

This document will detail the basic start up required to get motors moving once the MP2300Siec or MP2310iec controller is removed from its packaging.

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Remove controller from the box.

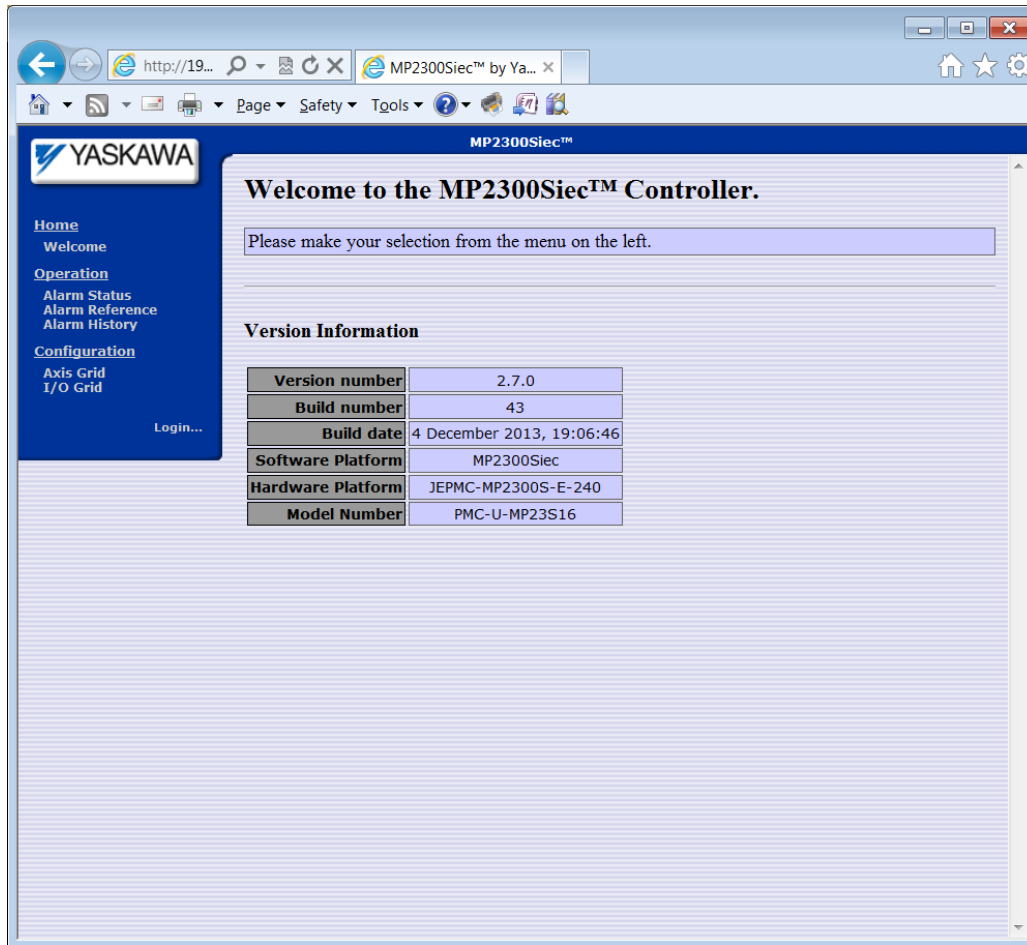
- 1) Insert Option cards. This step is optional, but it is best to let the controller self configure with all of the hardware, so if you have them, install them now.
- 2) Connect 24 VDC power to the controller, but do not power up just yet.
- 3) Set DIP switches to self configure the system and set the default IP address. When the CNFG switch is on, the controller will “look” for Mechatrolink devices and I/O cards in the option slots when it powers up. If the E-INIT switch is on, the controller will force the IP address to be 192.168.1.1.
- 4) On the front panel, set the CNFG switch to the ON position on SW1 and set E-INIT to the ON position on SW2, all others should be OFF.

Connecting to the Controller

- 1) Power up controller.
- 2) Connect an Ethernet cable to the PC and to the MPic controller.
- 3) Configure the PC with an IP address of 192.168.1.x where x is anything between 2 and 250. If you're not sure how to do this, refer to the following link, or Google “configure PC IP address”:

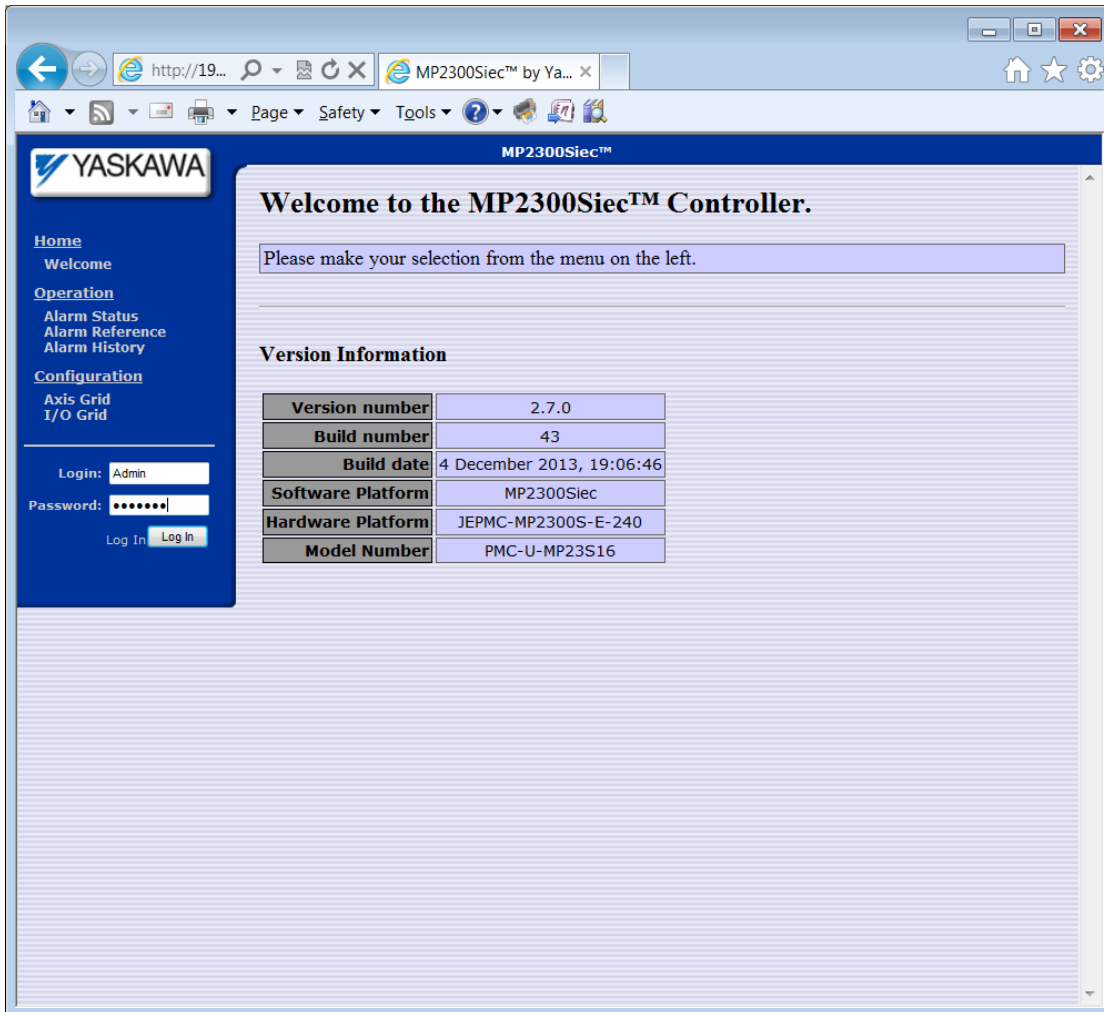
<http://www.howtogeek.com/howto/19249/how-to-assign-a-static-ip-address-in-xp-vista-or-windows-7/>

- 4) Open Internet Explorer and type the controllers IP address “192.168.1.1” in the address bar. Your browser should look something like this:



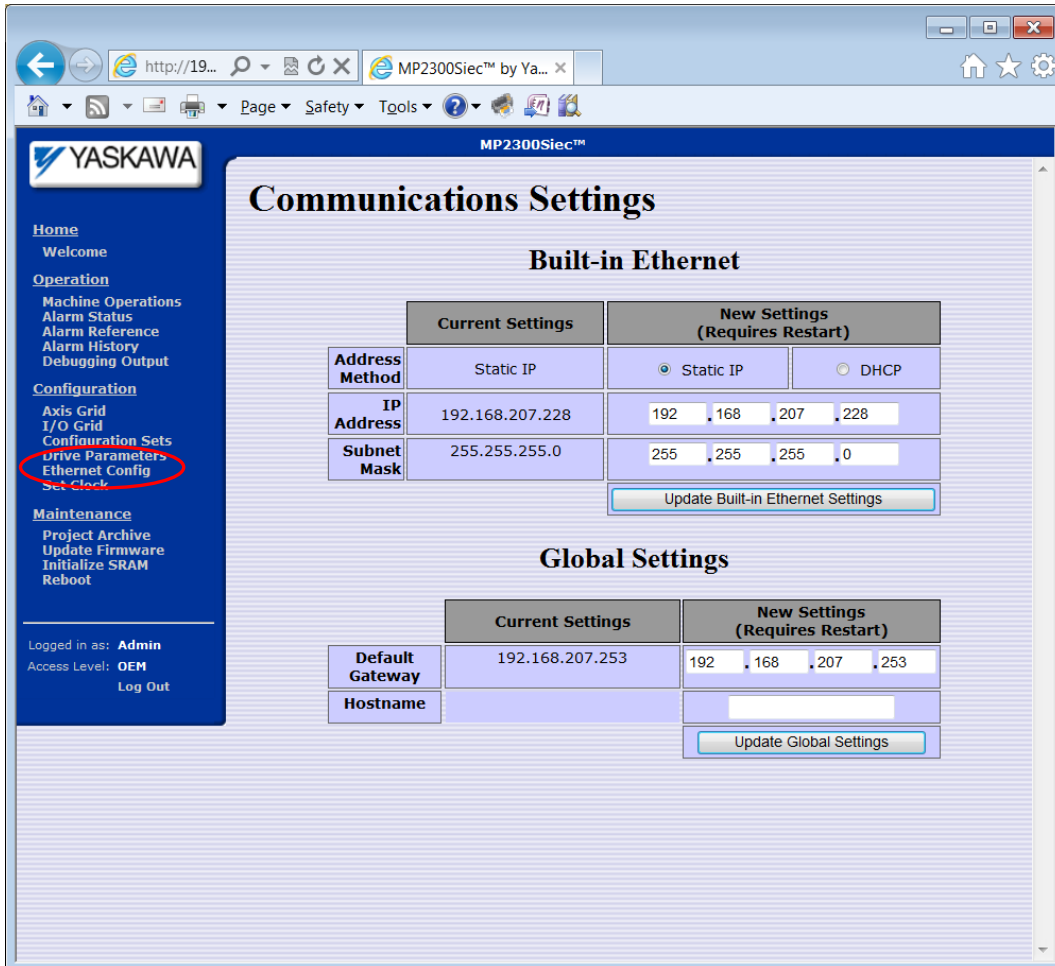
Setting an IP address (optional)

- 1) Login into the controller by clicking on Login and entering “Admin” in the Login field and “MP2300S” in the Password field. Note that both are case sensitive. If using an MP2310iec, the password is still MP2300S.



- 2) Click on the Ethernet Config link on the left side of the screen.

- 3) Set the IP address and click “Update Built-in Ethernet Settings.” Set the default gateway and click on “Update Global Settings.” Do not set both values before clicking on a button or you will have to reenter the value for the button that was not clicked.



- 4) Reset SW2 so that all switches are off. If E-INIT is left on, the controller will not use the configured IP address.
- 5) Reboot the controller and reset your PC's IP address to a number corresponding to the MPiec Controllers' configured address. If you plan to connect directly to the controller then the PC's IP address must be on the same subnet.
- 6) Confirm communication by typing the new address in the address bar of Internet Explorer.

Configuring the ServoPacks

- 1) Connect the ServoPacks via Mechatrolink.
- 2) See chapter 4 in the following manuals for information on setting the switches for Mechatrolink communications. Most switches are pre set at the factory to communicate with MPiec controllers, but if the system has more than one axis, the station addresses must be set to unique values.

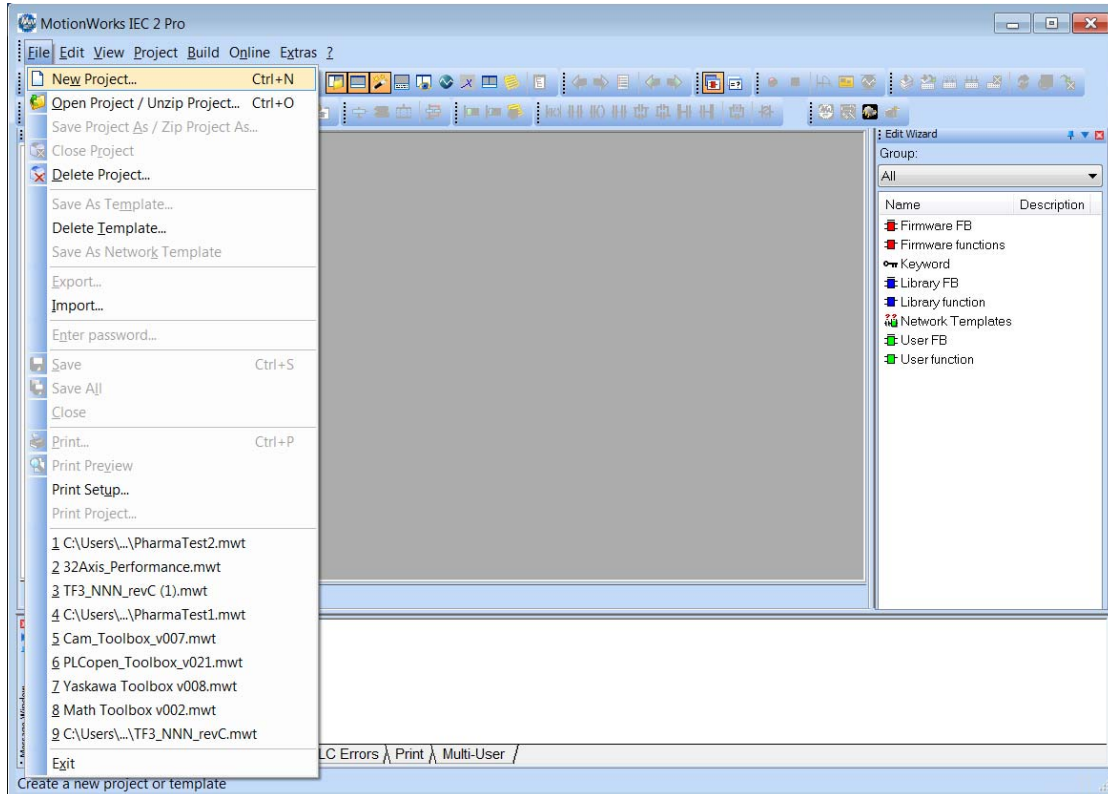
Sigma 5, Mechatrolink II

[http://www.yaskawa.com/site/dmservo.nsf/\(DocID\)/TKUR-79CL5Q/\\$File/sieps80000046g_9_0.pdf](http://www.yaskawa.com/site/dmservo.nsf/(DocID)/TKUR-79CL5Q/$File/sieps80000046g_9_0.pdf)

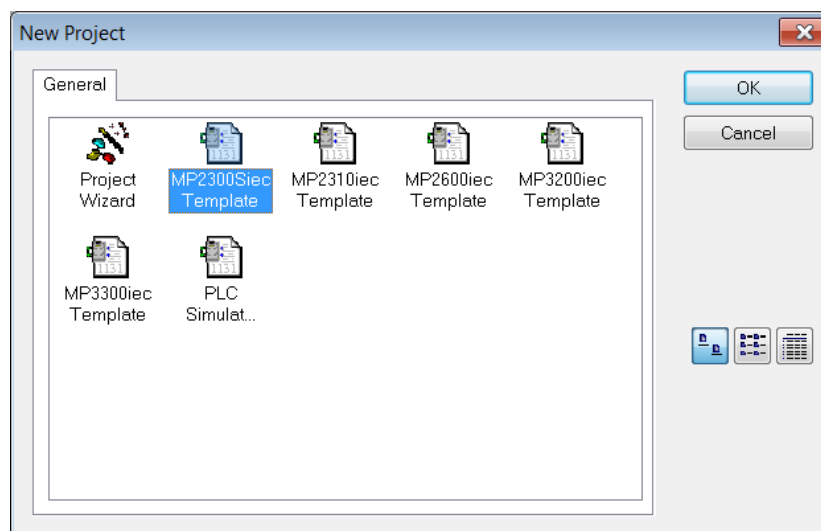
- 3) Set amplifier(s) station number, connect the servomotor to the amplifier with the power and encoder cables, and connect the amplifiers to the controller by inserting pre made Mechatrolink cables. Make sure a terminator (W6022) is placed at each end of the Mechatrolink cabling.
- 4) Power up the ServoPacks' control wiring and the MPiec controller together within about five seconds. The ServoPacks can be powered up before the MPiec controller for it to "find" all of the ServoPacks and other Mechatrolink devices.
- 5) Set Servopack parameters (Pn002, POT, NOT, ...) and cycle power. The amplifiers must have Pn002 set correctly for the MPiec Controller to operate the ServoPacks and the positive and negative over travels must either be connected or disabled to move the motor.

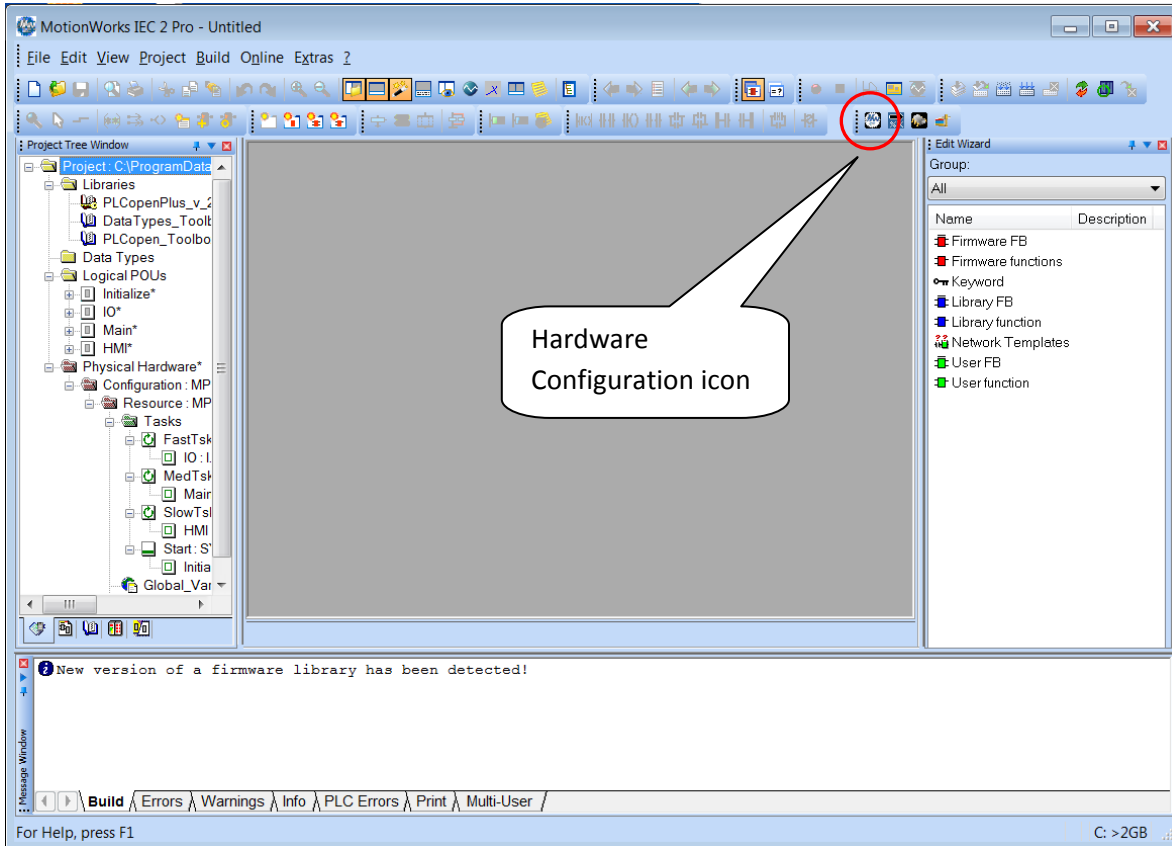
Creating a New Project

- 1) Open MotionWorks IEC and create a new MP2300iec project by clicking File -> New Project.



- 2) Select the MP2300Siec Template.



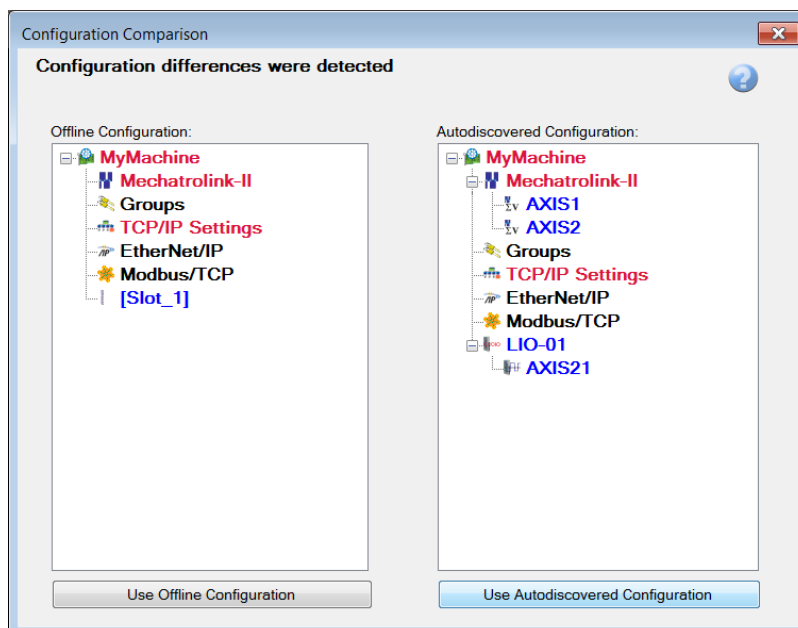


- 3) Locate and click the icon to open the Hardware Configuration. Note, this toolbar may be on the bottom left of the toolbar area.

- 4) Set the configured IP address in the boxes on the upper right and click the Connect button.



- 5) The application will display configuration differences since the project's default configuration will not match the autodiscovered configuration (unless no option cards or amplifiers are attached). Select the "Use Autodiscovered Configuration" button.



- 6) If the ServoPacks have factory default parameters, the connected axes will be shown in red, as they will have alarms. Click on MyMachine in the tree at the left and then on the Alarms tab. Notice that the alarms indicate that Pn002 is not properly initialized. This is an expected alarm when the servopack has factory default parameters.

The screenshot shows the MotionWorks IEC 2 Pro - Hardware Configuration software interface. The 'Alarms' tab is selected, displaying the following data:

Alarm Code	Source of Alarm	Description	Details
3301 000B	AXIS2	Pn 002 Not Correctly Initialized	Pn002 must be set to xx11 for correct operation in torque and
3301 000B	AXIS1	Pn 002 Not Correctly Initialized	Pn002 must be set to xx11 for correct operation in torque and

Alarm Code	Source of Alarm	Description	Details	Severity
3301 000B	MLink Node	Pn 002 Not Correctly Initialized	Pn002 must be set to xx11 for correct operation in torque and	alar
3301 000B	MLink Node	Pn 002 Not Correctly Initialized	Pn002 must be set to xx11 for correct operation in torque and	alar
440A 0019		The system was rebooted	The system was rebooted by the user.	wan
340C 0103	PLC	Watch dog error occurred for PLC		alar
440A 0019		The system was rebooted	The system was rebooted by the user.	wan
440A 0019		The system was rebooted	The system was rebooted by the user.	wan
440A 0019		The system was rebooted	The system was rebooted by the user.	wan
340C 0121	PLC	Internal PLC Error: Invalid change of mode	Internal PLC Error: Invalid change of mode.	alar
440A 0019		The system was rebooted	The system was rebooted by the user.	wan
4303 094A	AXIS2	A.94A: Data Setting Warning 1 (Incorrect command parameter number was set.		wan
4403 0005	RMI Connecti	RMI Connection Rejected	An RMI connection was attempted by an external client an	wan

- Click on Axis1 in the tree view and then on the all parameters tab. Notice that Pn002 is set to the proper value for the MPieC controller to operate the ServoPack. Blue background on this screen means the value is forcibly set each time an online save is performed in Hardware Configuration.

The screenshot shows the MotionWorks IEC 2 Pro - Hardware Configuration software. The interface includes a menu bar (File, Edit, Device, Tuning, Online, Help), a toolbar, and a tree view on the left showing the machine structure: MyMachine, Mechatrolink-II, AXIS1, and AXIS2. The main window displays the 'All Parameters' tab for Axis 1, with a table of parameters. The 'Online' button is highlighted in green. The table below shows the current values for various parameters, with Pn002 highlighted in blue.

Parameter	Parameters	Current Value	Units	Min	Max	Default Value
Pn000.0	Rotation Direction	0 - Set counter clockwise as the for				0 - Set counter cloc
Pn000.1	Reserved (Do not change.)	0 - Reserved (Do not change.)				
Pn000.2	Reserved (Do not change.)	0 - Reserved (Do not change.)				
Pn000.3	Reserved (Do not change.)	0 - Reserved (Do not change.)				
Pn001.0	Servo OFF or Alarm Stop Mode	0 - Stop motor by Dynamic Brake (0 - Stop motor by D
Pn001.1	Overtravel Stop Method	0 - Stops the motor by the *Servo O				1 - Decelerate motc
Pn001.2	AC/DC Power Input Selection	0 - Input AC Power				0 - Input AC Power
Pn001.3	Reserved (Do not change.)	0 - AL01, AL02, AL03 output only al				0 - AL01, AL02, AL
Pn002.0	Speed Control Option	1 - Mechatrolink values P-TLIM am				1 - Mechatrolink val
Pn002.1	Torque/Force Control Option	1 - Mechatrolink value VLIM is used				1 - Mechatrolink val
Pn002.2	Absolute Encoder Usage	0 - Use absolute encoder as absolu				0 - Use absolute en
Pn002.3	Full-Closed Encoder Selection	0 - Unused				0 - Unused
Pn006.0	Analoo Monitor 1	2 - Torque/Thrust Reference (1V / 1				2 - Torque/Thrust F
Pn006.1	Reserved (Do not change.)	0 - Reserved (Do not change.)				
Pn006.2	Reserved (Do not change.)	0 - x 1				0 - x 1
Pn006.3	Reserved (Do not change.)	0 - Reserved (Do not change.)				
Pn007.0	Analoo Monitor 2	0 - Motor Speed (1V / 1000 RPM. 1'				0 - Motor Speed (1\
Pn007.1	Reserved (Do not change.)	0 - Reserved (Do not change.)				
Pn007.2	Reserved (Do not change.)	0 - x 1				0 - x 1
Pn007.3	Reserved (Do not change.)	0 - Reserved (Do not change.)				
Pn008.0	Low Battery Voltage Alarm/Warning	0 - Disolv Alarm for low batterv vol				0 - Disolv Alarm fo
Pn008.1	Function Selection for Insufficient Voltage	0 - Disables detection of insufficient				0 - Disables detecti
Pn008.2	Warnino Detection Selection	0 - Detects warnino				0 - Detects warnino
Pn008.3	Reserved (Do not change.)	4 - Reserved (Do not change.)				
Pn009.0	Reserved (Do not change.)	0 - Reserved (Do not change.)				
Pn009.1	Current Control Method	1 - Current Control Method 2 fenab				1 - Current Control

Limit Switches

- 1) Scroll down to Pn50A and 50B.

WARNING: Do not disable the limit switches if the axis can physically hit something. If this is the case, connect the over travel (limit) switches to the ServoPacks IO connector (Cn1). If the motor is not coupled to a load or if it is impossible for the axis to hit anything, then disable the limit switches.

Parameter	Parameters	Current Value	Units	Min	Max	Default Value
Pn495	Polarity Detection Confirmation Force Refe	100	%	0	200	100
Pn498	Polarity Detection Allowable Error Range	10	deo	0	30	10
Pn501	Zero Clamo Level	10	per mir	0	100	10
Pn502	Rotation Detection Level	20	per mir	1	100	20
Pn503	Speed Coincidence Signal Output Width	10	per mir	0	100	10
Pn506	Brake Reference - Servo OFF Delay Time	0	ms	0	500	0
Pn507	Brake Reference Output Speed Level	100	per mir	0	100	100
Pn508	Timina for Brake Reference durina Motor	500	ms	100	100	500
Pn509	Momentary Hold Time	20	ms	20	100	20
Pn50A.0	Reserved (Do not change.)	1 - Reserved (Do not change.)				
Pn50A.1	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50A.2	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50A.3	Positive Over Travel	1 - ON When Terminal CN1-41 for				1 - ON When Termi
Pn50B.0	Neagative Over Travel	2 - ON When Terminal CN1-42 for				2 - ON When Termi
Pn50B.1	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50B.2	/P-CL Signal Mapping	8 - Sets Signal OFF				8 - Sets Signal OFF
Pn50B.3	/N-CL Signal Mapping	8 - Sets Signal OFF				8 - Sets Signal OFF
Pn50C.0	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50C.1	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50C.2	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50C.3	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50D.0	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50D.1	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50D.2	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50D.3	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50E.0	COIN Output	0 - Disable				0 - Disable

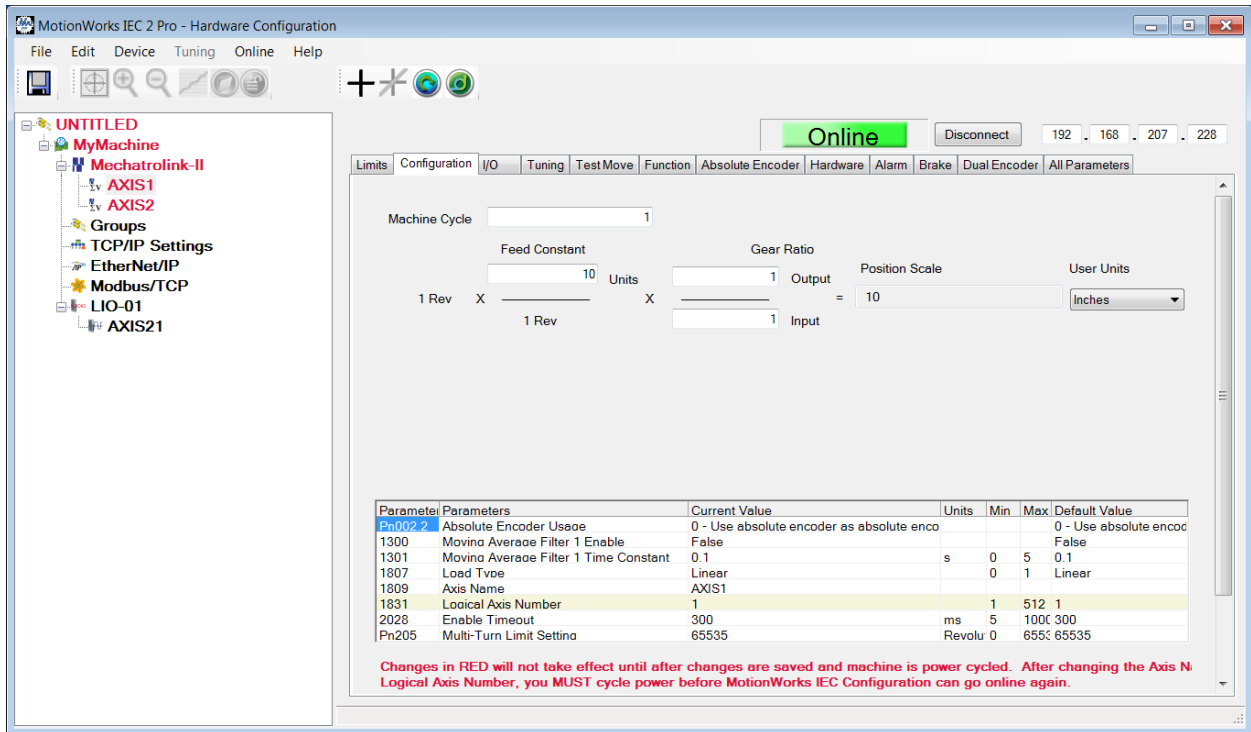
- 2) To disable the limit switches, set Pn50A.3 and Pn50B.0 to 8. When these parameters are changed, a warning will be displayed indicating that this setting will not take effect until the ServoPack power is cycled off and on again.

The screenshot shows the MotionWorks IEC 2 Pro - Hardware Configuration software interface. The 'Online' button is highlighted in green. The 'Parameters' tab is selected, displaying a table of parameters. The parameters Pn50A.3 and Pn50B.0 are highlighted in red, indicating they have been changed. The current values for these parameters are 8, and the default values are 1 and 2, respectively. A warning message at the bottom of the table states: 'Changes in Red will not take effect until after changes are saved and power is cycled on the machine'.

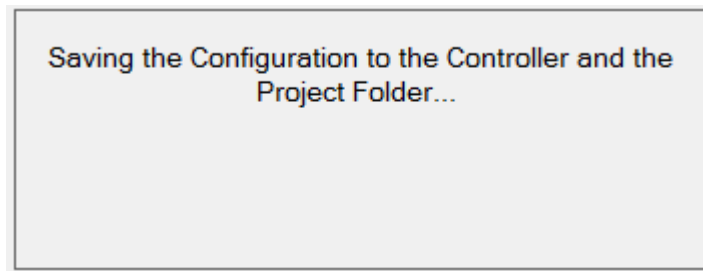
Parameter	Parameters	Current Value	Units	Min	Max	Default Value
Pn495	Polarity Detection Confirmation Force Refe	100	%	0	200	100
Pn498	Polarity Detection Allowable Error Range	10	deg	0	30	10
Pn501	Zero Clamp Level	10	per mir	0	100	10
Pn502	Rotation Detection Level	20	per mir	1	100	20
Pn503	Speed Coincidence Signal Output Width	10	per mir	0	100	10
Pn506	Brake Reference - Servo OFF Delay Time	0	ms	0	500	0
Pn507	Brake Reference Output Speed Level	100	per mir	0	100	100
Pn508	Timing for Brake Reference during Motor	500	ms	100	100	500
Pn509	Momentary Hold Time	20	ms	20	100	20
Pn50A.0	Reserved (Do not change.)	1 - Reserved (Do not change.)				
Pn50A.1	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50A.2	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50A.3	Positive Over Travel	8 - Set Signal OFF				1 - ON When Tern
Pn50B.0	Negative Over Travel	8 - Set Signal OFF				2 - ON When Tern
Pn50B.1	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50B.2	/P-CL Signal Mapping	8 - Sets Signal OFF				8 - Sets Signal OFF
Pn50B.3	/N-CL Signal Mapping	8 - Sets Signal OFF				8 - Sets Signal OFF
Pn50C.0	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50C.1	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50C.2	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50C.3	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50D.0	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50D.1	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50D.2	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50D.3	Reserved (Do not change.)	8 - Reserved (Do not change.)				
Pn50E.0	COIN Output	0 - Disable				0 - Disable

Changes in Red will not take effect until after changes are saved and power is cycled on the machine

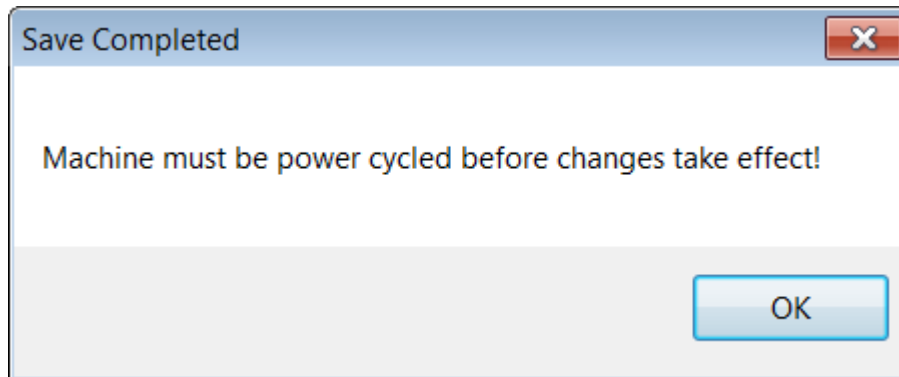
- Click on the configuration tab to set user units. For this example, the load will move 10 inches for every motor revolution, so we set the position scale to 10 and the user units to inches.



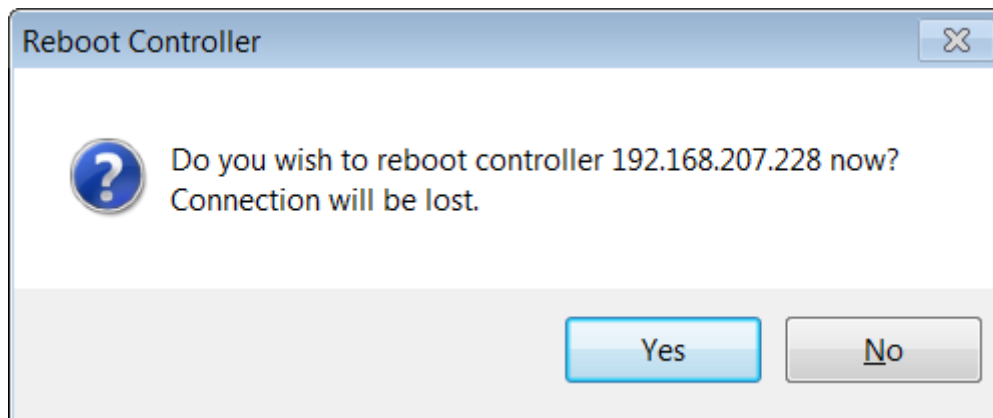
- After setting the User Units save the configuration by clicking the save icon or choosing 'Save' from the file menu. The following dialog will appear while the configuration is being saved.



- 5) When the save has completed, a dialog will inform you that the system must be power cycled.



- 6) Select 'Reboot Controller' from the Online menu, and then 'Yes' to the following confirmation dialog.



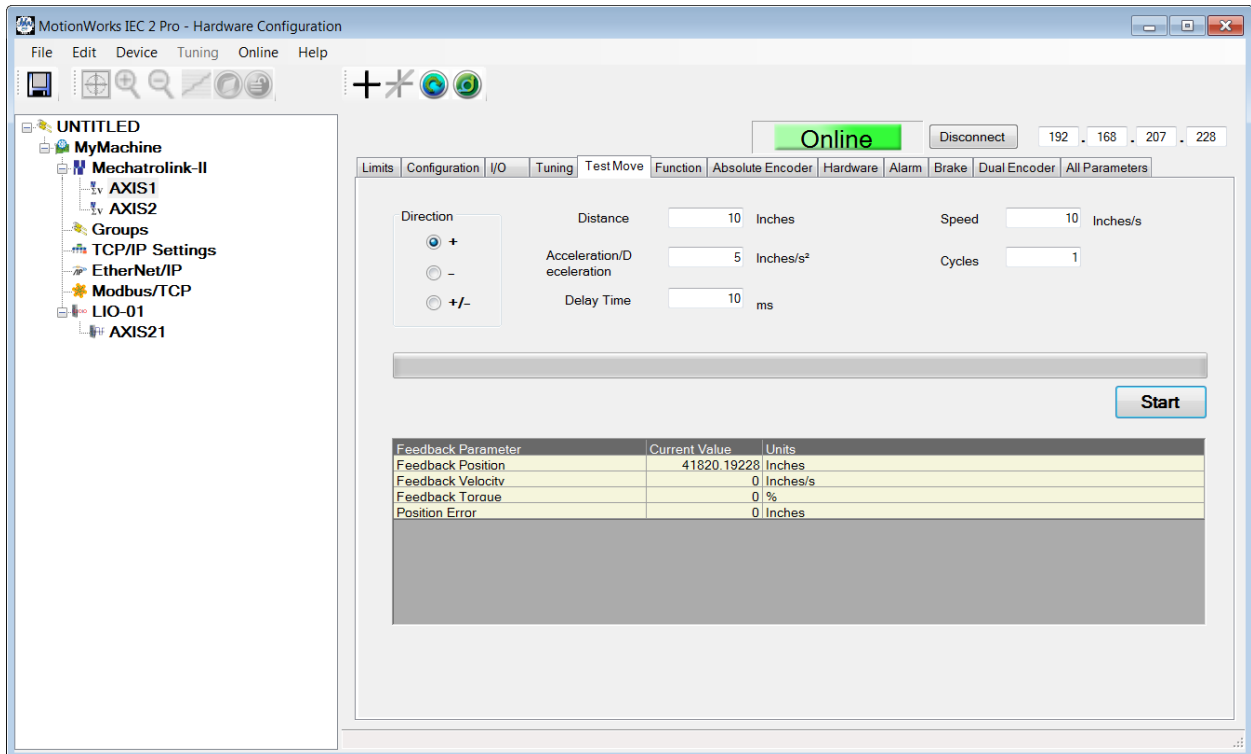
When the controller reboots, it performs a software power cycle on the ServoPacks, so there is no need to physically remove power from them.

- 7) After the controller has rebooted, click 'Connect.' This time the 'Configuration Differences' dialog box will not be displayed since the offline and online configurations are identical.



Test Moves

To run a test move, click on the Test Move tab. To move the axis one revolution so set a 10 in the distance field, and we are also going to run it at 10 rev/sec so set the speed to 10 also. In the following screen shot I have also set the direction to positive only and changed the number of cycles to 1. Click on the “+” icon to enable the motor and then click on Start to begin the motion. If you click on Start first, the application will prompt you to enable the motor.

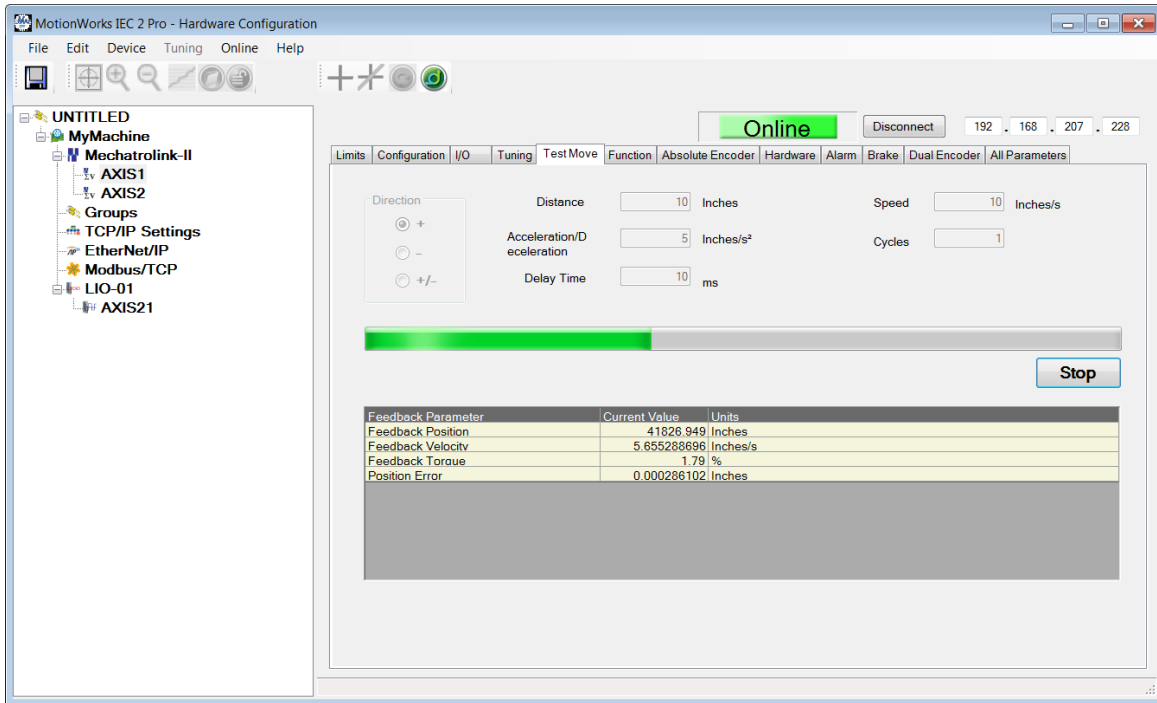


The screenshot shows the MotionWorks IEC 2 Pro - Hardware Configuration software interface. The main window is titled "MotionWorks IEC 2 Pro - Hardware Configuration" and has a menu bar with "File", "Edit", "Device", "Tuning", "Online", and "Help". The interface is divided into several sections:

- Left Panel:** A tree view showing the machine configuration. The root is "UNTITLED", followed by "MyMachine", "Mechatrolink-II", "AXIS1", "AXIS2", "Groups", "TCP/IP Settings", "EtherNet/IP", "Modbus/TCP", "LIO-01", and "AXIS21".
- Top Right:** A status bar showing "Online" in a green box, a "Disconnect" button, and IP address ranges: "192 . 168 . 207 . 228".
- Tabbed Interface:** A row of tabs at the top of the main workspace includes "Limits", "Configuration", "I/O", "Tuning", "Test Move" (which is selected), "Function", "Absolute Encoder", "Hardware", "Alarm", "Brake", "Dual Encoder", and "All Parameters".
- Test Move Configuration:**
 - Direction:** Three radio buttons are present: "+" (selected), "-", and "+/-".
 - Distance:** A text input field containing "10" with the unit "Inches".
 - Speed:** A text input field containing "10" with the unit "Inches/s".
 - Acceleration/Deceleration:** A text input field containing "5" with the unit "Inches/s²".
 - Delay Time:** A text input field containing "10" with the unit "ms".
 - Cycles:** A text input field containing "1".
- Start Button:** A blue button labeled "Start" is located at the bottom right of the configuration area.
- Feedback Table:** A table at the bottom of the workspace displays real-time feedback data:

Feedback Parameter	Current Value	Units
Feedback Position	41820.19228	Inches
Feedback Velocity	0	Inches/s
Feedback Torque	0	%
Position Error	0	Inches

The motor will begin moving and the screen will be updated with new information as the axis is moved.



Now that the motors are running, the next steps in the development of an application are to mount and tune the motors and write the IEC 61131 application program. The following link has good information about tuning the servomotors.

<http://www.yaskawa.com/site/dmservo.nsf/SearchV/7BBC75A9A5EBFF1A862578F40075604E?OpenDocument&Source=SearchResultPage>