



# EC01 Quick Start Guide

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Atlanta, GA USA

For more information, please visit the product web page:

[www.vitalsystem.com/ec01](http://www.vitalsystem.com/ec01)

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## License Agreement

Before using the HICON and accompanying software tools, please take a moment to go thru this License agreement. Any use of this hardware and software indicate your acceptance to this agreement.

It is the nature of all machine tools that they are dangerous devices. In order to be permitted to use HICON on any machine you must agree to the following license:

I agree that no-one other than the owner of this machine, will, under any circumstances be responsible, for the operation, safety, and use of this machine. I agree there is no situation under which I would consider Vital Systems, or any of its distributors to be responsible for any losses, damages, or other misfortunes suffered through the use of the HICON board and its software. I understand that the HICON board is very complex, and though the engineers make every effort to achieve a bug free environment, that I will hold no-one other than myself responsible for mistakes, errors, material loss, personal damages, secondary damages, faults or errors of any kind, caused by any circumstance, any bugs, or any undesired response by the board and its software while running my machine or device.

I fully accept all responsibility for the operation of this machine while under the control of HICON, and for its operation by others who may use the machine. It is my responsibility to warn any others who may operate any device under the control of HICON board of the limitations so imposed.

I fully accept the above statements, and I will comply at all times with standard operating procedures and safety requirements pertinent to my area or country, and will endeavor to ensure the safety of all operators, as well as anyone near or in the area of my machine.

**WARNING:** Machines in motion can be extremely dangerous! It is the responsibility of the user to design effective error handling and safety protection as part of the system. VITAL Systems shall not be liable or responsible for any incidental or consequential damages. By Using the HiCON motion controller, you agree to the license agreement.

## 1. Power Up and Connect to PC

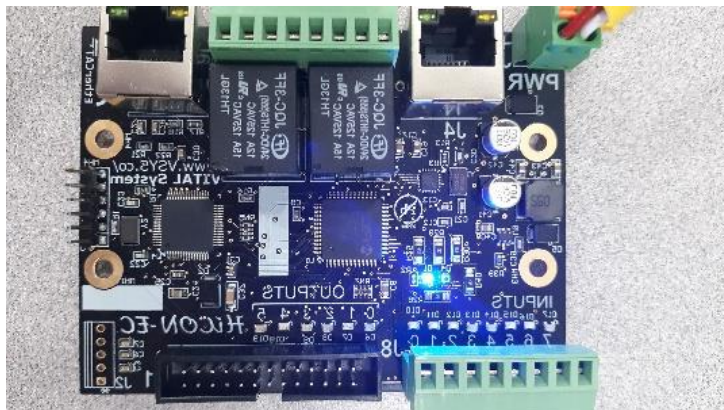
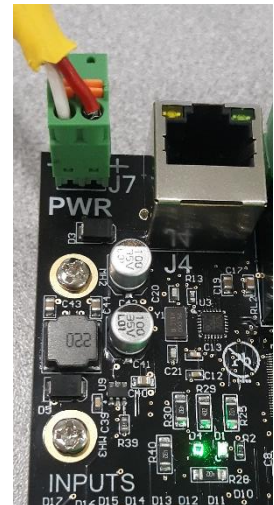
The following steps are provided to give the user a basic step-by-step guide for setting up the EC01 on a target machine. These instructions assume that the user has some knowledge about working with electrical wiring, adequate knowledge about the target machine, and has some experience with building or retrofitting CNC machines. A video QuickStart guide that steps through the software configuration is also available [here](#).

1.1) Download and install the VSI Device Manager application if you haven't already.

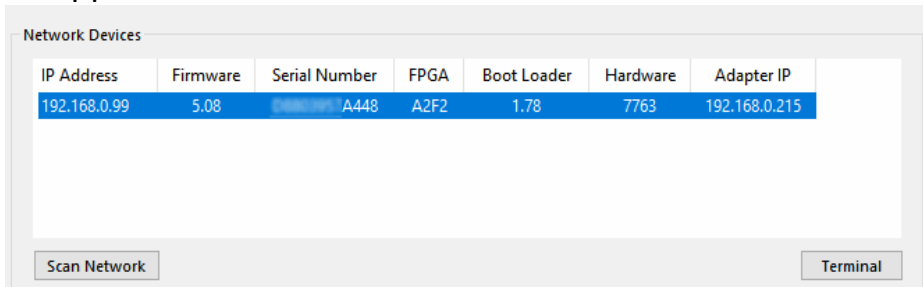
- [VSI Device Manager](#)
- [VSI Device Manager manual](#)

1.2) Connect power to the EC01 on J7. The image below shows the necessary wiring connections for this part of the setup. Only turn on the power supply once all the connections below are made.

1.3) If the EC01 is correctly powered up, the green power LED should be lit and the blue CPU LED blinks in some pattern.



- 1.4) Establish a network connection to the EC01. Follow the “[Network Connection Setup](#)” Section. If a direct connection to the PC is used, make sure to carefully follow the steps for setting the PC IP address. If all instructions were followed correctly, you should be able to scan the EC01 using the “VSI Device Manager” application.



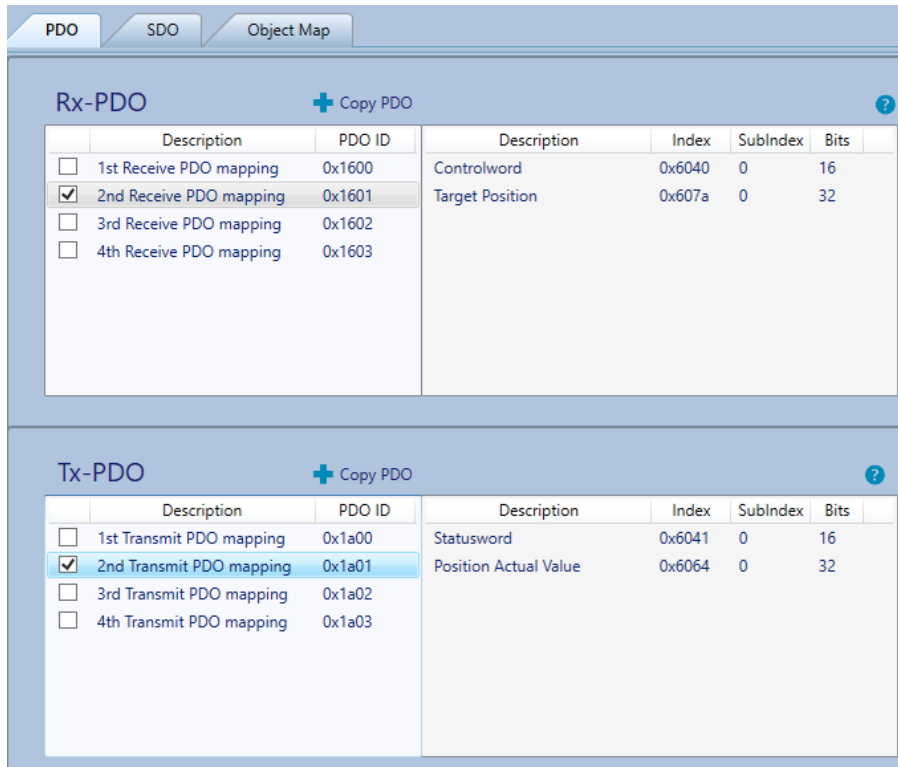
The screenshot shows a window titled "Network Devices" with a table containing one row of data. Below the table are two buttons: "Scan Network" and "Terminal".

IP Address	Firmware	Serial Number	FPGA	Boot Loader	Hardware	Adapter IP
192.168.0.99	5.08	A448	A2F2	1.78	7763	192.168.0.215

## 2. [Setup EC-Link Software](#)

- 2.1) Download and install [EC-Link](#) Software.
- 2.2) Setup and connect the EtherCAT slave devices to the master using the J5 Ethernet port on the EC01. Connect **one** drive to begin with.
- 2.3) Refer [EC-Link manual](#) for complete information on the software.
- 2.4) Then open the VSI EC-Link configuration software. You will be greeted with the following menu:
- 2.5) Create a new project by clicking on “New Project”
- 2.6) Click ESI Files->Import ESI, and import the ESI file (XML) for your drive (Available from your drive distributor.)
- 2.7) Then right click in the leftmost area and select “Add Master Device.” Then select the master and right click on it and click “Add Slave Device”. This will bring up the following menu:

- 2.8) Select the vendor of your drive from the Vendor dropdown, select the option with the correct revision and product code for your drive, then press “Add Slave”. This will add the selected slave device to the device list under the selected master. Close the window.
- 2.9) Select the added slave. You should see a number of PDO mappings appear in the Rx and Tx PDO sections. Here you can choose which PDOs to use by clicking the checkbox next to the PDO.
- Your EtherCAT Drive should have a minimum of these objects listed  
**Rx-PDO:** Control word (0x6040), Target Position (0x607a).  
**Tx-PDO:** Statusword (0x6041), Position Actual (0x6064).
  - You need to select only one PDO in each section. Usually (0x1600 or 0x1601). In case of I/O modules the PDOs are already selected for you



The screenshot shows a software interface with three tabs: PDO, SDO, and Object Map. The 'PDO' tab is active, displaying two sections: Rx-PDO and Tx-PDO. Each section has a '+ Copy PDO' button and a help icon (?).

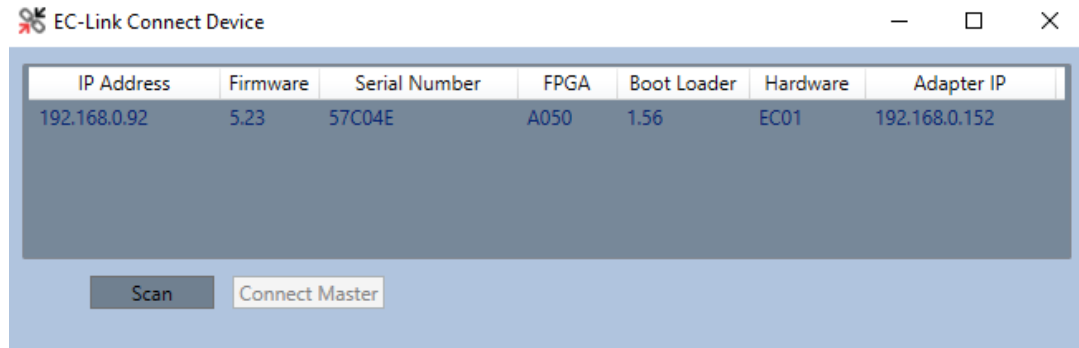
**Rx-PDO Section:**

Description	PDO ID	Description	Index	SubIndex	Bits
<input type="checkbox"/> 1st Receive PDO mapping	0x1600	Controlword	0x6040	0	16
<input checked="" type="checkbox"/> 2nd Receive PDO mapping	0x1601	Target Position	0x607a	0	32
<input type="checkbox"/> 3rd Receive PDO mapping	0x1602				
<input type="checkbox"/> 4th Receive PDO mapping	0x1603				

**Tx-PDO Section:**

Description	PDO ID	Description	Index	SubIndex	Bits
<input type="checkbox"/> 1st Transmit PDO mapping	0x1a00	Statusword	0x6041	0	16
<input checked="" type="checkbox"/> 2nd Transmit PDO mapping	0x1a01	Position Actual Value	0x6064	0	32
<input type="checkbox"/> 3rd Transmit PDO mapping	0x1a02				
<input type="checkbox"/> 4th Transmit PDO mapping	0x1a03				

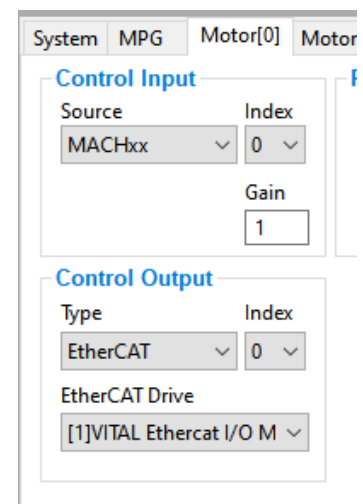
- 2.10) Now you can connect to the master device by clicking on “Connect Device” in the toolbar to bring up this menu:



- 2.11) Click “Scan”, select your master from the list, and then press “Connect Master”. Close this menu and select “Download Project” in the toolbar to download the configuration to the device. Note that Mach4 must be closed when downloading the project to the EC01. This concludes the configuration necessary from the EC-Link software.

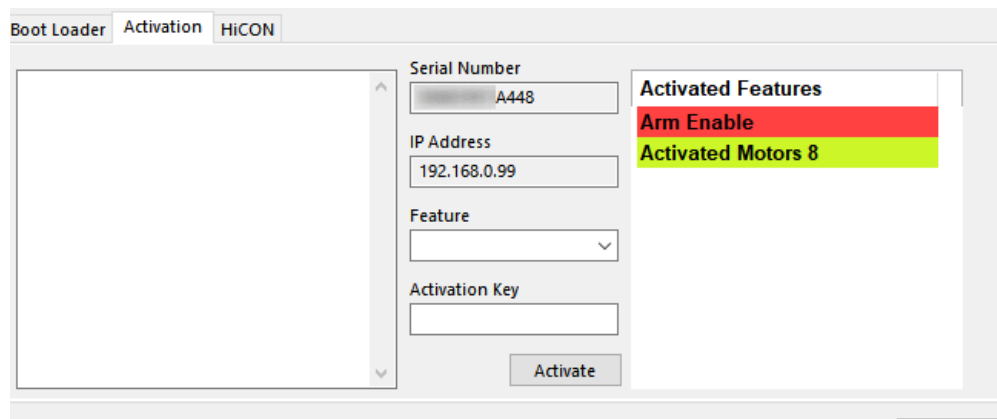
### 3. Setup Mach4 and Install Plugin

- 3.1) Refer [Mach4 Software Integration Manual](#) to setup the plugin.
- 3.2) After the plugin is setup open the menu Configure->Plugins->HiCON. Click “Factory Reset” available on the bottom right. Apply and click Ok.
- 3.3) Make sure to select the Type to EtherCAT, Index to 0 and select the drive name. (refer integration manual for descriptions for these settings)
- 3.4) Make sure to select Type as “Undefined” for all other motors. Click Apply and Ok.



- 3.5) You should now be able to enable Mach4 and jog the motor.
- 3.6) Once you have one drive working you can now go ahead and setup the other drives.

**NOTE:** Check the “Activations” tab and ensure that Arm Enable and that some number of motors have been activated. These two features are required for the operation of the motion controller. If either of these activations is missing, please email [support@vitalsystem.com](mailto:support@vitalsystem.com) for assistance.

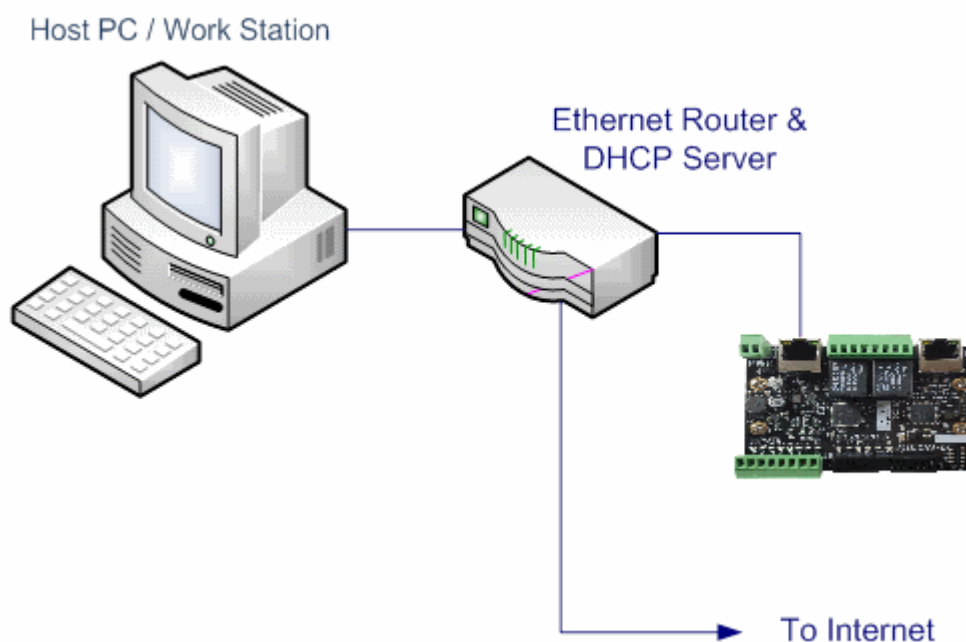




## 4. Network Connection Setup

You can connect the EC01 directly to your PC or connect via an Ethernet switch. The HiCON board can use the DHCP server on the network or a fixed IP address (firmware pre-assigned IP address is 192.168.0.95). The default IP address of the device can be manually changed via the VSI Device Manager Software.

### 4.1. Connect using an Internet Router (DHCP Server)

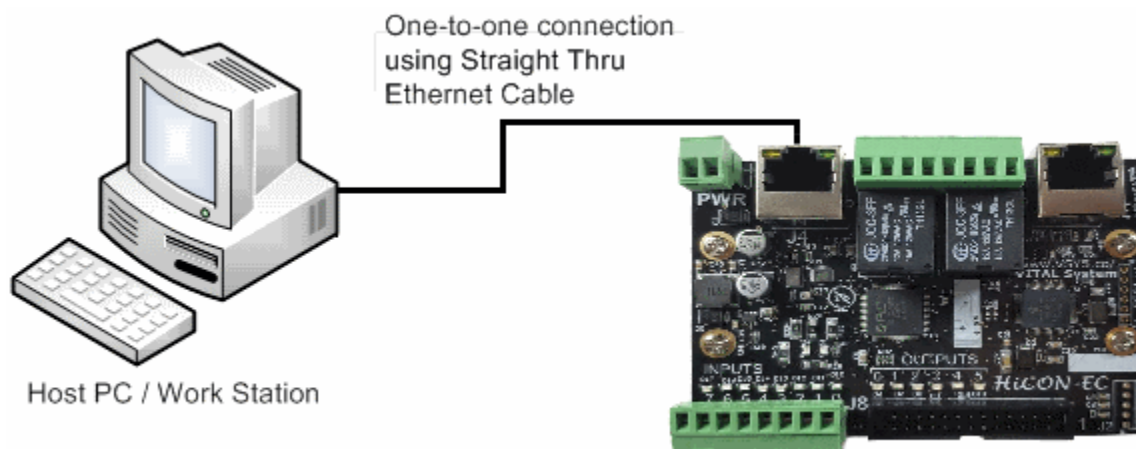


This is the simplest method to connect Mach software to the controller. The figure above shows a basic setup using an Internet router on your network. Connect the Ethernet cable from the J4 Ethernet port of the HiCON to the router. Connect another Ethernet cable from the router to your PC. The router dynamically assigns unique IP address both to the PC as well as to the HiCON, and therefore completes the network setup without requiring any intervention from the user.

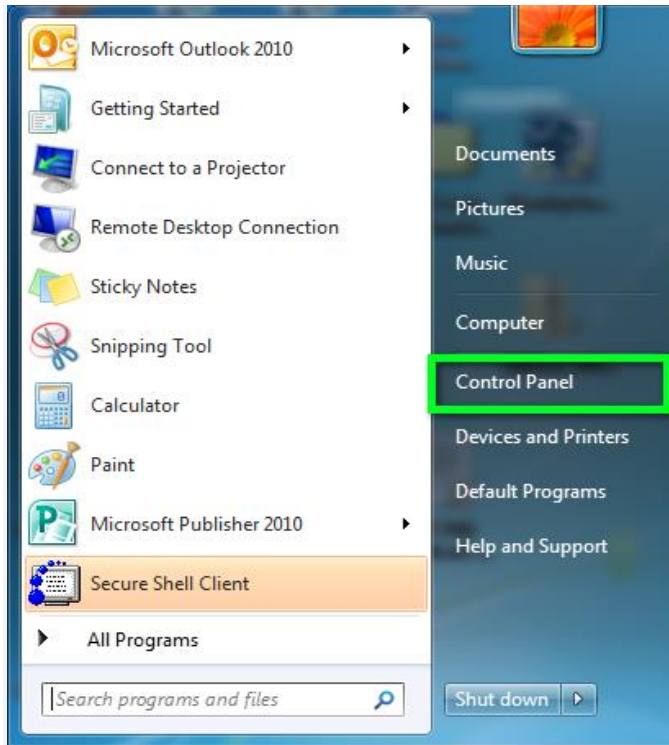
## 4.2 Direct Connection to the PC

On Windows 10 the network setup occurs automatically when the HiCON is connected to the PC. In case there is a need to manually assign IP address in Windows XP, 7 or newer. The default IP address of the HiCON board is 192.168.0.95 and you may change it using the VSI Device Manager Software. Do not use VSI Device Manager Software to change the HiCON IP address, unless you know exactly what you doing. If not sure, please email VSI for more information (support@vitalsystem.com). Network setup is a pretty simple task, but wrong settings can get you stuck for many hours.

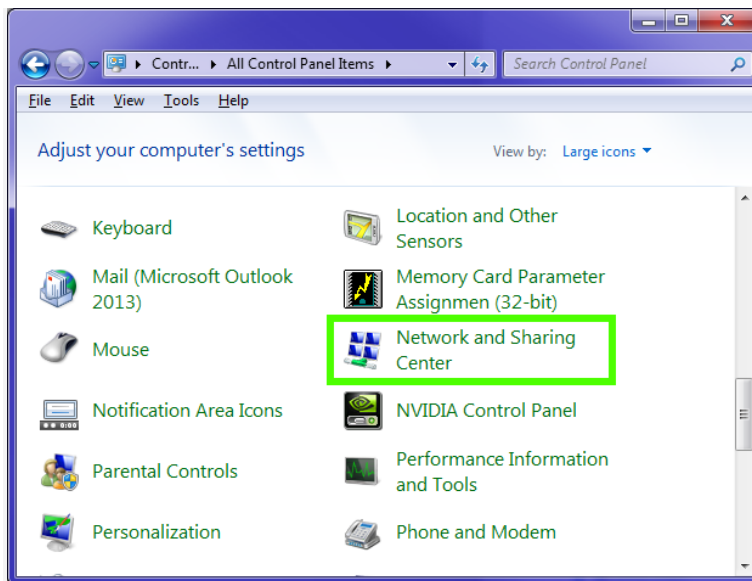
The Ethernet cable is connected from the J5 Ethernet port of the HiCON board to the PC as shown below:



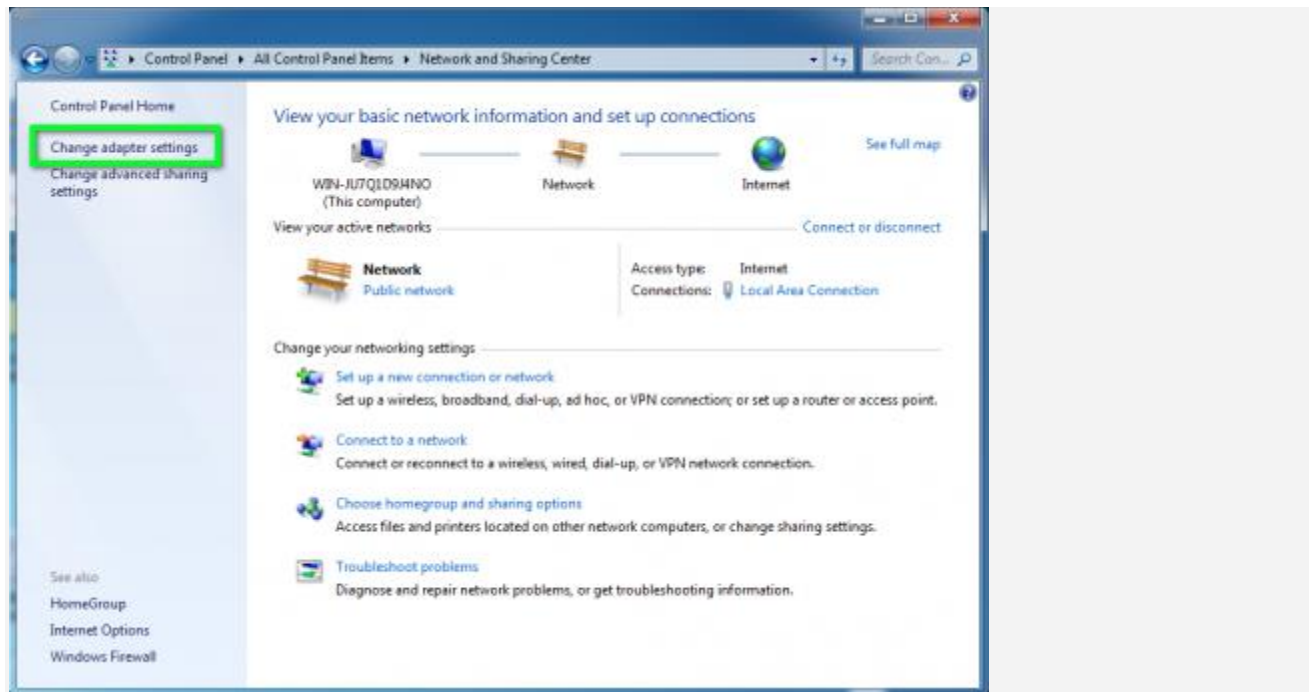
Click the **Start** menu. Next, click on the **Control Panel** option.



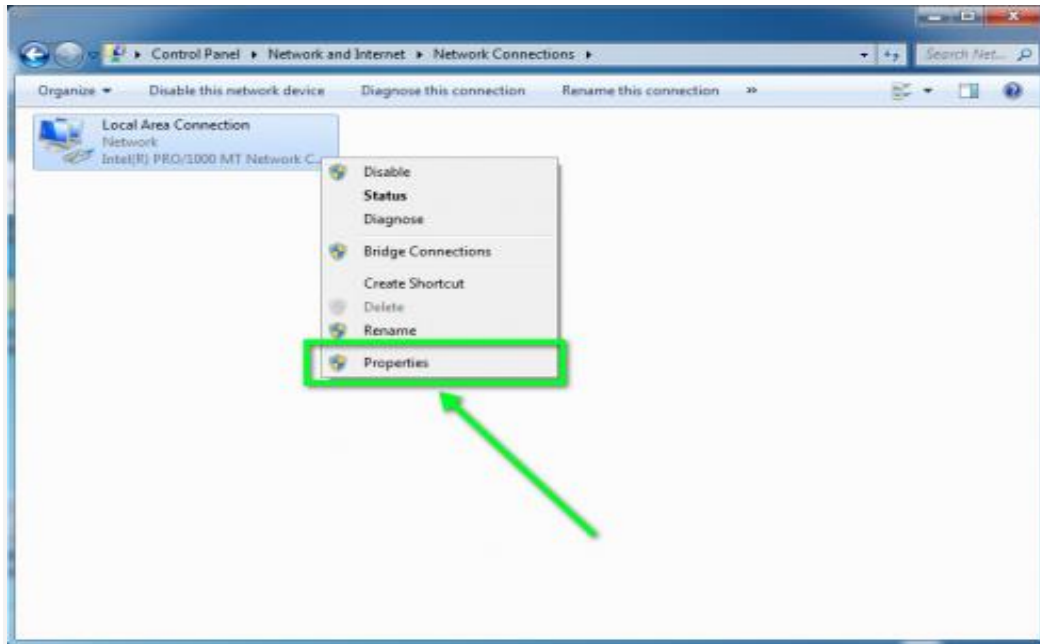
Click on the **Network and Sharing Center** option.



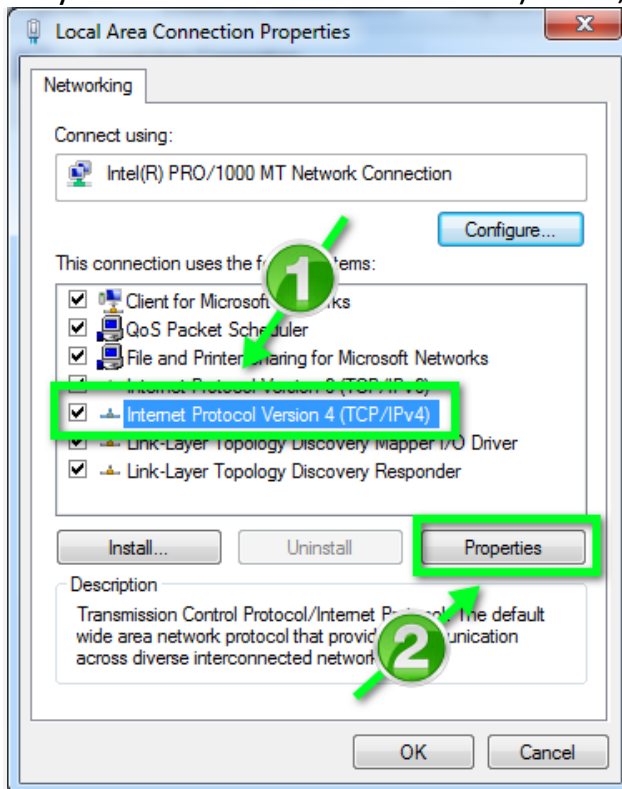
Click on **Change adapter settings** from the left side menu.



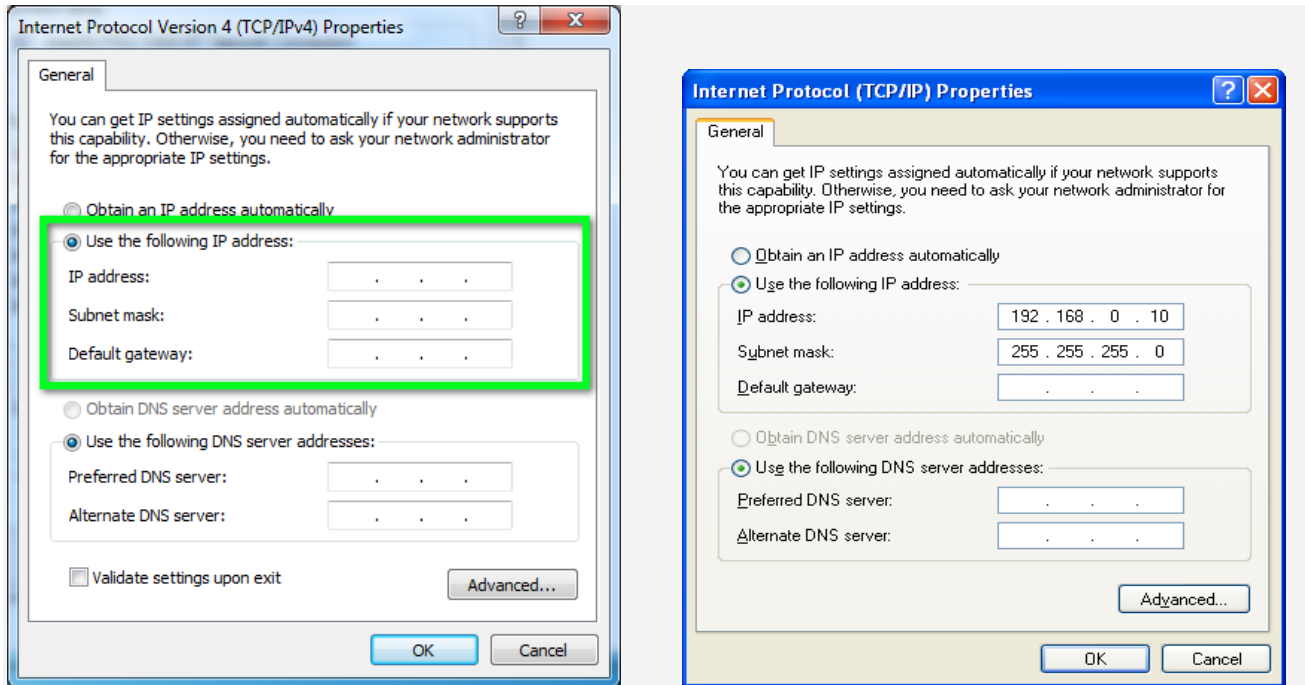
Right-click on the **Local Area Connection** icon, then select **Properties**.



In the window that opens, click on the **Internet Protocol Version 4 (TCP/IPv4)** (you may need to scroll down to find it). Next, click on the **Properties** button.



In the window that opens, click the Use the following IP address: radio button. In the IP address:, type **192.168.0.10**, Subnet mask: **255.255.255.0**, and Default gateway: leave blank. For the DNS server settings, leave both of them blank.



Click OK to save the setting. After a few seconds, you should be able to connect HiCON from Mach software.