Bluetooth, the I/O's of the module can be mirrored to other modules in the network to distribute I/O's to other motors. This feature is very useful for simultaneous starts and stops of multiple motors in a network.

Observe that this option only is available for Bluetooth.

The wireless technology opens up for demanding applications where cables and wires are undesired or mobile devices that are battery operated and needs to be controlled / monitored. Typically in large storage applications with moving battery operated containers.

Using the TCP/UDP packages the actual communication to the motor is based on the standard JVL protocol also used for serial communication and ModBus.

The MAC400-3000 series supports both ModBus RTU and ModBusTCP which is widely supported in different control environments such as LabView, CodeSys and SCADA-applications. All the most common PLC brands supports ModBus communication as well.

Please notice that the MAC50-141 –series only supports the JVL protocol.

MAC type	Protocol(s) supported
MAC50 – 141	JVL
MAC400 - 3000	JVL, ModBus RTU, ModBus TCP

Since this wireless communication module is based on the widely used MAC00-R –module this module is equipped with the simple yet very versatile PLC system programmed using the JVL RxP programming environment.

So decentralized handling in cases of loss of communication, I/O handling and mechanical endstop, can be handled in the motor.

For details regarding RxP programming, please find the MAC00-R –section in the motor manual.

### Bluetooth

2 options either used with a BlueTooth box paired to a number of motors (up to 7)

Or used with a USB Bluetooth device supporting SPP, typically form a standard Labtop/PC. This solution binds a motor to a virtual serial port. This port will be available exactly as a wired solution to the motor. MacTalk will be able to use this port for configuration etc. (Except firmware update).

### IEEE 802.15.4

This solution is solely based on a Box to motor configuration where a number of motors are paired to a box, that runs a serial line out to either a PC or a serial port based PLC solution.

The box acts a access point. Up to 7 motors can be connected and paired using this method.

### WLAN

The WLAN solution holds a number of different implementation methods.

Depending on which platform that controls the motor a variety of implementation methods can be used.

A multidrop solution fra one Master box can be implemented, this solution is limited to 7 motors pr. Box.

Another method is to use an Accesspoint with a specific SSID. This accesspoint is the base of up to 254 motors that will connect to this accesspoint. The platform on which the motor(s) are controlled is then connected to this accesspoint, exactly as a usual office network is configured, each motor then holds an IP address that will be used to address the motor.

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## Quick start guide

### Bluetooth

When the module is received from JVL it is configured to be running out of the box. There is no need for any configuration.

The module will be recognizable on the Bluetooth network as a "JVL MAC00-FB" –module.

When the module is added, it will locate the SPP –service (Serial Protocol Service) and install a com port.

This serial comport is then used for the communication, exactly the same as if a serial cable is connected.

The system will at some point during the binding, ask for a password, just enter "0" (the number 0) and press enter.

MacTalk is opened and the newly generated comport can be used to communicate with the motor.

Observe that MacTalk does not recognize the module as a Bluetooth module but as a basic MAC00-R module.

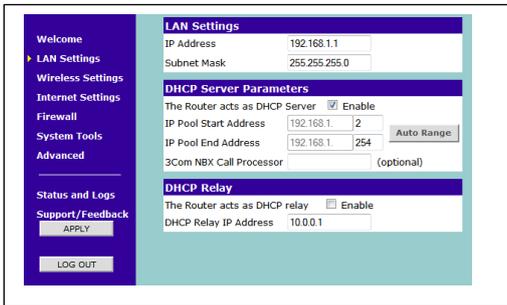
In a network up to 7 nodes (motors) can be established and paired.

### WLAN (Wireless Lan)

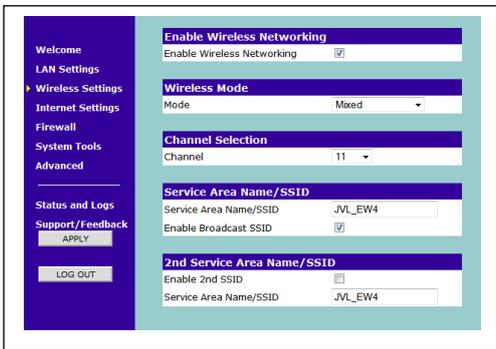
The WLAN modules are configured so setting up the first time will be as simple as possible. So a standard wireless accesspoint/router is needed with the following settings:

SSID: JVL\_EW4  
IP: 192.168.1.1  
Encryption: No Encryption

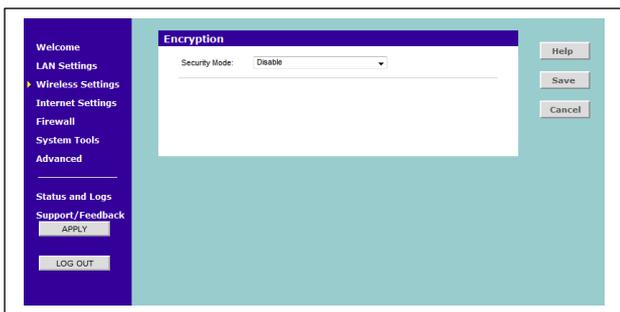
Typical wireless router settings. These settings are also applicable for other WLAN router/switches.



These are default settings in the router as it is configured from the vendor.



Note the SSID which must be set to JVL\_EW4. The channel setting can be set to another value, since the MAC00-EW4 module is set to Auto.

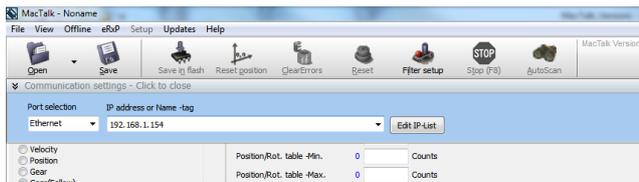


These are default settings in the router as it is configured from the vendor.

The PC/Labtop/other can be connected to to this accesspoint either using a wireless connection or a cable. The Modules will automatically connect to this accesspoint and the PC/Labtop is now able to connect to the motor.

From MacTalk the IP address for the motor is entered in the “IP address “-field and MacTalk will connect to the motor.

The IP address settings are accessed by clicking on the “Communication settings” –panel in MacTalk.



Per default the IP configuration in the modules are configured as follows:

Network (AT*ANIP)	
IP Address	192.168.1.154
Netmask	255.255.255.0
Gateway	192.168.1.1

SSID (AT*AGSSID)	Authentication Mode (AT*AGAM)
JVL_EW4	0 = None
Channel (AT*AGCH)	Encryption Mode (AT*AGEM)
0 = Auto (Default)	0 = Open
Operational Mode (AT*AGOM)	Data Rate and Link Adaptation (AT*AGRTE)
1 = Managed (Default)	12 = 54Mbit
	<input checked="" type="checkbox"/> Link Adaptation

So they will connect to an accesspoint with the SSID JVL\_EW4, no encryption and using the gateway IP 192.168.1.1. This IP address is usually set to 192.168.1.1 in the accesspoint by default.

The modules are configured from JVL to use port 23 for both TCP and UDP communicatio.  
This can be changed later to suit the current application.  
For running ModBusTCP the port number 502 must be used.

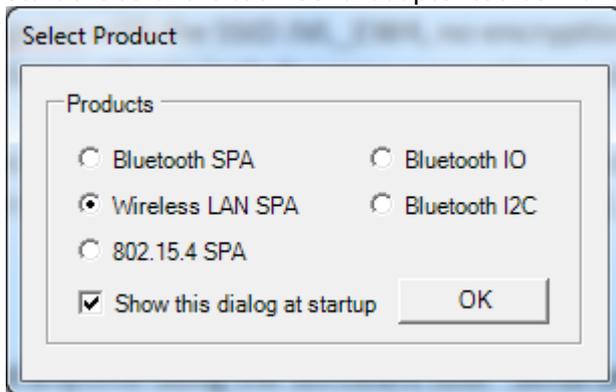
### Module configuration

The configuration can be changed anytime using the software tool "Serial adapter toolbox".  
This tool can be downloaded following this link:

<http://support.connectblue.com/download/attachments/4128782/Setup+Toolbox+%28cB-2138-20%29.zip?version=1&modificationDate=1384527916000>

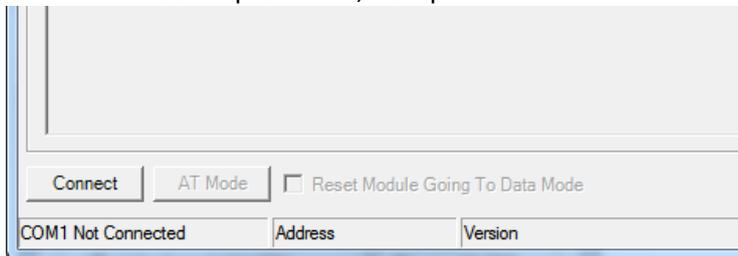
This tool connects to the module using the Ethernet connection, so MacTalk needs to be closed as well as any other application communicating with the module when settings are done.

Start the software tool “Serial adapter toolbox” and select:

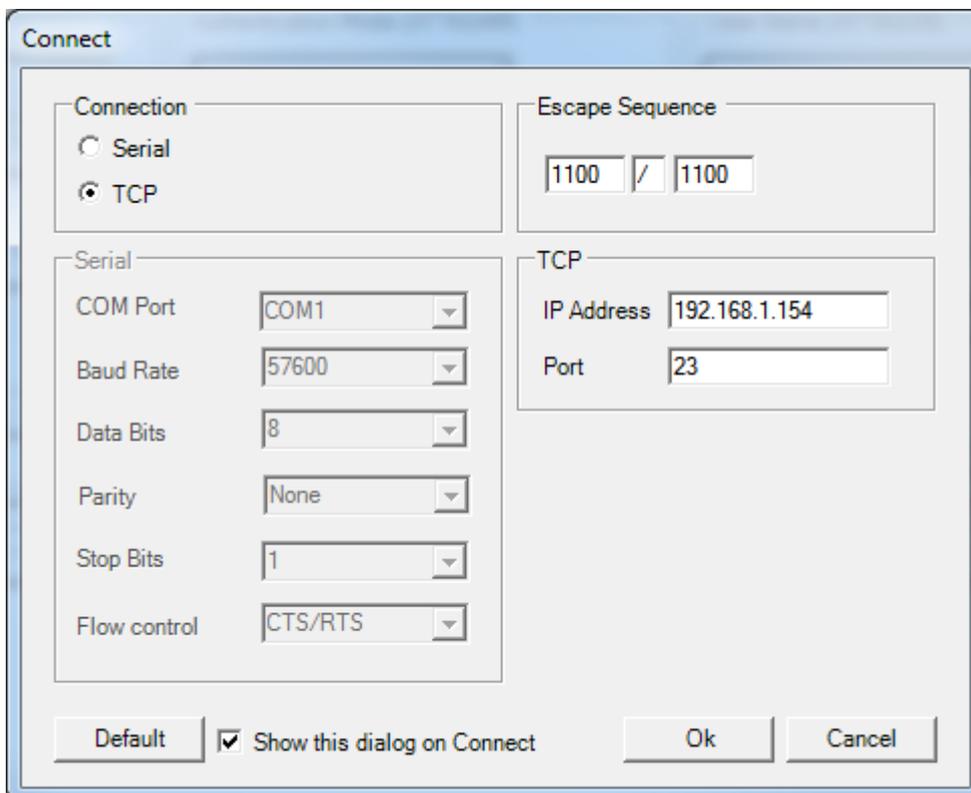


Press ok.

The main screen is presented, now press “Connect”



And the following communication setup is presented:



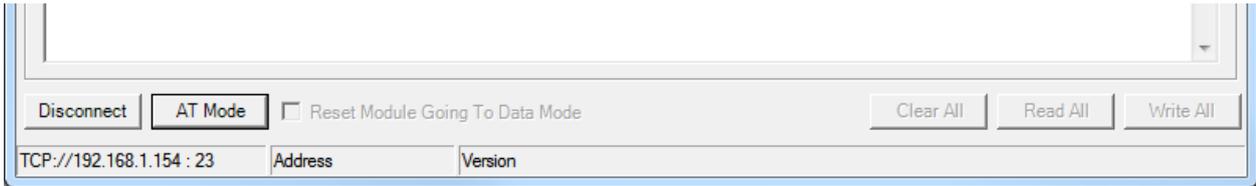
Select TCP and enter the IP address in “IP Address” –field with the port number. The port number is per default 23 when the module is received from JVL.

If this port number is changed later on, the new port number needs to be used.

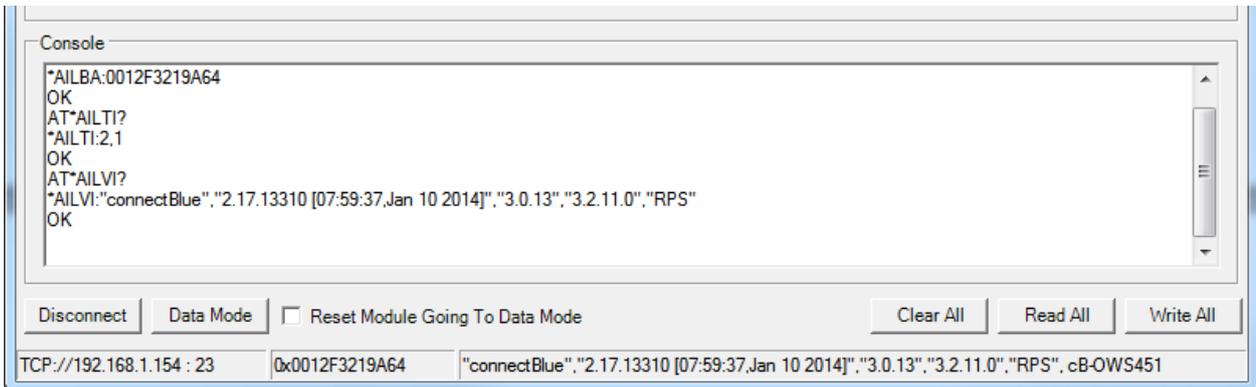
Press ok and the software tool will try establish the connection.

When the connection is established, the text “TCP://192.168.1.154:23” is displayed in the bottom right info panel.

Press the “AT-mode” –button to put the module into configuration –mode.



When the module has entered configuration mode the following appears in the “Console”:

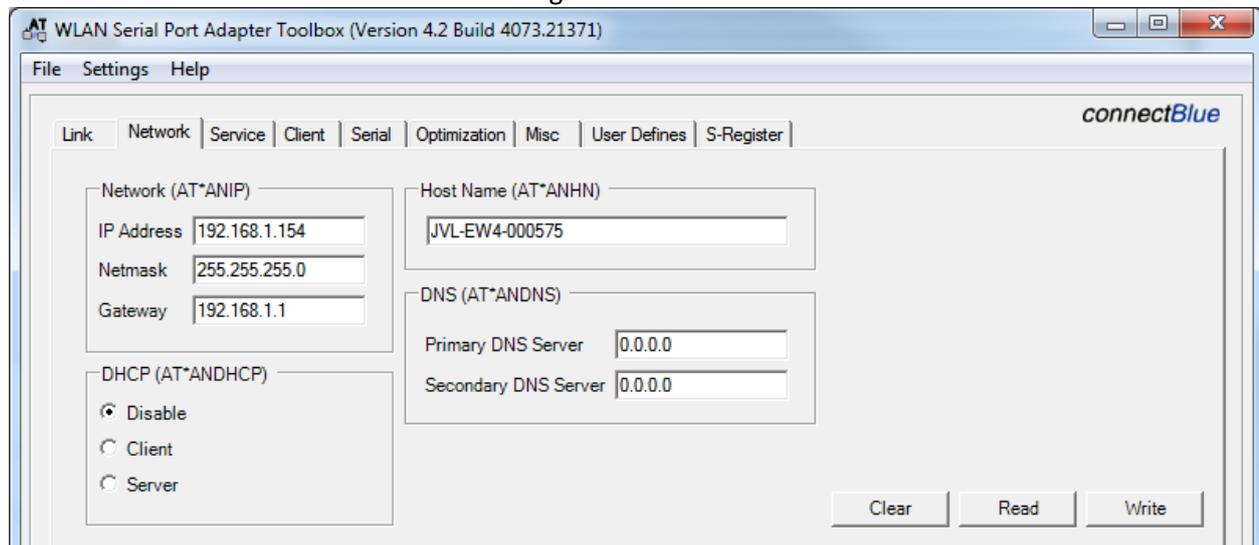


And additional module specific information is displayed.

Now to read all settings in the module press the “Read All” –button.

## Changing the IP address

Find the “Network” –tab in the tool and change the IP address in the “IP Address” –field.



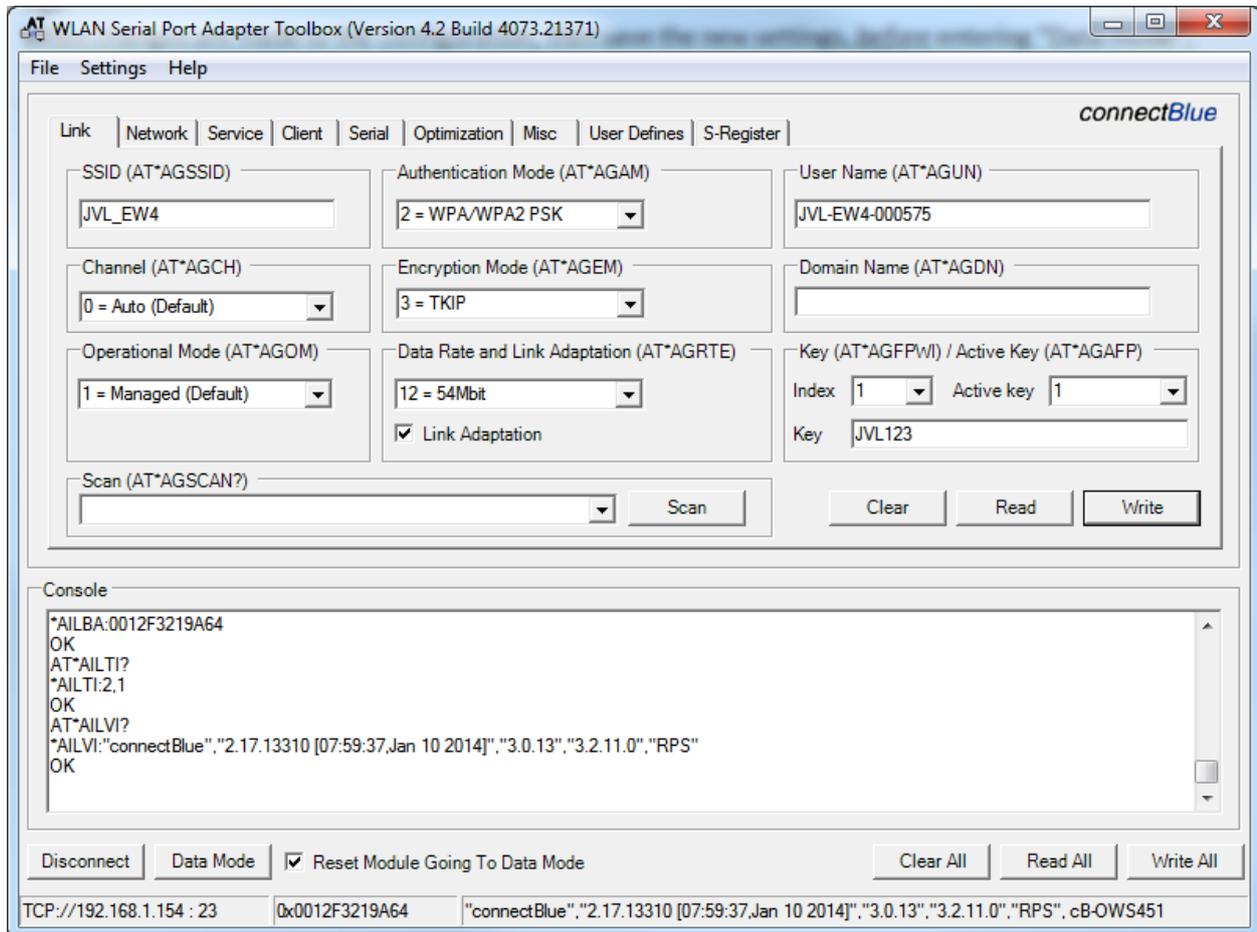
Press the “Write” –button when the IP -settings are satisfactory.

Please observe that these settings are not used until the module is reset.

The module needs to be put into “Data mode” when all the configuration changing is done.

## Changing the encryption and enhancing the security

On the “Link” –tab all the security settings are configured, different kind of Authentication methods can be used in combination with Encryption modes. The settings below is a configuration for using **WPA/WPA2 PSK** with **TKIP** the password string is **JVL123**, we select 1 active key. These settings needs to applied to the accesspoint afterwards in order to re-connect the module.



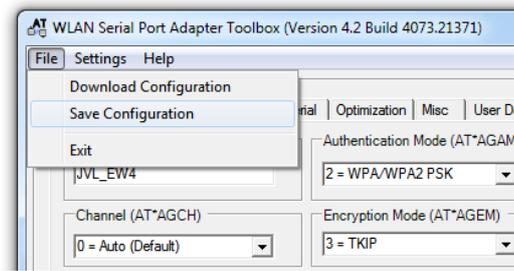
### **OBS!!!**

Be very carefull when changing the IP settings and especially when introducing encryption. When these configurations are changed the module will use them after reset and there is no way of resetting it back to the JVL settings again. In this case the module needs to be sent back to JVL for repair.

### Tip!

When changes are made to the configuration, then save the new settings, *before* entering “Data mode”. This may be the only documentation on the settings in the module and very helpful if the connection cant be re-established to the module.

The settings are saved by selecting the menu.



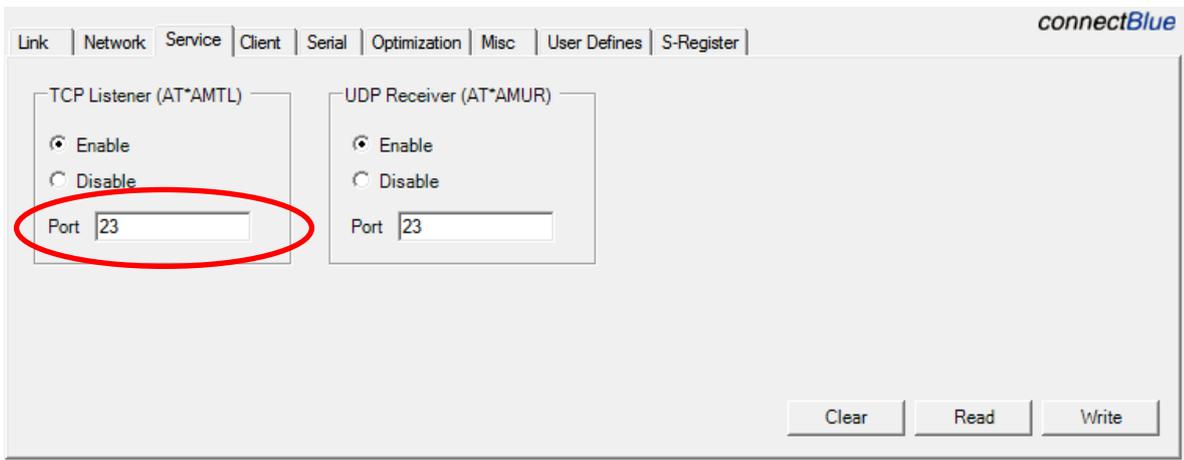
The configuration is saved in a .txt file that can be opened directly in notepad or any other ASCII file editor.

### Changing the port number

On the "Service" –tab the port numbers for both the UDP and the TCP configuration.

**Please notice.**

**For running ModbusTCP it is necessary to change the TCP port to 502**

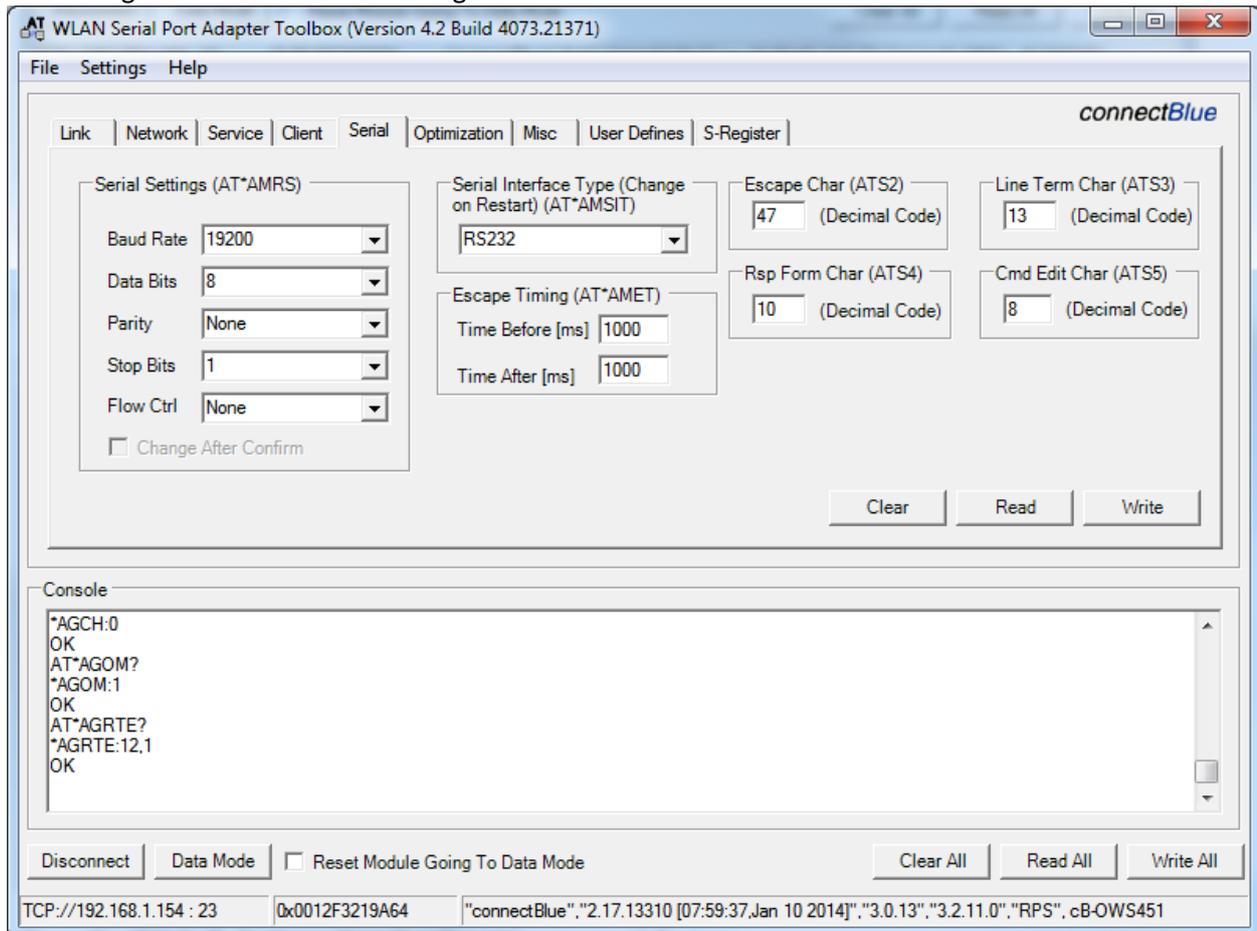


Finish by pressing "Write" then follow the steps to return to "Data mode" again.

## Changing baudrate

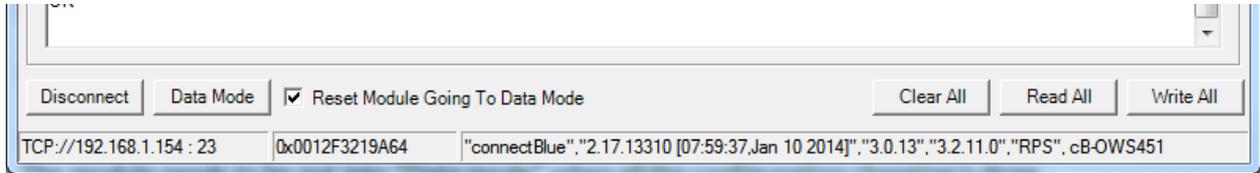
By default the motor setup for 19200 baud but to achieve a faster update rate, the baudrate can be changed in the motor. When the baudrate is changed in the motor, the module must match the baudrate. This is configured in the "Serial" –tab.

This configuration is the default configuration.



## Returning to Data mode

Putting the module into “Data mode” again is simply done by pressing the “Data mode” –button on the main screen.



Please observe the “Reset Module Going To Data Mode” –checkbox, please check this box. When the “Data mode” –button is pressed the module will use the new settings.

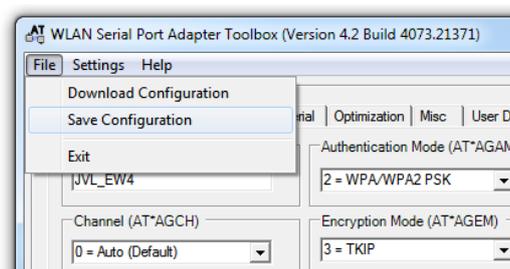
## **OBS!!!**

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## Tip!

When changes are made to the configuration, then save the new settings, *before* entering “Data mode”. This may be the only documentation on the settings in the module and very helpful if the connection cant be re-established to the module.

The settings are saved by selecting the menu.



The configuration is saved in a .txt file that can be opened directly in notepad or any other ASCII file editor.

### Troubleshooting:

- Check that the accesspoint is configured for DHCP and that the PC is setup for automatic configuration.
- Check the IP address of the PC, try pinging the module on 192.168.1.154. if no response is received, Check the wireless accesspoint for correct configuration.