MotionWorks IEC Hardware Configuration

2013-03-26

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1.1 Hardware Configuration Overview

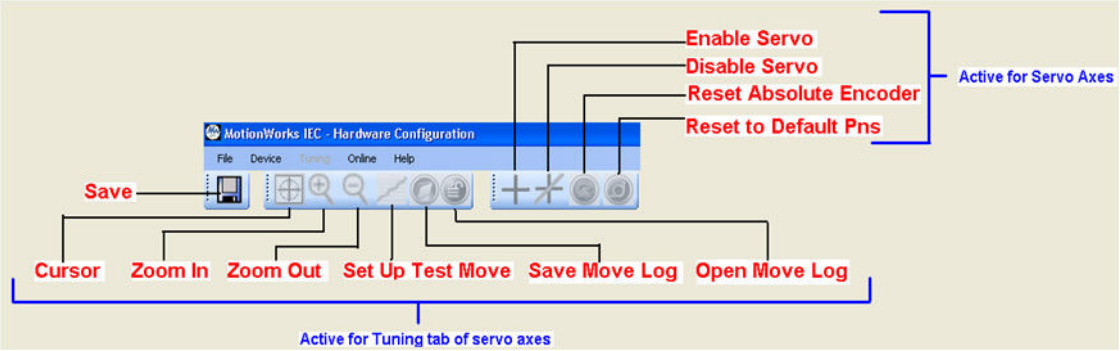
The Hardware Configuration provides a means of setting details for the hardware and communication devices with which the IEC application program interfaces. This information consists of items such as:

- MECHATROLINK Axis and Remote I/O configuration
- Parameters for devices on the Ethernet network,
- Option Slot configuration.

For each of these elements, the Configuration software automatically enters variable groups and default names in the Global Variables Definition for use with the application program.

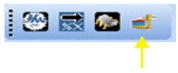
Other capabilities of the Hardware Configuration include graphical motor tuning interface, test move interface, alarm monitoring, and axis parameter monitoring.

Menu on Hardware Configuration



1.2 Accessing the Configuration

Open a project before launching the Hardware Configuration, otherwise the Open Project dialog box will appear so a project can be selected.

Click the Icon on the toolbar  to launch the Hardware Configuration.

1.3 Closing the Configuration

The Hardware Configuration will automatically close when the programming environment is closed, or if another project is opened. It is not necessary to close the Hardware Configuration while in the MotionWorks IEC programming environment.

1.4 Online vs. Offline

Offline

When the Hardware Configuration is offline, all data displayed, modified and saved is written to XML files in the project directory. If devices are added or removed, the IEC application will be changed accordingly when the Hardware Configuration's save button is pressed. This includes updating drivers, variable groups, and auto created variables. Changes made Offline that do not require servopack updates (no pn values changed) can be sent to the controller using the Online Menu to send the Offline configuration.

Online

Upon connection with a controller, a search for configuration data previously stored by MotionWorks IEC Hardware Configuration is performed.

If no configuration is found in controller (factory default):

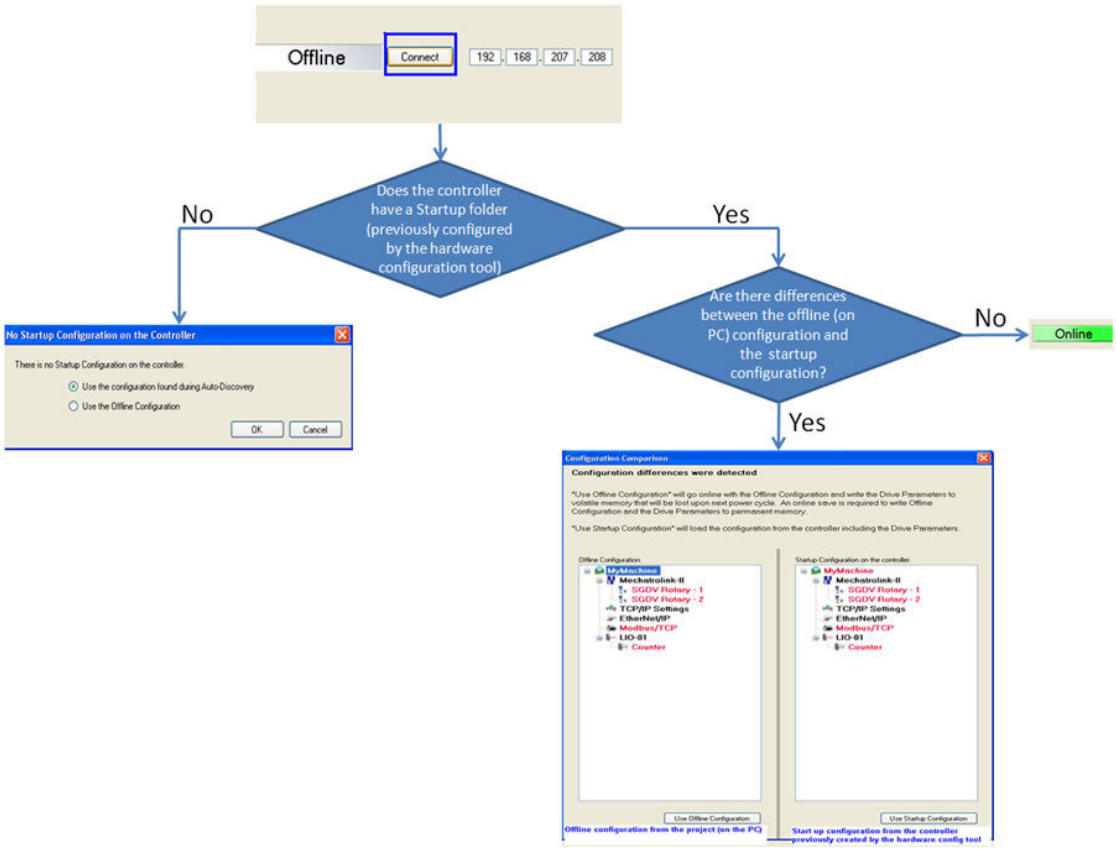
The auto discovered hardware is compared to the offline Hardware Configuration. If the hardware matches, the parameters for each component are compared. If the parameters match, the controller's configuration is displayed. If the configurations are different at either the hardware or parameter level, a side-by-side comparison will be displayed. The user must select one of the two configurations. When the Save

function is executed, the project's Hardware Configuration is stored in the controller.

If a previously stored configuration is found:

The previously stored Hardware Configuration is compared to the offline hardware. If the hardware matches, the parameters for each component are compared. If the parameters match, the controller's configuration is displayed. If the configurations are different at either the hardware or parameter level, a side-by-side comparison will be displayed. The user must select one of the two configurations.

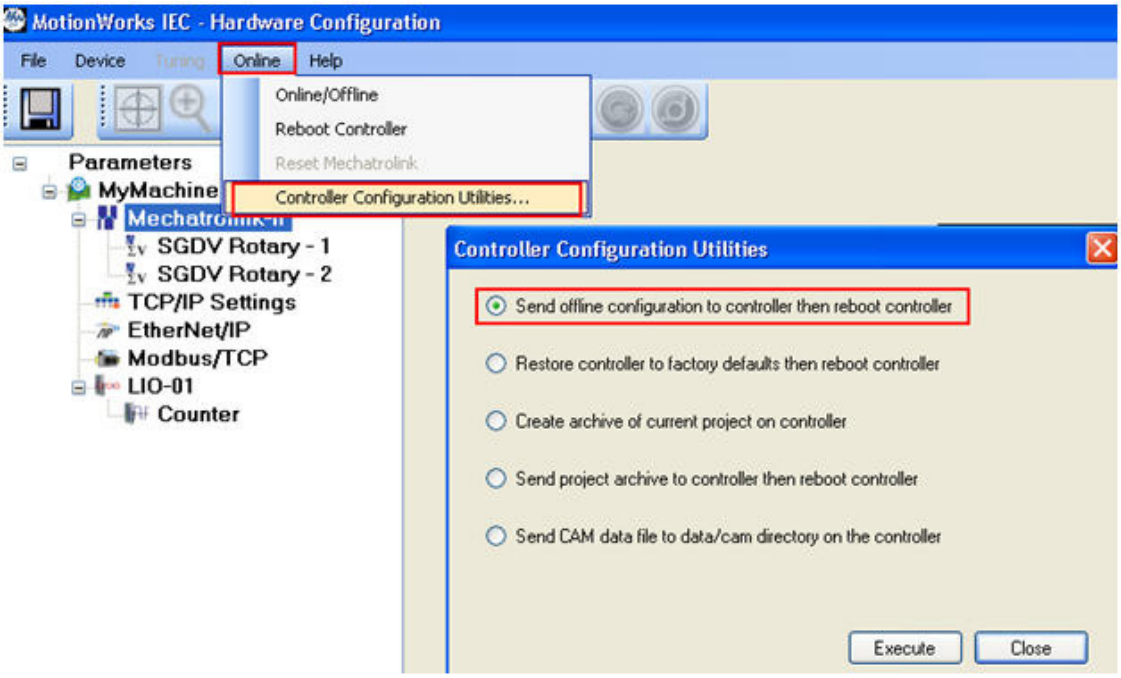
Process of going online with an MPiec Series Controller



It is not possible to go online with an offline Hardware Configuration that includes hardware not physically connected to the controller. For example, if the project's Configuration contains four servo axes but only one servo is connected to the controller over the MECHATROLINK motion network, it will not be possible to go online with the Hardware Configuration, however the user can send a configuration with missing hardware to the controller without going online.

1. Click the 'Online' menu
2. Click the 'Controller Configuration Utilities' menu

3. Click 'Send offline configuration to controller then reboot controller'. Note that this feature will only send the XML configuration files to the StartUp directory on the controller, and not send amplifier parameters to devices on the MECHATROLINK network.



1.4.1 Configuration Comparison

This window will appear if differences were detected in the configuration files in the project directory on the computer and the MPiec controller.

Device Differences

Differences in physical devices or communication settings are displayed visually in the windows.

Parameter Differences

If both locations contained configuration files, the exact differences can be viewed by right clicking in the item highlighted in red.

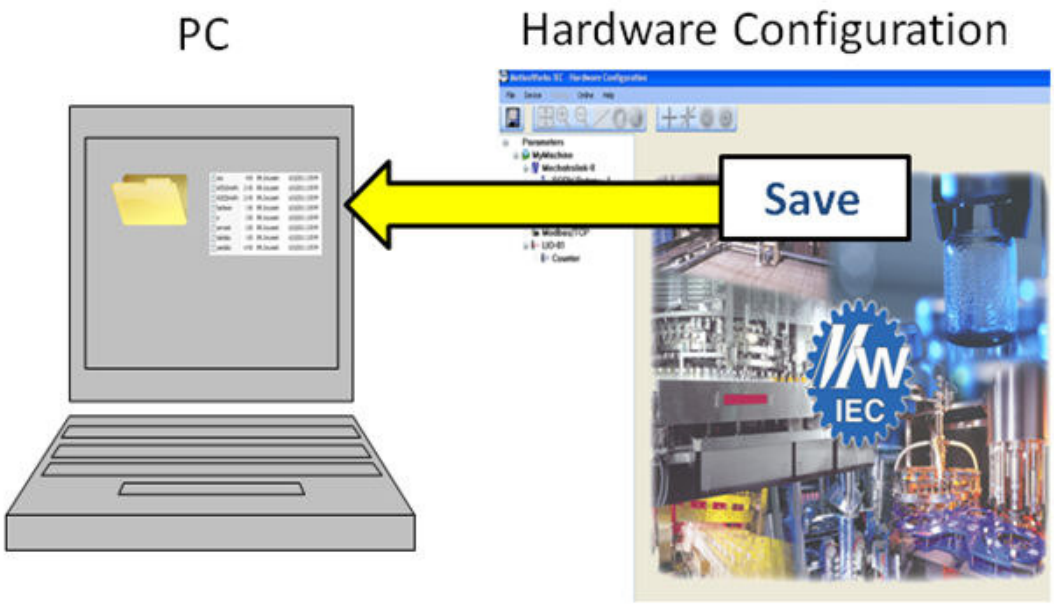
If either location did not contain configuration files, such as the case of a new project or new controller, the differences cannot be displayed.

1.5 Saving Configuration Data

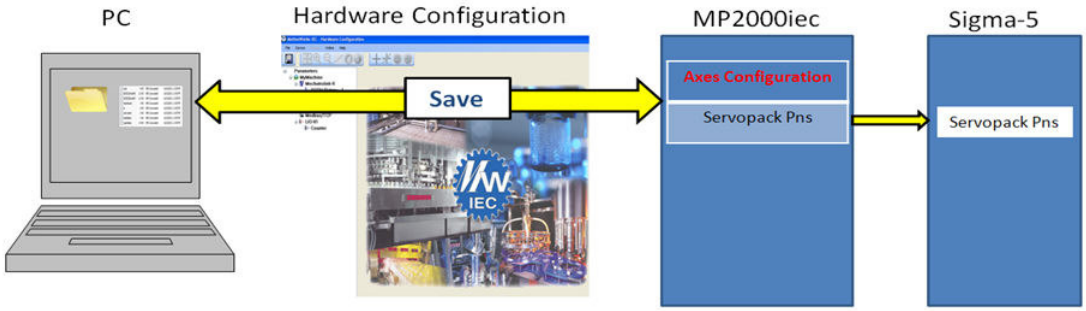
Configuration files are stored in a sub directory of the MotionWorks IEC application's project directory when the Save icon is clicked from within the Hardware Configuration. When online with the controller, the save function also downloads parameters to the controller and all MECHATROLINK motion devices.

The Save function will universally save data for all configured components.

Saving while offline



Saving while online with the controller

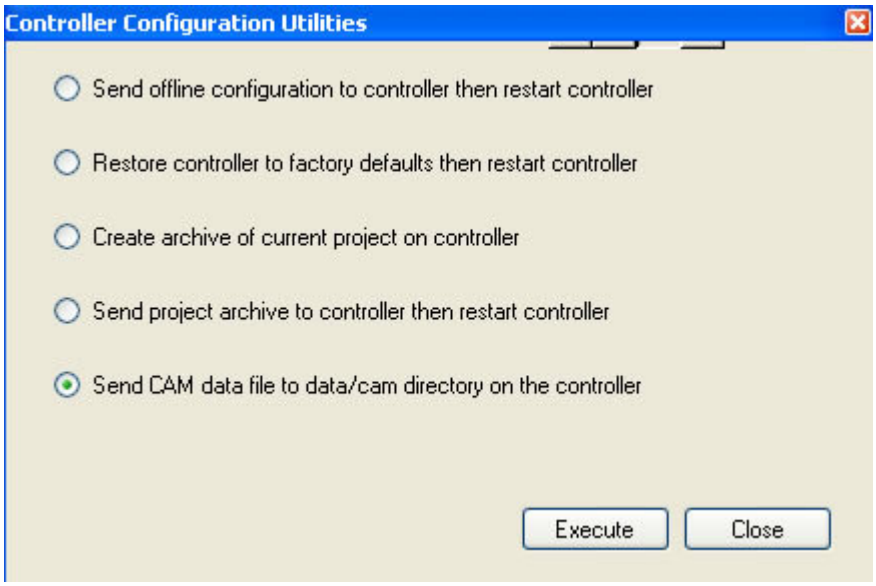


1.7 Additional Tools

1.7.1 User File Download

To add a user data file to any MPiec Series Controller, including cam files, follow these steps:

1. Open the Hardware Configuration
2. Click the "Online" menu
3. Click the "Controller Configuration Utilities" menu
4. Select the radio button called "Send Cam Data to Controller"



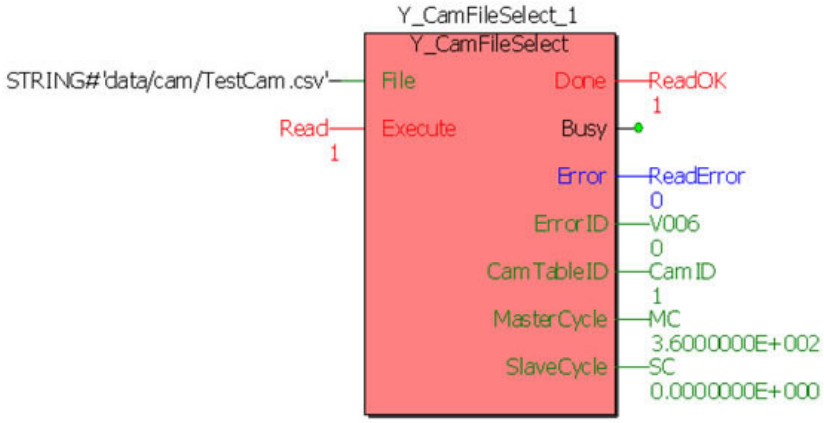
5) Select a CSV file.

6) Press Execute.

7) The file will be visible from the web server Project Archive list, and it is possible to select the CSV file using Y_CamFileSelect. Use the directory path in the filename input as shown below:

File Listing

Filename	Size
procon/any/PcFiles.pcf	320
procon/any/Pdc.MLI	14078
procon/any/Pdc.PRI	716
procon/any/PLCopenP.xml	154
procon/any/sr.zsv	1391
procon/boot/BootFile.pro	79475
user/config/current.xml	65
user/config/disco/axis.xml	5788
user/config/disco/hardware.xml	912
user/config/disco/io.xml	2041
user/config/disco/servonet.xml	1449
user/config/startup/axis.xml	5204
user/config/startup/hardware.xml	944
user/config/startup/io.xml	1496
user/config/startup/servonet.xml	1309
user/config/startup/taskdata.xml	775
user/config/startup/userdata.xml	2906
user/data/cam/dawg4.csv	11550
user/data/cam/TestCam.csv	11550
user/driveParam/AXIS1DrivePn.xml	17211
user/driveParam/AXIS2DrivePn.xml	8781



1.8 MECHATROLINK Configuration

1.8.1 Adding a Motion Axis

There are a couple methods to add axes to the configuration.

Offline:

1) Right click on the MECHATROLINK-II or MECHATROLINK-III item in the configuration tree.

2) Select 'Add Device' from the menu.

3) Select a drive model.

4) Enter a MECHATROLINK node number. This must match the rotary switches of the MECHATROLINK address on the device. Each device must have a unique address.

Online:

If Self Configuration is selected, the configuration will be automatically loaded into the configuration tree if 'auto discovered' is selected.

Drive configuration is divided into the following areas, depending on the type of drive configured. (Some products may not include all tabs) :

Limits	Test Move	All Parameters
Configuration	Function	Alarm
I/O	Absolute Encoder	Brake
Tuning	Hardware	Dual Encoder

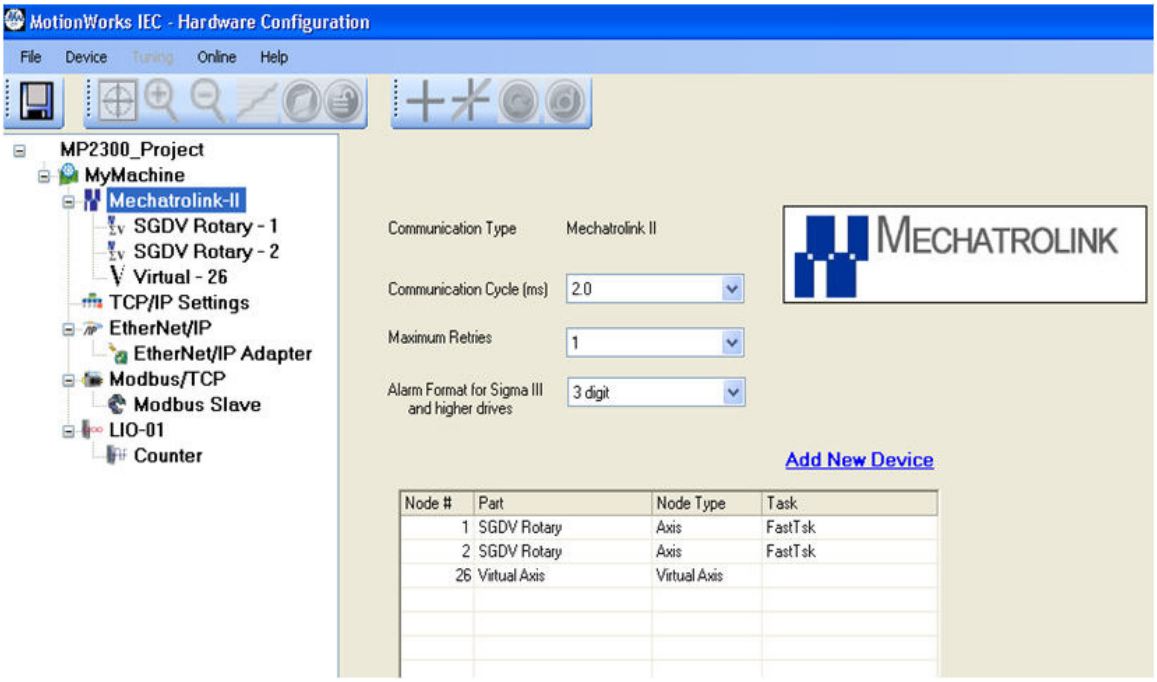


Figure 1: Two SGDV MECHATROLINK II axes and a virtual axis configured on an MP2300siec controller

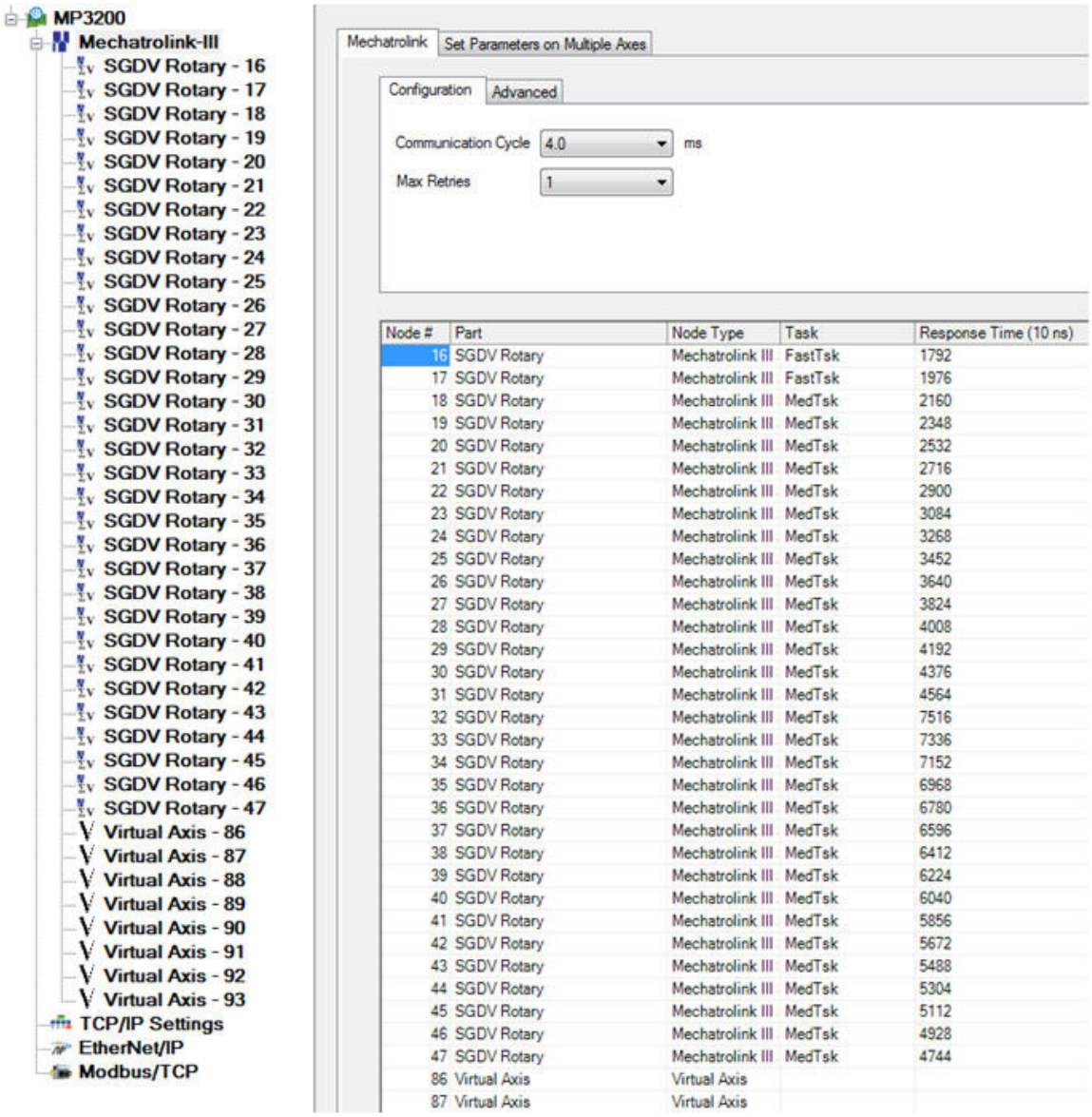


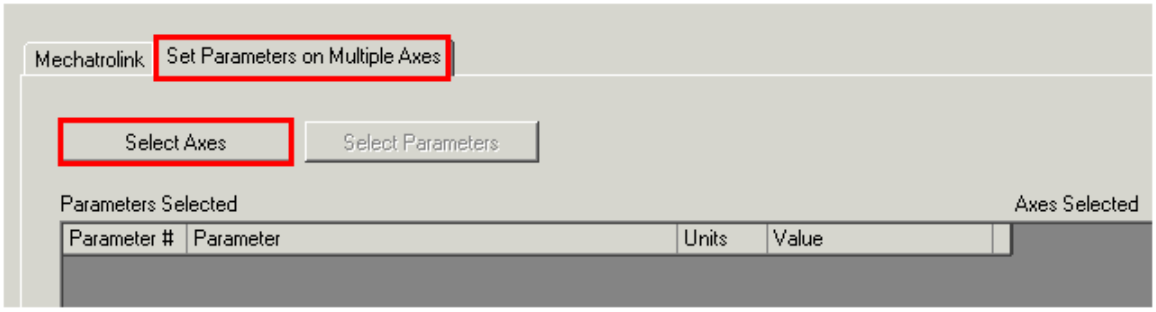
Figure 2: Thirty two MECHATROLINK III SGDVs and eight virtual axes configured on an MP3200iec controller

1.8.1.1 Multi Axis Parameter Editing

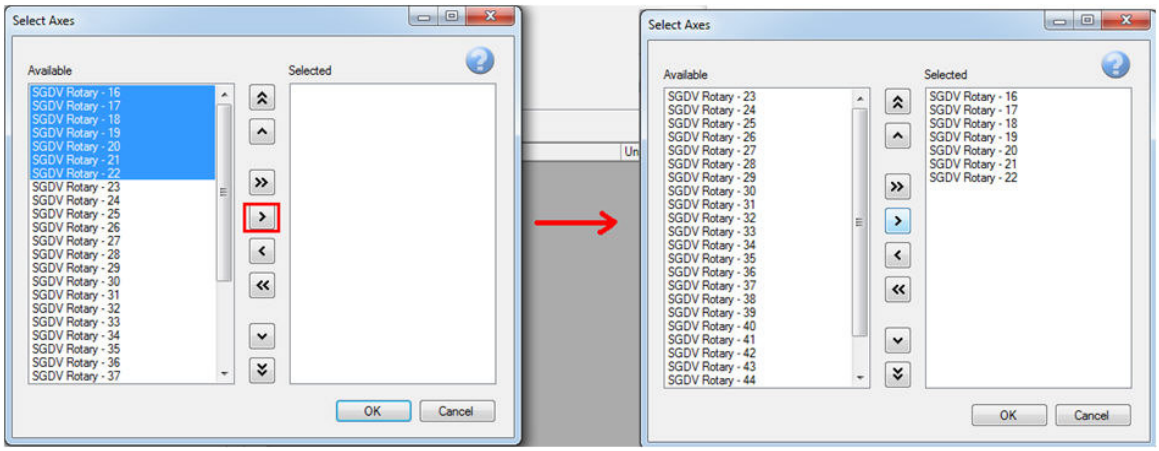
Machine configurations with multiple axes that have similar functionality requirements can be set simultaneously. This is useful in situations when many axes require the same parameter value which may differ from the default value.

Parameter Setting on Multiple Axes

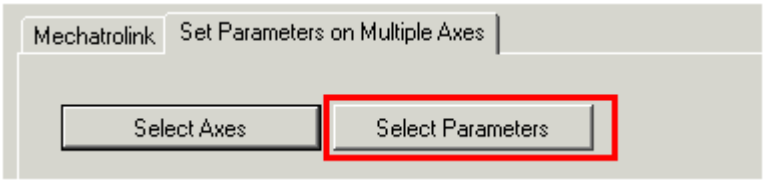
1. Select MECHATROLINK in the configuration tree.
2. Select the 'Set Parameters on Multiple Axes' tab as shown in the figure below.
3. Select the axes whose parameters must be set to the same value.



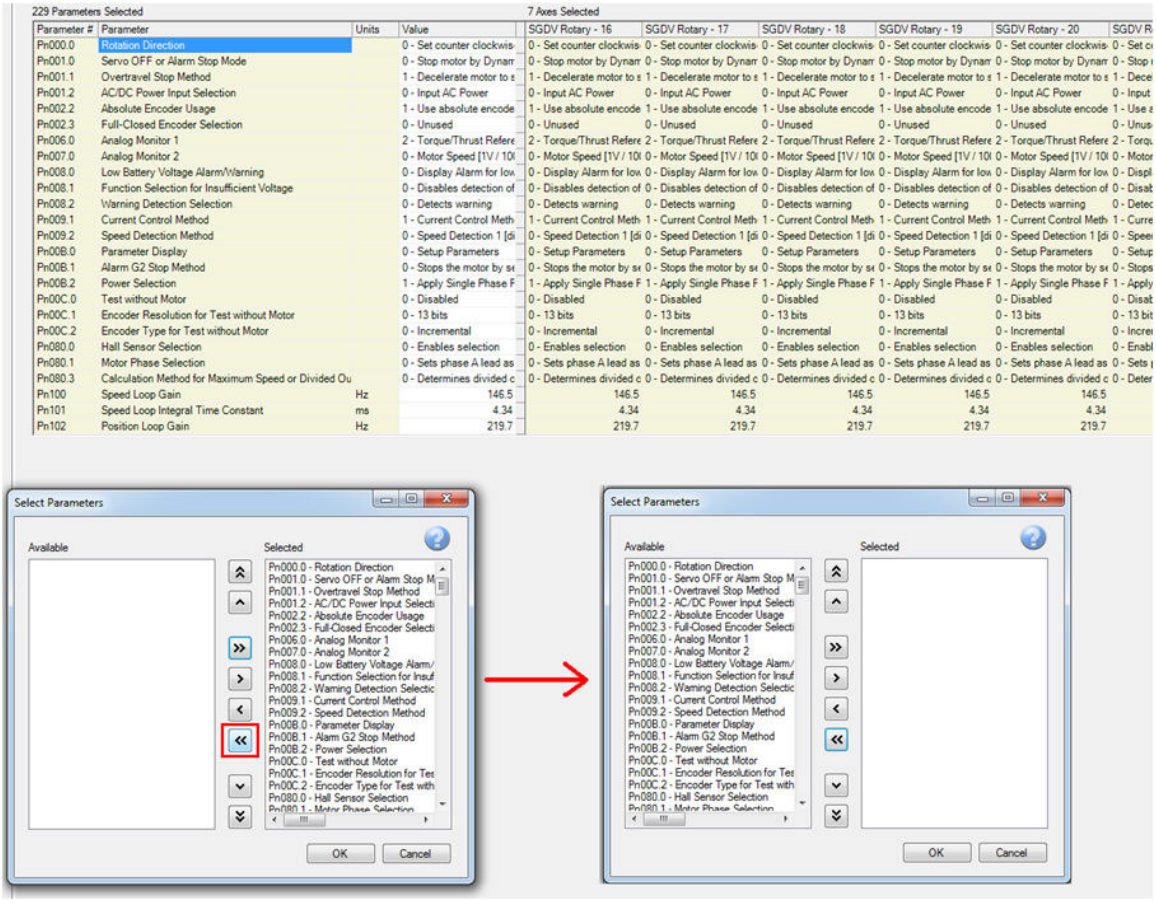
4. Select the axes whose parameters must be set/edited.



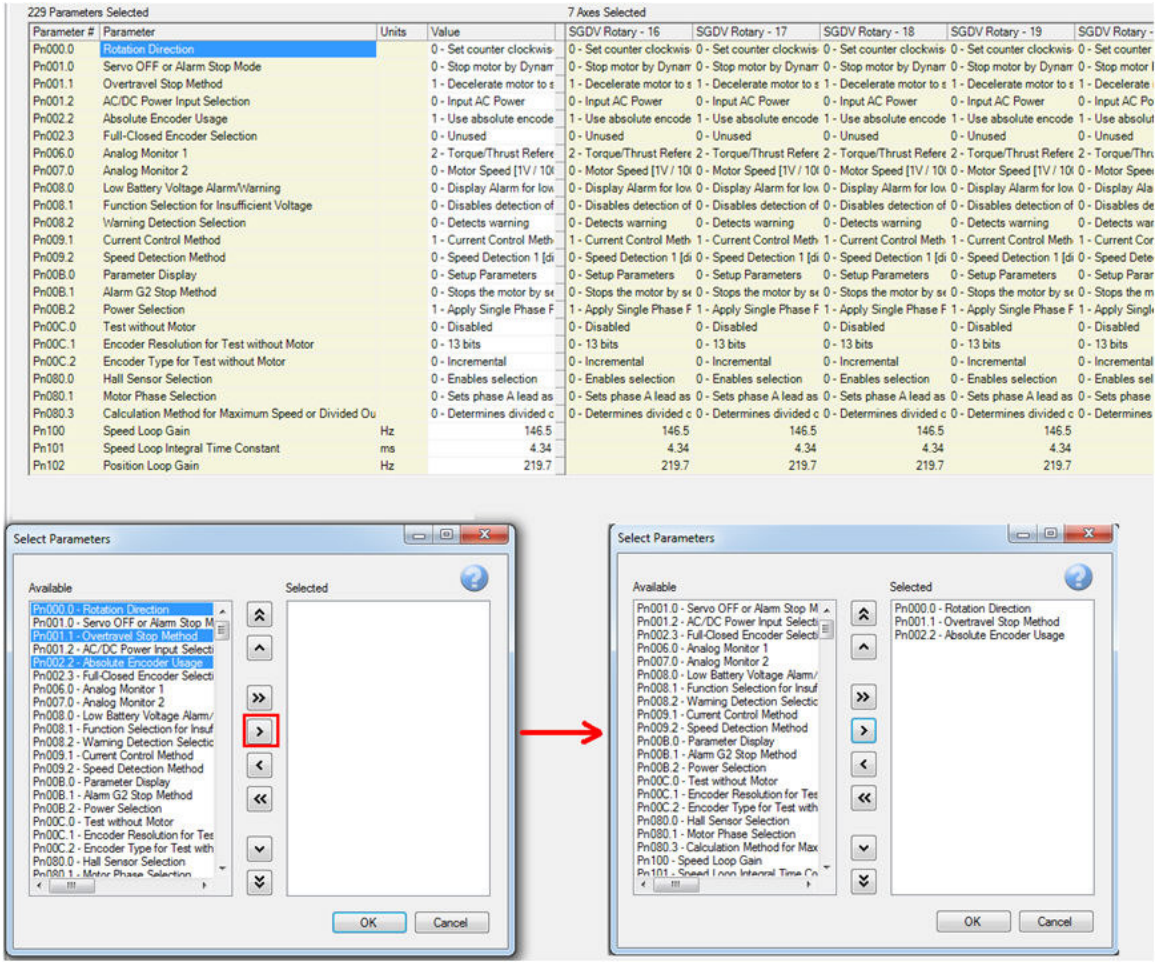
5. Select the parameters that must be edited.



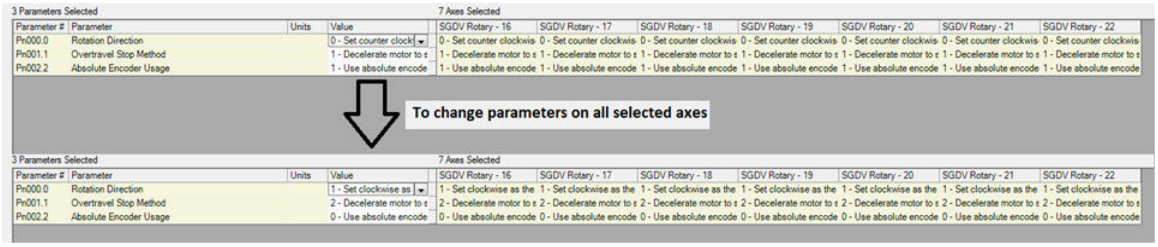
6. By default, all parameters will appear in the list. The parameter list can be reduced / customized by transferring the parameters to the Available box as shown below.



7. Select the parameters to be edited and transfer them to the Selected group as shown below.



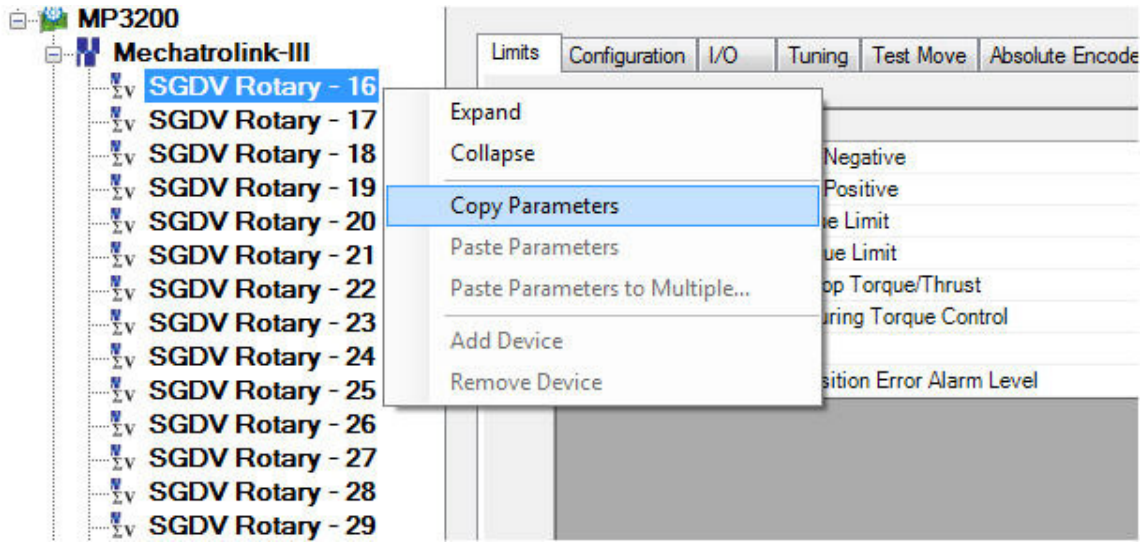
8. Enter the desired value in the value column. Press 'Enter'. The parameter change will occur for all axes instantaneously. Note that the drives may require a power cycle for some parameter changes to take effect.



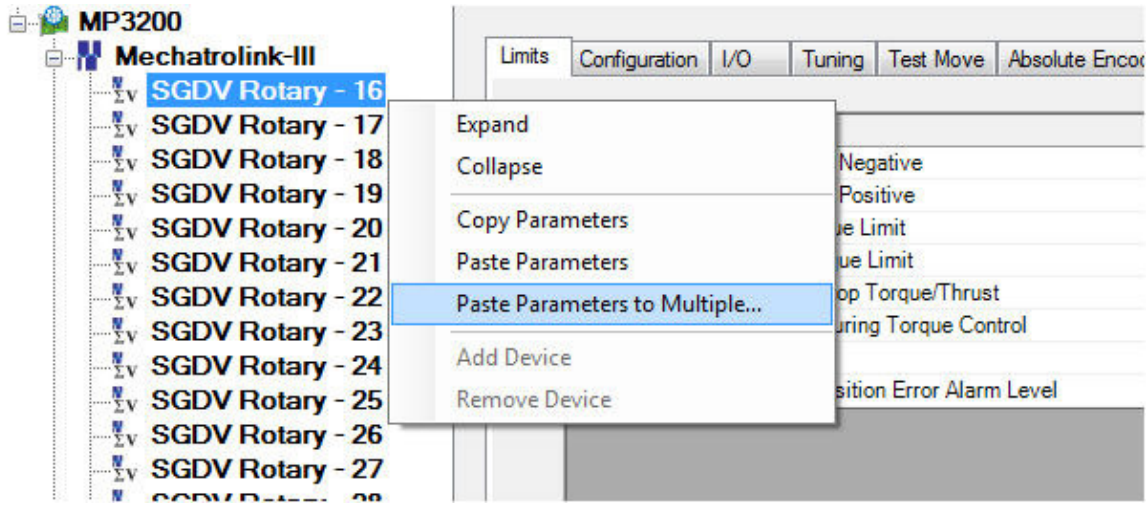
1.8.1.2 Copy - Paste All Parameters

Copy All Parameters to Multiple Drives

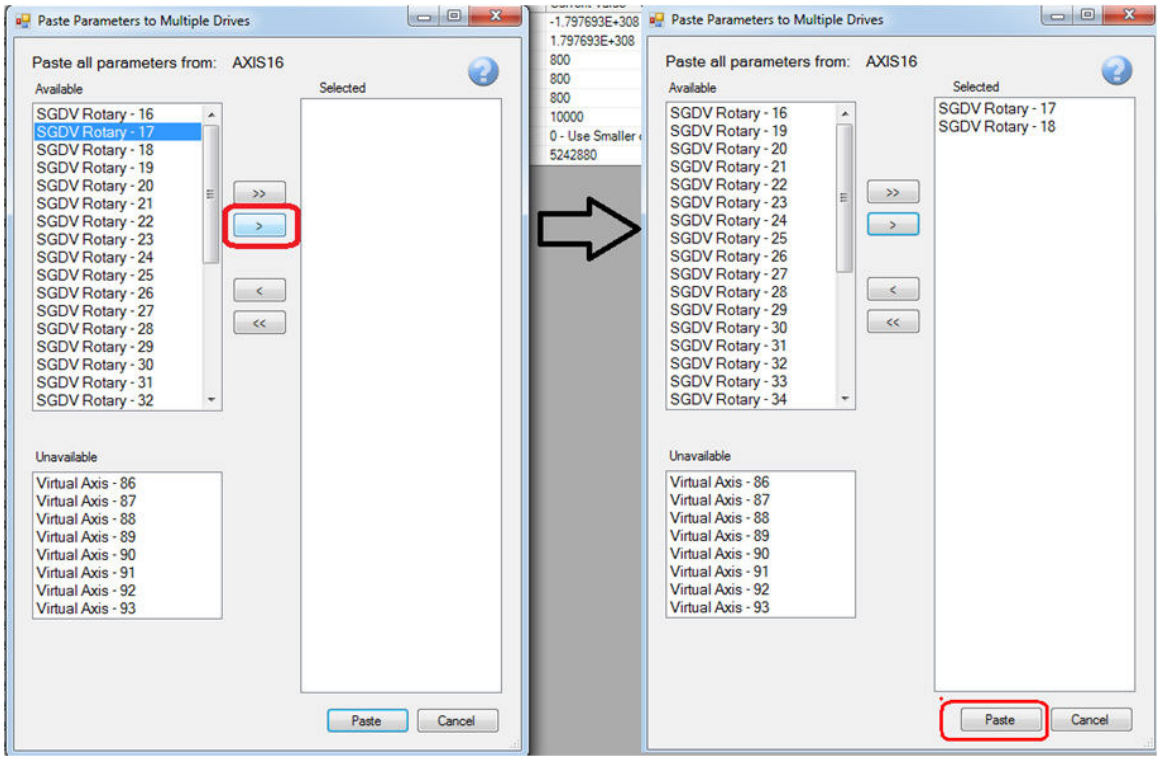
1. Select the drive whose parameters will be copied to other drives. Right Click on the drive in the configuration tree.



2. To copy parameters to multiple axes, select 'Paste Parameters to Multiple Axes'



3. Select the axes to which the parameters will be copied. In the example shown below, parameters from axis 16 will be copied to axes 17 and 18. Once the target drives are in the Selected window, click the Paste button. Note that drives may require power cycle before for some parameters to take effect. (See the Servopack manual for details.)



1.8.2 Motion axis I/O Addressing

Global variable groups are automatically added to the global variable list when the Hardware Configuration is saved. The following groups and their associated hardware addresses (for all 16 axes) are provided for reference.

Variable group are automatically created for the following motion axis types:

1. Servo
2. Variable Frequency Drive
3. Stepper

Applicability of specific variables will depend on the hardware support for such features.

Please refer to the Sigma-5 manual for further details of individual inputs / outputs and their allocations : SIEPS80000046 (section 3.2)

Name	Type	Usage	Description	Address
<SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:1 (* Modify Variable Names, Not Group Name. *)				
AX1_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX53248.0
AX1_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX53248.1
AX1_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX53248.2
AX1_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX53248.6
AX1_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX53248.7
AX1_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX53249.0
AX1_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX53249.1
AX1_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX53249.2
AX1_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX53249.4
AX1_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX53249.5
AX1_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX53249.6
AX1_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX53249.7
AX1_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX53252.0
AX1_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX53252.1
AX1_SVON	BOOL	VAR_GLOBAL	Servo On	%IX53252.3
AX1_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX53252.4
AX1_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX53252.7
AX1_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX53248.0
AX1_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX53248.1
AX1_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX53248.2

Name	Type	Usage	Description	Address
<SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:2 (* Modify Variable Names, Not Group Name. *)				
AX2_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX53312.0
AX2_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX53312.1
AX2_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX53312.2
AX2_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX53312.6
AX2_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX53312.7
AX2_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX53313.0
AX2_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX53313.1
AX2_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX53313.2
AX2_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX53313.4
AX2_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX53313.5
AX2_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX53313.6
AX2_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX53313.7
AX2_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX53316.0
AX2_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX53316.1
AX2_SVON	BOOL	VAR_GLOBAL	Servo On	%IX53316.3
AX2_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX53316.4
AX2_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX53316.7
AX2_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX53312.0
AX2_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX53312.1
AX2_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX53312.2

Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:3 (* Modify Variable Names, Not Group Name. *)				
AX3_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX53376.0
AX3_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX53376.1
AX3_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX53376.2
AX3_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX53376.6
AX3_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX53376.7
AX3_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX53377.0
AX3_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX53377.1
AX3_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX53377.2
AX3_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX53377.4
AX3_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX53377.5
AX3_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX53377.6
AX3_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX53377.7
AX3_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX53380.0
AX3_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX53380.1
AX3_SVON	BOOL	VAR_GLOBAL	Servo On	%IX53380.3
AX3_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX53380.4
AX3_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX53380.7
AX3_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX53376.0
AX3_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX53376.1
AX3_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX53376.2

Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:4 (* Modify Variable Names, Not Group Name. *)				
AX4_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX53440.0
AX4_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX53440.1
AX4_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX53440.2
AX4_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX53440.6
AX4_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX53440.7
AX4_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX53441.0
AX4_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX53441.1
AX4_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX53441.2
AX4_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX53441.4
AX4_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX53441.5
AX4_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX53441.6
AX4_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX53441.7
AX4_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX53444.0
AX4_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX53444.1
AX4_SVON	BOOL	VAR_GLOBAL	Servo On	%IX53444.3
AX4_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX53444.4
AX4_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX53444.7
AX4_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX53440.0
AX4_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX53440.1
AX4_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX53440.2

Name	Type	Usage	Description	Address
⊟ <SGDV Linear> - Sigma-V Linear Servo Amplifier - 1:5 (* Modify Variable Names, Not Group Name. *)				
AX5_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX53504.0
AX5_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX53504.1
AX5_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX53504.2
AX5_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX53504.6
AX5_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX53504.7
AX5_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX53505.0
AX5_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX53505.1
AX5_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX53505.2
AX5_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX53505.4
AX5_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX53505.5
AX5_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX53505.6
AX5_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX53505.7
AX5_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX53508.0
AX5_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX53508.1
AX5_SVON	BOOL	VAR_GLOBAL	Servo On	%IX53508.3
AX5_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX53508.4
AX5_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX53508.7
AX5_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX53504.0
AX5_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX53504.1
AX5_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX53504.2

Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:6 (* Modify Variable Names, Not Group Name. *)				
AX6_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX53568.0
AX6_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX53568.1
AX6_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX53568.2
AX6_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX53568.6
AX6_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX53568.7
AX6_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX53569.0
AX6_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX53569.1
AX6_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX53569.2
AX6_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX53569.4
AX6_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX53569.5
AX6_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX53569.6
AX6_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX53569.7
AX6_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX53572.0
AX6_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX53572.1
AX6_SVON	BOOL	VAR_GLOBAL	Servo On	%IX53572.3
AX6_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX53572.4
AX6_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX53572.7
AX6_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX53568.0
AX6_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX53568.1
AX6_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX53568.2

Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:7 (* Modify Variable Names, Not Group Name. *)				
AX7_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX53632.0
AX7_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX53632.1
AX7_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX53632.2
AX7_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX53632.6
AX7_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX53632.7
AX7_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX53633.0
AX7_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX53633.1
AX7_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX53633.2
AX7_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX53633.4
AX7_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX53633.5
AX7_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX53633.6
AX7_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX53633.7
AX7_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX53636.0
AX7_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX53636.1
AX7_SVON	BOOL	VAR_GLOBAL	Servo On	%IX53636.3
AX7_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX53636.4
AX7_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX53636.7
AX7_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX53632.0
AX7_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX53632.1
AX7_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX53632.2

Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:8 (* Modify Variable Names, Not Group Name. *)				
AX8_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX53696.0
AX8_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX53696.1
AX8_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX53696.2
AX8_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX53696.6
AX8_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX53696.7
AX8_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX53697.0
AX8_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX53697.1
AX8_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX53697.2
AX8_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX53697.4
AX8_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX53697.5
AX8_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX53697.6
AX8_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX53697.7
AX8_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX53700.0
AX8_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX53700.1
AX8_SVON	BOOL	VAR_GLOBAL	Servo On	%IX53700.3
AX8_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX53700.4
AX8_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX53700.7
AX8_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX53696.0
AX8_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX53696.1
AX8_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX53696.2

Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:9 (* Modify Variable Names, Not Group Name. *)				
AX9_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX53760.0
AX9_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX53760.1
AX9_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX53760.2
AX9_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX53760.6
AX9_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX53760.7
AX9_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX53761.0
AX9_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX53761.1
AX9_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX53761.2
AX9_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX53761.4
AX9_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX53761.5
AX9_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX53761.6
AX9_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX53761.7
AX9_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX53764.0
AX9_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX53764.1
AX9_SVON	BOOL	VAR_GLOBAL	Servo On	%IX53764.3
AX9_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX53764.4
AX9_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX53764.7
AX9_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX53760.0
AX9_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX53760.1
AX9_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX53760.2

Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:10 (* Modify Variable Names, Not Group Name. *)				
AX10_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX53824.0
AX10_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX53824.1
AX10_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX53824.2
AX10_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX53824.6
AX10_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX53824.7
AX10_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX53825.0
AX10_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX53825.1
AX10_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX53825.2
AX10_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX53825.4
AX10_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX53825.5
AX10_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX53825.6
AX10_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX53825.7
AX10_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX53828.0
AX10_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX53828.1
AX10_SVON	BOOL	VAR_GLOBAL	Servo On	%IX53828.3
AX10_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX53828.4
AX10_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX53828.7
AX10_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX53824.0
AX10_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX53824.1
AX10_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX53824.2

Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:11 (* Modify Variable Names, Not Group Name. *)				
AX11_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX53888.0
AX11_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX53888.1
AX11_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX53888.2
AX11_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX53888.6
AX11_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX53888.7
AX11_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX53889.0
AX11_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX53889.1
AX11_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX53889.2
AX11_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX53889.4
AX11_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX53889.5
AX11_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX53889.6
AX11_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX53889.7
AX11_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX53892.0
AX11_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX53892.1
AX11_SVON	BOOL	VAR_GLOBAL	Servo On	%IX53892.3
AX11_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX53892.4
AX11_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX53892.7
AX11_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX53888.0
AX11_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX53888.1
AX11_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX53888.2

Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:12 (* Modify Variable Names, Not Group Name. *)				
AX12_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX53952.0
AX12_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX53952.1
AX12_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX53952.2
AX12_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX53952.6
AX12_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX53952.7
AX12_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX53953.0
AX12_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX53953.1
AX12_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX53953.2
AX12_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX53953.4
AX12_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX53953.5
AX12_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX53953.6
AX12_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX53953.7
AX12_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX53956.0
AX12_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX53956.1
AX12_SVON	BOOL	VAR_GLOBAL	Servo On	%IX53956.3
AX12_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX53956.4
AX12_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX53956.7
AX12_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX53952.0
AX12_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX53952.1
AX12_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX53952.2

Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:13 (* Modify Variable Names, Not Group Name. *)				
AX13_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX54016.0
AX13_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX54016.1
AX13_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX54016.2
AX13_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX54016.6
AX13_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX54016.7
AX13_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX54017.0
AX13_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX54017.1
AX13_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX54017.2
AX13_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX54017.4
AX13_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX54017.5
AX13_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX54017.6
AX13_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX54017.7
AX13_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX54020.0
AX13_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX54020.1
AX13_SVON	BOOL	VAR_GLOBAL	Servo On	%IX54020.3
AX13_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX54020.4
AX13_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX54020.7
AX13_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX54016.0
AX13_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX54016.1
AX13_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX54016.2

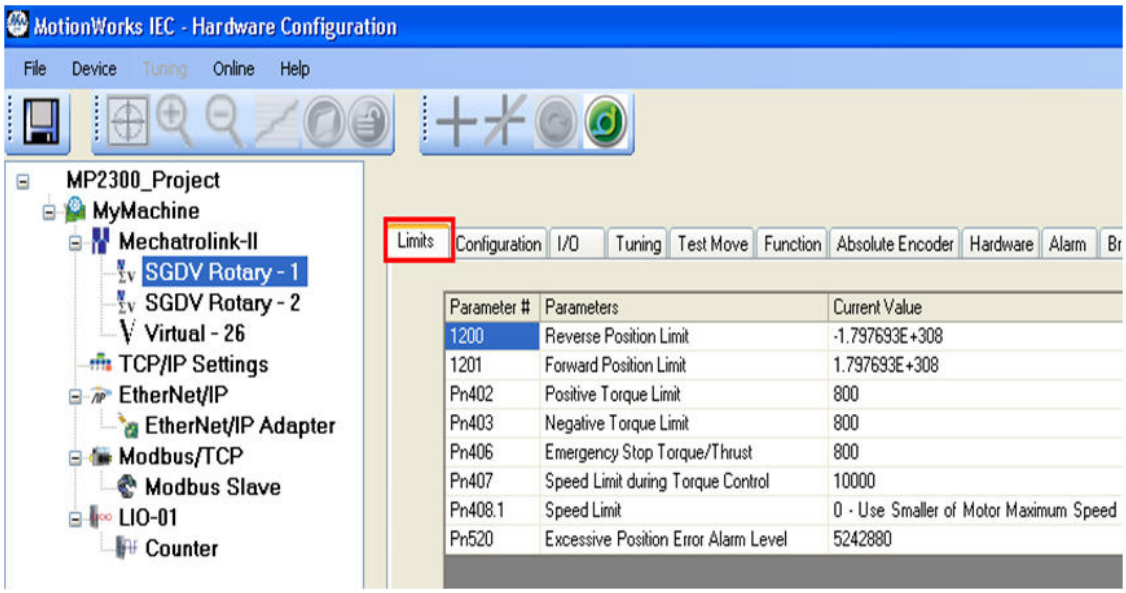
Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:14 (* Modify Variable Names, Not Group Name. *)				
AX14_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX54080.0
AX14_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX54080.1
AX14_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX54080.2
AX14_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX54080.6
AX14_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX54080.7
AX14_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX54081.0
AX14_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX54081.1
AX14_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX54081.2
AX14_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX54081.4
AX14_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX54081.5
AX14_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX54081.6
AX14_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX54081.7
AX14_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX54084.0
AX14_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX54084.1
AX14_SVON	BOOL	VAR_GLOBAL	Servo On	%IX54084.3
AX14_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX54084.4
AX14_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX54084.7
AX14_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX54080.0
AX14_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX54080.1
AX14_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX54080.2

Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:15 (* Modify Variable Names, Not Group Name. *)				
AX15_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX54144.0
AX15_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX54144.1
AX15_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX54144.2
AX15_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX54144.6
AX15_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX54144.7
AX15_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX54145.0
AX15_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX54145.1
AX15_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX54145.2
AX15_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX54145.4
AX15_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX54145.5
AX15_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX54145.6
AX15_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX54145.7
AX15_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX54148.0
AX15_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX54148.1
AX15_SVON	BOOL	VAR_GLOBAL	Servo On	%IX54148.3
AX15_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX54148.4
AX15_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX54148.7
AX15_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX54144.0
AX15_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX54144.1
AX15_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX54144.2

Name	Type	Usage	Description	Address
⊟ <SGDV Rotary> - Sigma-V Rotary Servo Amplifier - 1:16 (* Modify Variable Names, Not Group Name. *)				
AX16_SI1_POT	BOOL	VAR_GLOBAL	POT, default on pin #7, configurable by Pn50A.3	%IX54208.0
AX16_SI2_NOT	BOOL	VAR_GLOBAL	NOT, default on pin #8, configurable by Pn50B.0	%IX54208.1
AX16_SI3_DEC	BOOL	VAR_GLOBAL	DEC, default on pin #9, configurable by Pn511.0	%IX54208.2
AX16_SI4_EXT1	BOOL	VAR_GLOBAL	EXT1, default on pin #10, configurable by Pn511.1	%IX54208.6
AX16_SI5_EXT2	BOOL	VAR_GLOBAL	EXT2, default on pin #11, configurable by Pn511.2	%IX54208.7
AX16_SI6_EXT3	BOOL	VAR_GLOBAL	EXT3, default on pin #12, configurable by Pn511.3	%IX54209.0
AX16_BRK	BOOL	VAR_GLOBAL	Brake Output Status	%IX54209.1
AX16_HBB	BOOL	VAR_GLOBAL	HBB, Stop Signal Input	%IX54209.2
AX16_SI0_IO12	BOOL	VAR_GLOBAL	Configurable by Pn81E.0, default is unallocated	%IX54209.4
AX16_SI1_IO13	BOOL	VAR_GLOBAL	Configurable by Pn81E.1, default is unallocated	%IX54209.5
AX16_SI2_IO14	BOOL	VAR_GLOBAL	Configurable by Pn81E.2, default is unallocated	%IX54209.6
AX16_SI3_IO15	BOOL	VAR_GLOBAL	Configurable by Pn81E.3, default is unallocated	%IX54209.7
AX16_ALM	BOOL	VAR_GLOBAL	Alarm On Drive	%IX54212.0
AX16_WARNG	BOOL	VAR_GLOBAL	Warning On Drive	%IX54212.1
AX16_SVON	BOOL	VAR_GLOBAL	Servo On	%IX54212.3
AX16_PON	BOOL	VAR_GLOBAL	Main Circuit Power On	%IX54212.4
AX16_PSET	BOOL	VAR_GLOBAL	Positioning Completed	%IX54212.7
AX16_SO1	BOOL	VAR_GLOBAL	SO1, pins 1 and 2, configurable by Pn82E, Pn50E, Pn50F, P...	%QX54208.0
AX16_SO2	BOOL	VAR_GLOBAL	SO2, pins 23 and 24, configurable by Pn82E, Pn50E, Pn50F,...	%QX54208.1
AX16_SO3	BOOL	VAR_GLOBAL	SO3, pins 25 and 26, configurable by Pn82E, Pn50E, Pn50F,...	%QX54208.2

1.8.3 Limits

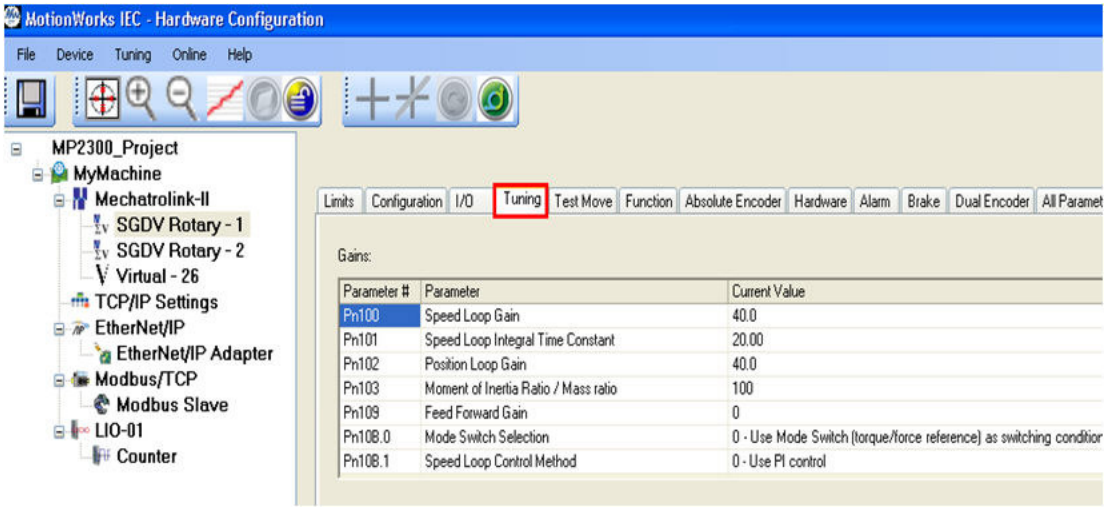
Set the soft position, torque, and velocity limits for the application. The Yaskawa system provides some redundancy for torque and velocity limits. In addition to the Servopack speed and torque limits shown below (Pn402, 403, and 407, the MPiec controller can limit position, speed and torque via parameters settable by MC_WriteParameter. Please check the PLCopen help documentation for details.



1.8.4 Servo Tuning

Please refer to the following tuning documents on www.yaskawa.com:

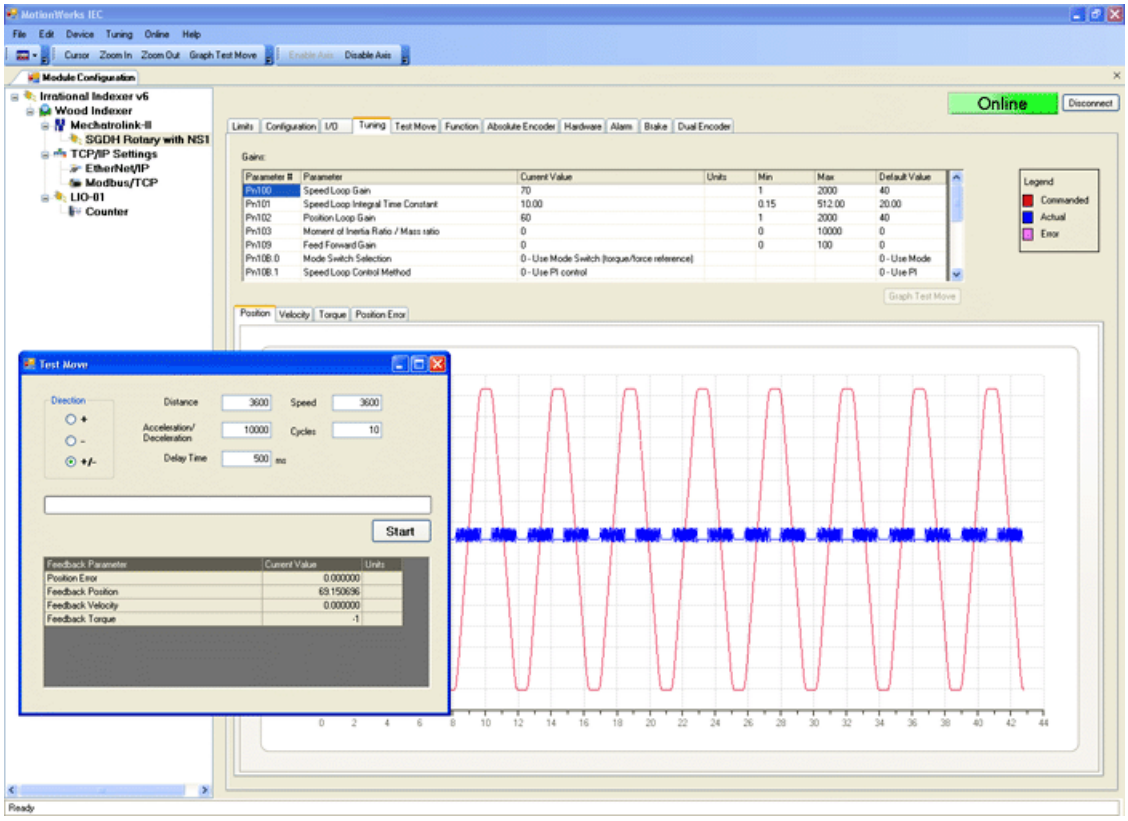
1. Tuning for minimizing trajectory following error: AN.MCD.09.122
2. Sigma-5 manual: SIEPS80000046 (section 5.)



1.8.5 Performing a Test Move

Warning: Be sure to safeguard the machine during the Test Move operation! Use a hardwired E-Stop function in case of unexpected operation.

The IEC application program must be stopped using the resource dialog window before using the test move function.



Direction

Select from forward only, reverse only, and forward & reverse motion.

Distance	User Units
Accel/Decel	User Units/s^2
Delay Time	ms
Speed	User Units/s
Cycles	Quantity

1.8.6 Motion Alarms

The Alarms tab shows alarm history related to the selected axis. The alarms displayed here are the same alarms available from the web server or the MC_ReadAxisError and function block. Each alarm consists of two 16 bit values; an AlarmClass and AlarmID. The following AlarmClasses refer to alarms originating on devices other than the MPiec controller:

0x3302=SGDH

0x3303=SGDS or SGDV

0x3312=VFD

0x3313=Generic Stepper

0x3314=Oriental Stepper

0x3315=MyComStepper

For each of the AlarmClasses listed above, the AlarmID is the alarm code generated by the device.

For more information regarding Servopack alarms, refer to the following manuals:

Sigma II with NS115: SIEP C710800 01, see section 9.3

Sigma III: YEA-SIA-S800-11, see section 10.1.4

Sigma-5 with rotary motor: SIEPS8000043, see Section 6.1

Sigma-5 with linear motor: SIEPS8000044, see Section 6.1

For more information regarding Variable Frequency Drive alarms, refer to the following manuals:

A1000: SIEP C710616 41, see section 6.3

V1000: SIEP C710606 18, see section 6.5

If the AlarmClass is any other value, check the Controller AlarmID List.

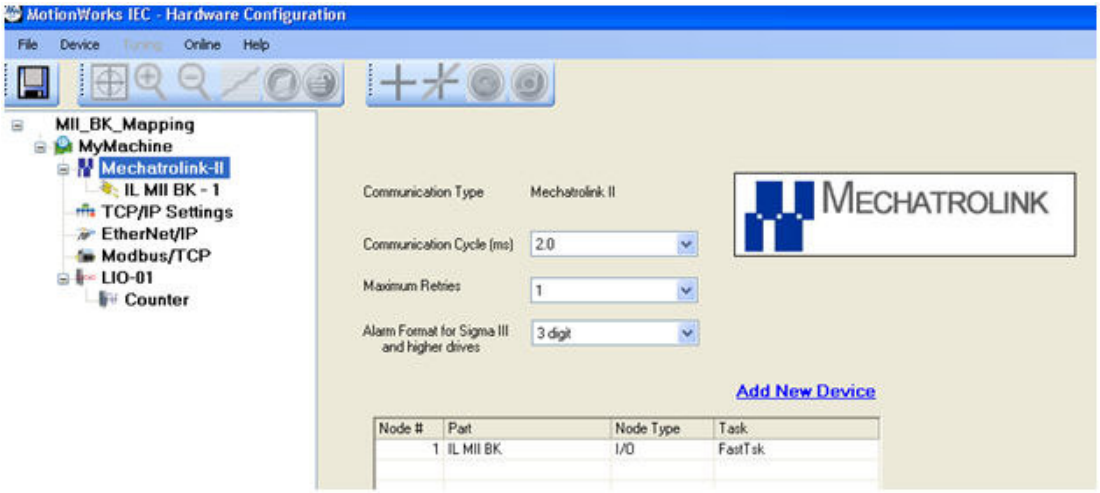
1.8.7 Remote I/O Devices

MECHATROLINK I/O devices, such as those provided by Yaskawa and Phoenix Contact can be connected to the MP2300Siec or MP2310iec controller. Once the remote I/O device has been added and saved in the Hardware Configuration, a new group will be automatically created in the Global Variables grid.

Configuring a Phoenix Remote I/O device

A Phoenix Remote I/O Mapping Tool is available to help configure IL MII BK units.

Instructions for the mapping tool and creating variable sets are available in this document: AN.MP2000iec.10.



More information on the IL MII BK units can be obtained from the Phoenix Contact Bus Coupler Manual from www.phoenixcontact.com.

Application Notes

Phoenix IB IL PWM 2 PAC configuration for pulse/step and direction output : AN.MCD.09.094

1.8.8 Setting User Units

When one of the motion axes is selected on the configuration tree, click on its Configuration tab to set the user unit parameters. Changes to user units will only take effect after a power cycle.

Rotary Motors:

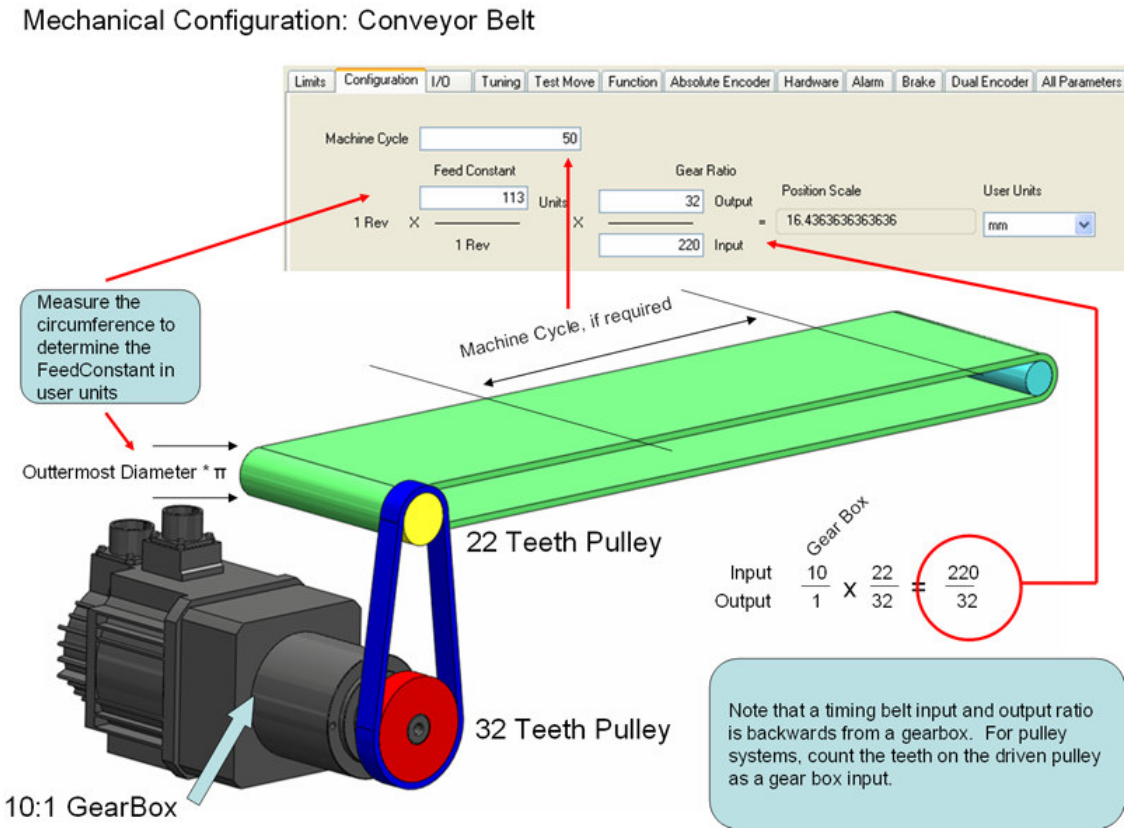
The default User Unit for rotary motors is 1.0 = one motor revolution. This User Unit configuration in the controller is independent of the encoder resolution. Encoder resolution is read from the drive and is factored at run time by the controller firmware.

Linear Motors:

The default User Unit for linear motors is 1.0 = one millimeter, however Pn282 must be set correctly for the linear encoder scale used. Typically, the linear scale pitch is 20 microns.

Warning: If user unit parameters are changed after MC_SetPosition has been executed to store an absolute encoder position offset, the position value will be incorrect after power cycle. Use MC_SetPosition again to calibrate the axis after changing the User Unit parameters.

Example 1:



1.8.9 All Parameters

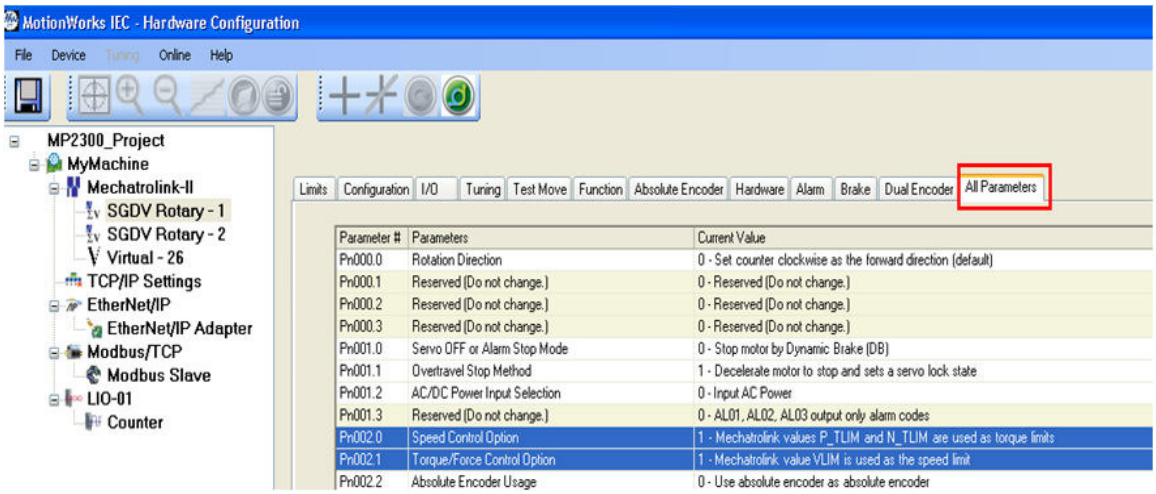
This tab displays a list of all parameters related to the selected axis, including both controller and drive side parameters. If the Hardware Configuration is online with the controller, the current value column displays parameters in the amplifier (Pns) and controller parameters (non Pn parameters). This page can be used to edit both amplifier parameters and controller parameters.

Color Legend:

Blue = Parameters that are forced to a specific value as shown in the grid. Do not alter these parameters in the amplifier using other means, such as a digital operator, or the Y_WriteParameter function block. If blue parameters are changed using other methods, improper operation may result.

Note: In some applications, it may be advantageous to change the gear ratio Pns 20E and 210 in the amplifier to account for situations where the physical ratio may be changed as part of the machine design. For example, assume the User Units are set for a 360 degree rotary cycle, and the gear ratio setting on the Configuration tab is 5:1. If later the gear box is changed to 10:1, Pn 20E and 210 can be set to reflect an additional 2:1 change in physical ratio, but the controller will still operate using 0 ~ 360 degrees per cycle of the machine.

Grey = Parameters that cannot be changed by the Hardware Configuration.



1.8.10 S-Curve Settings

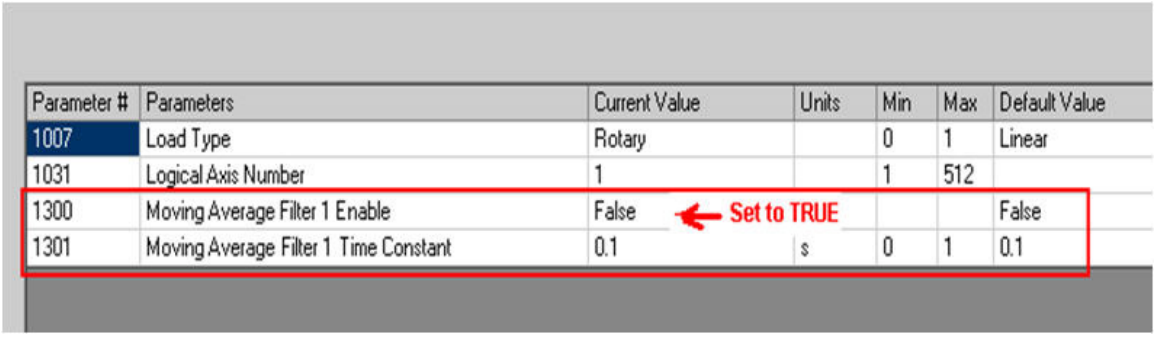
The configuration page allows the user to select whether an axis is to be used in rotary mode or in linear mode. A rotary mode axis is one which has a positioning system that is based on a modulus called machine cycle. For example, an indexing table that travels in one direction only with a finite machine cycle is a rotary axis. A ball screw system can be defined as a linear axis. For rotary axes, the user should specify a machine cycle.

Refer to section 1.8.8 on how to set user units in the hardware configuration.

S-Curve functionality

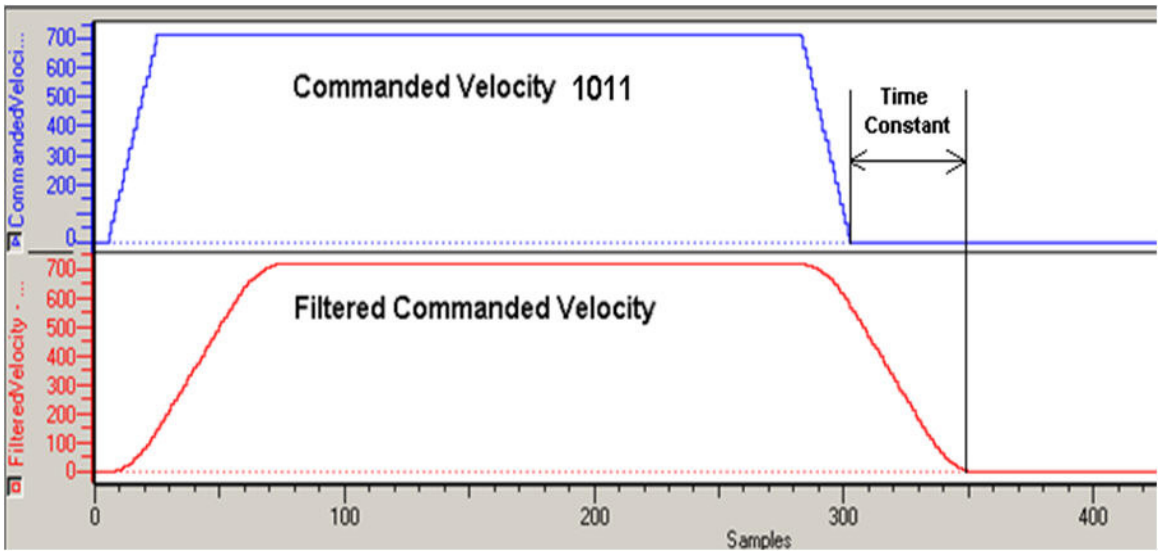
S-Curve functionality for discrete motion profiles is available starting in firmware version 1.1.2.5 by enabling the moving average filter function. To use the moving average filter, enable it in the configuration tab for the motion axis. Once enabled in the Hardware Configuration and saved in the controller, the feature cab be toggled off and on in the IEC application

using MC_WriteBoolParameter and parameter number 1300. The filter time constant (parameter 1301) can also be specified in the same tab. The filter is implemented as a lag filter as shown below.



The moving average filter limits are [0,5). (0 excluded).

If the Moving Average filter time constant is set to 0.1 seconds and the MECHATROLINK/DPRAM update rate is set to 2 ms, the moving average will provide a filter of 50 data points (50 data points in 100 ms). An example of a move profile with the Moving Average Filter applied is shown below. The logic analyzer plot below shows the effect of a 0.1 s moving average filter set up. The logic analyzer is synchronized with a 2 ms application task. It can be seen that the filtered profile (in red) settles to steady state 50 scans after the commanded profile (in blue). Since each scan is 2 ms in time, 50 scans show 100ms in time. Thus it can be seen that a 0.1s moving average filter set up generates an s curve velocity profile where the filtered velocity will lag the commanded trapezoidal profile by 0.1 seconds.



Commanded velocity in blue (Parameter 1011). Post S - curve commanded velocity in red (Parameter 1021)

Note:

For rotary mode applications using the Moving Average Filter, use firmware 1.2.1 or greater.

1.8.11 Dual Encoder (Full Closed Loop)

Configuration of a fully closed module on a Sigma-5 Servopack is possible by setting parameters on the 'Dual Encoder' and 'Configuration' tab.

1. Set Pn20A, Number of External Scale Pitch.
2. Set Pn002.2 = 1 (Use absolute encoder as incremental.)
3. Set Pn002.3 to 1 or 3 depending on the direction of the fully closed encoder.

4. Increase Pn51B , the allowable deviation between motor and load positions that will trigger an alarm. The proper value is application dependant.

5. Set Pn22A.3 = 0 (Use motor encoder speed for speed feedback (Recommended.)

NOTES:

Yaskawa recommends selecting an encoder resolution that closely matches the encoder counts per user unit of the Sigma-5 servo. (Less than 20:1 pulse count difference.) High resolution will improve the effectiveness of the powerful auto-tuning algorithms in the Sigma-5 Servopack.

The MPiec controller forces the electronic gear ratio (Pn20E and Pn210) to be unity (1:1). Use the Gear Ratio values on the Configuration tab as shown below.

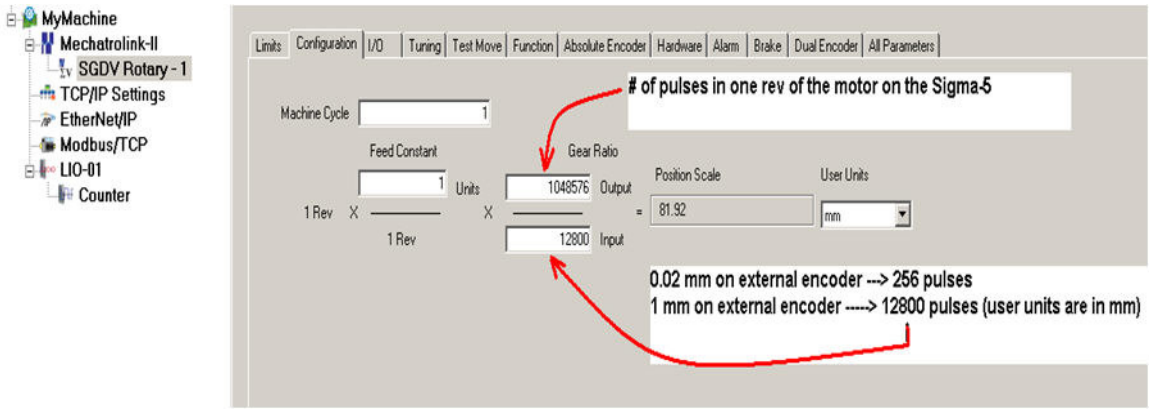
Please refer to the Sigma-5 manual for details about individual Servopack Pns: SIEPS80000046 (Section 8)

Example 1:

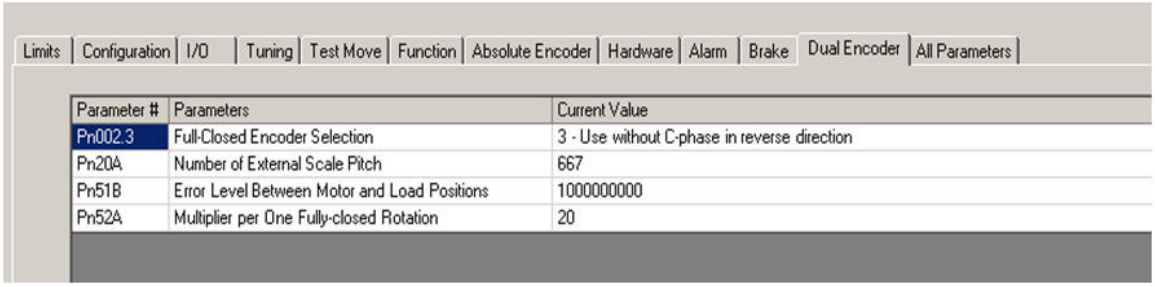
Assume a ball screw system with a lead of 120 mm. There is gear reduction of 9:1, and the external encoder sine wave pitch = 20 um.

Pn20A = (120mm/1 rev of gearbox) x (1rev of gearbox / 9 rev of motor) x (pitch / 0.02 mm) = 667 pitch / rev.

The configuration settings for this example are shown in the figure below.



A snap shot of the dual encoder tab is shown below



Example 2:

Assume a fully closed loop system with the following encoder parameters:

One rev of the motor shaft = 50.265 mm at the load.

Fully Closed Encoder, wheel diameter = 1.25 inches.

Encoder resolution = 5000 sine waves / rev.

8 bit serial converter (256 pulses per cycle).

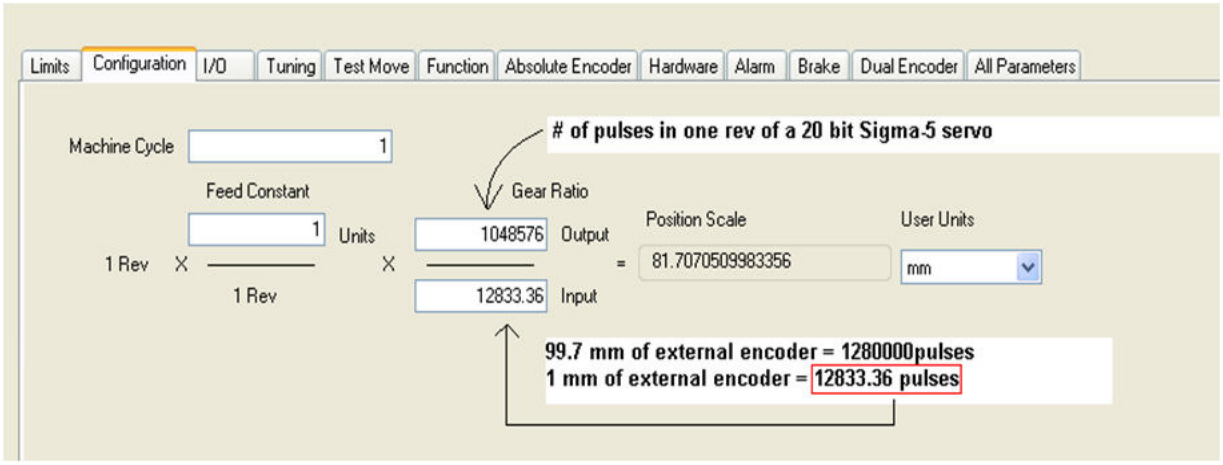
Therefore, the number of pulses in one rev of the external encoder = 5000 x 256 = 1280000 pulses / rev.

The distance covered in one revolution of the fully closed encoder = 1.25” x Pi x 25.4 = 99.7 mm.

99.7 mm --> 1280000 pulses.

1 mm --> 1280000/99.7 = 12833.36 pulses.

The configuration settings for this example are shown in the figure below.



Pn20A = The number of external encoder pitches per rev of the motor.

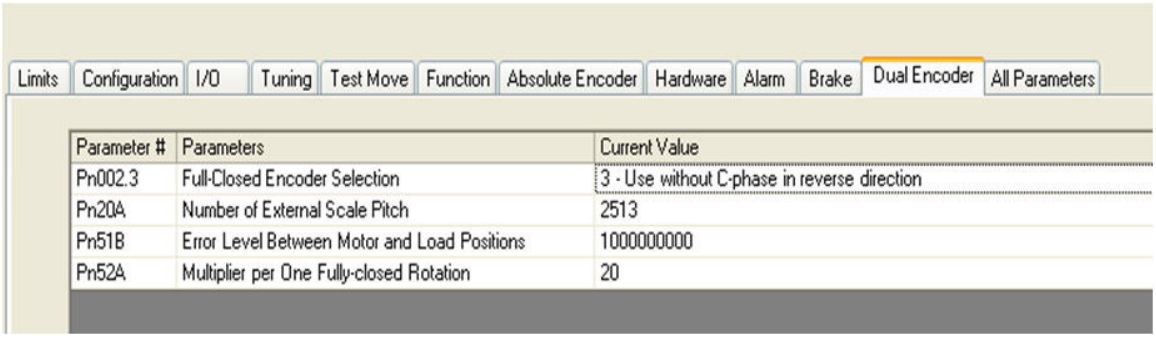
1 rev of motor = 50.265 mm.

Therefore, (99.7/50.265) revs of the motor = 99.7 mm (distance for one rev of the fully closed encoder)

99.7/50.265 revs of the motor = 5000 pitches.

Therefore, 1 rev of the motor = **(**5000 / (99.7/50.265)**)** = 2513 pitches / rev of motor.

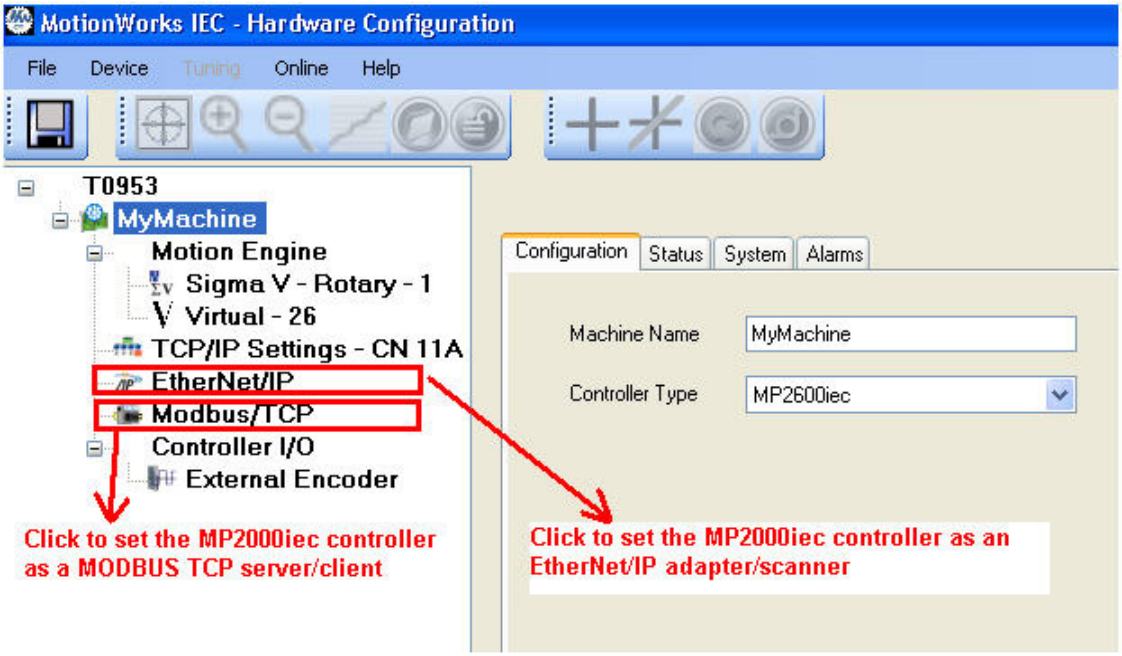
Pn20A = 2513 pitches / rev of the motor.



1.9 Ethernet Communications

1.9.1 Ethernet Connections Overview

The controller can operate as an EtherNet/IP scanner and adapter, a Modbus/TCP client (master) and server (slave), and deliver OPC data simultaneously.



E/IP Output Instance #101, Qty: 128 Bytes, Address Range: %QB21488-%QB21615
E/IP Output Instance #102, Qty: 256 Bytes, Address Range: %QB22000-%QB22255
E/IP Output Instance #103, Qty: 128 Bytes, Address Range: %QB22512-%QB22639
E/IP Output Instance #104, Qty: 256 Bytes, Address Range: %QB23024-%QB23279
E/IP Output Instance #105, Qty: 128 Bytes, Address Range: %QB23536-%QB23663
E/IP Output Instance #106, Qty: 256 Bytes, Address Range: %QB24048-%QB24303
E/IP Input Instance #111, Qty: 128 Bytes, Address Range: %IB21488-%IB21615
E/IP Input Instance #112, Qty: 256 Bytes, Address Range: %IB22000-%IB22255
E/IP Input Instance #113, Qty: 128 Bytes, Address Range: %IB22512-%IB22639
E/IP Input Instance #114, Qty: 256 Bytes, Address Range: %IB23024-%IB23279
E/IP Input Instance #115, Qty: 128 Bytes, Address Range: %IB23536-%IB23663
E/IP Input Instance #116, Qty: 256 Bytes, Address Range: %IB24048-%IB24303
Modbus FC#05 Qty: 128 Coils, Address Range: %IB24560 - %IB24575
Modbus FC#02 Qty: 128 Inputs, Address Range: %QB24560 - %QB24575
Modbus FC#04 Qty: 1024 Input Registers, Address Range: %QB28672 - %QB30719
Modbus FC#06,16 Qty: 1024 Registers, Address Range: %IB28672 - %IB30719
Modbus FC#03 Qty: 1024 Registers, Address Range: %QB24576 - %QB26623

Global Variable Groups created when EthetNet/IP adapter and MODBUS TCP server (slave) communication capabilities are enabled in the Hardware Configuration.

1.9.0 Connecting to the Controller

The project IP address is located under the TCP/IP Settings in the Configuration Tree. The IP Address is cross-linked with the IP Address in the Hardware Tab of the Project. All programming tools can communicate simultaneously with the controller (MotionWorks IEC, Hardware Configuration, and web server.) A color-coded indicator in the upper right corner of the window indicates the connection status with a red or green background and displaying the text "Online" or "Offline."

MotionWorks IEC uses the following Ethernet ports to communicate with the controller hardware. Certain firewall implementations may block these ports, and prohibit communication. An easy way to test for this is a network Ping, or if communication is possible via the web server, but not MotionWorks IEC.

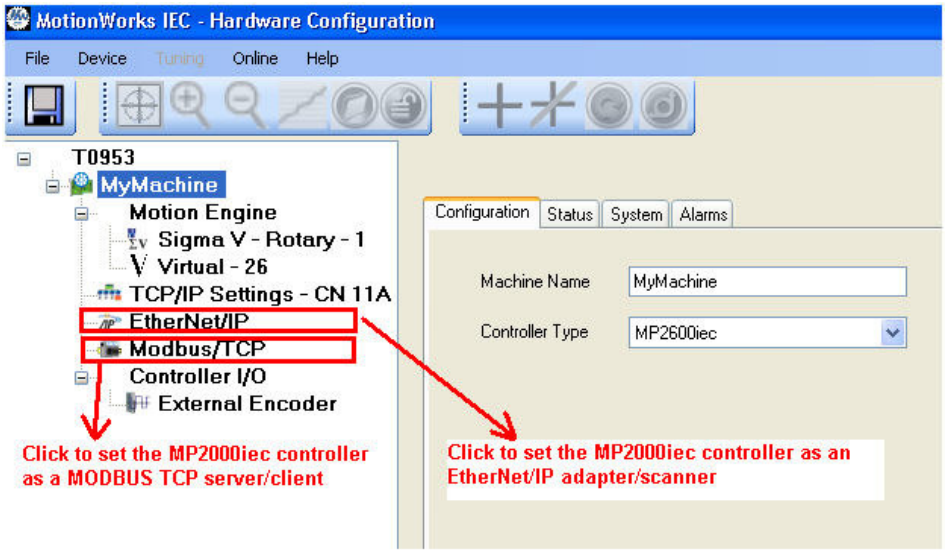
Communication Method	Port Number
MotionWorks IEC	20547
Hardware Configuration	4040
Web Server	80
Ethernet/IP (Implicit Messaging)	2222
Ethernet/IP (Explicit Messaging)	44818
Modbus/TCP	502
OPC Server	20547

Application Note

Setup for remote EtherNet/IP connections using Routers: AN.MP2000iec.04

1.9.1 Ethernet Connections Overview

The controller can operate as an EtherNet/IP scanner and adapter, a Modbus/TCP client (master) and server (slave), and deliver OPC data simultaneously.

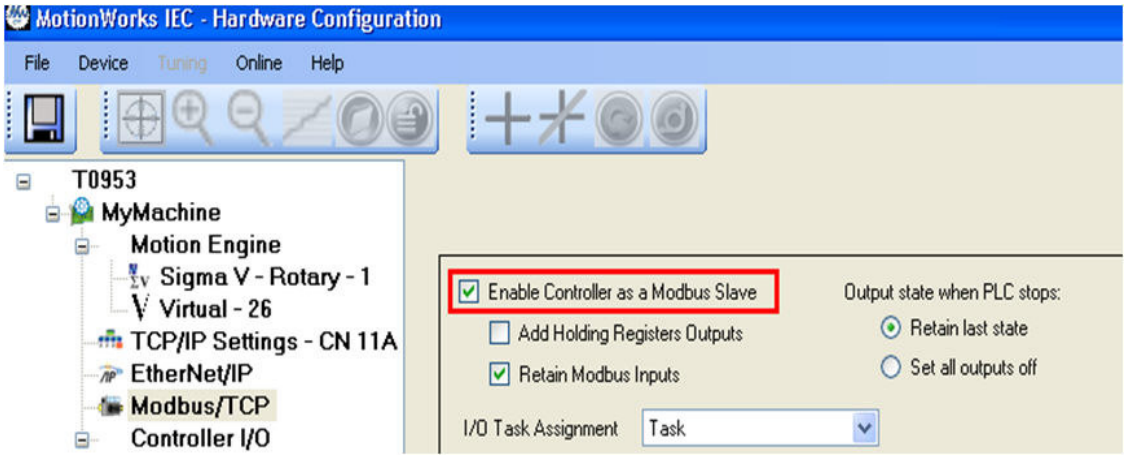


E/IP Output Instance #101, Qty: 128 Bytes, Address Range: %QB21488-%QB21615
E/IP Output Instance #102, Qty: 256 Bytes, Address Range: %QB22000-%QB22255
E/IP Output Instance #103, Qty: 128 Bytes, Address Range: %QB22512-%QB22639
E/IP Output Instance #104, Qty: 256 Bytes, Address Range: %QB23024-%QB23279
E/IP Output Instance #105, Qty: 128 Bytes, Address Range: %QB23536-%QB23663
E/IP Output Instance #106, Qty: 256 Bytes, Address Range: %QB24048-%QB24303
E/IP Input Instance #111, Qty: 128 Bytes, Address Range: %IB21488-%IB21615
E/IP Input Instance #112, Qty: 256 Bytes, Address Range: %IB22000-%IB22255
E/IP Input Instance #113, Qty: 128 Bytes, Address Range: %IB22512-%IB22639
E/IP Input Instance #114, Qty: 256 Bytes, Address Range: %IB23024-%IB23279
E/IP Input Instance #115, Qty: 128 Bytes, Address Range: %IB23536-%IB23663
E/IP Input Instance #116, Qty: 256 Bytes, Address Range: %IB24048-%IB24303
Modbus FC#05 Qty: 128 Coils, Address Range: %IB24560 - %IB24575
Modbus FC#02 Qty: 128 Inputs, Address Range: %QB24560 - %QB24575
Modbus FC#04 Qty: 1024 Input Registers, Address Range: %QB28672 - %QB30719
Modbus FC#06,16 Qty: 1024 Registers, Address Range: %IB28672 - %IB30719
Modbus FC#03 Qty: 1024 Registers, Address Range: %QB24576 - %QB26623

Global Variable Groups created when EthetNet/IP adapter and MODBUS TCP server (slave) communication capabilities are enabled in the Hardware Configuration.

1.9.2 Using an HMI (Master) to Communicate to the Controller via Modbus/TCP

Any MPiec controller can be configured as a MODBUS TCP server (slave) if the user enables the controller as a MODBUS slave in the Hardware Configuration, saves and cycles power on the controller.



The Modbus memory map for an MPiec controller when configured as a server (slave) is shown in the figure below. Note that by default, function codes 01 and 03 return data that was sent to the controller from the master and do not reflect data from the Global Variables in the IEC application program.

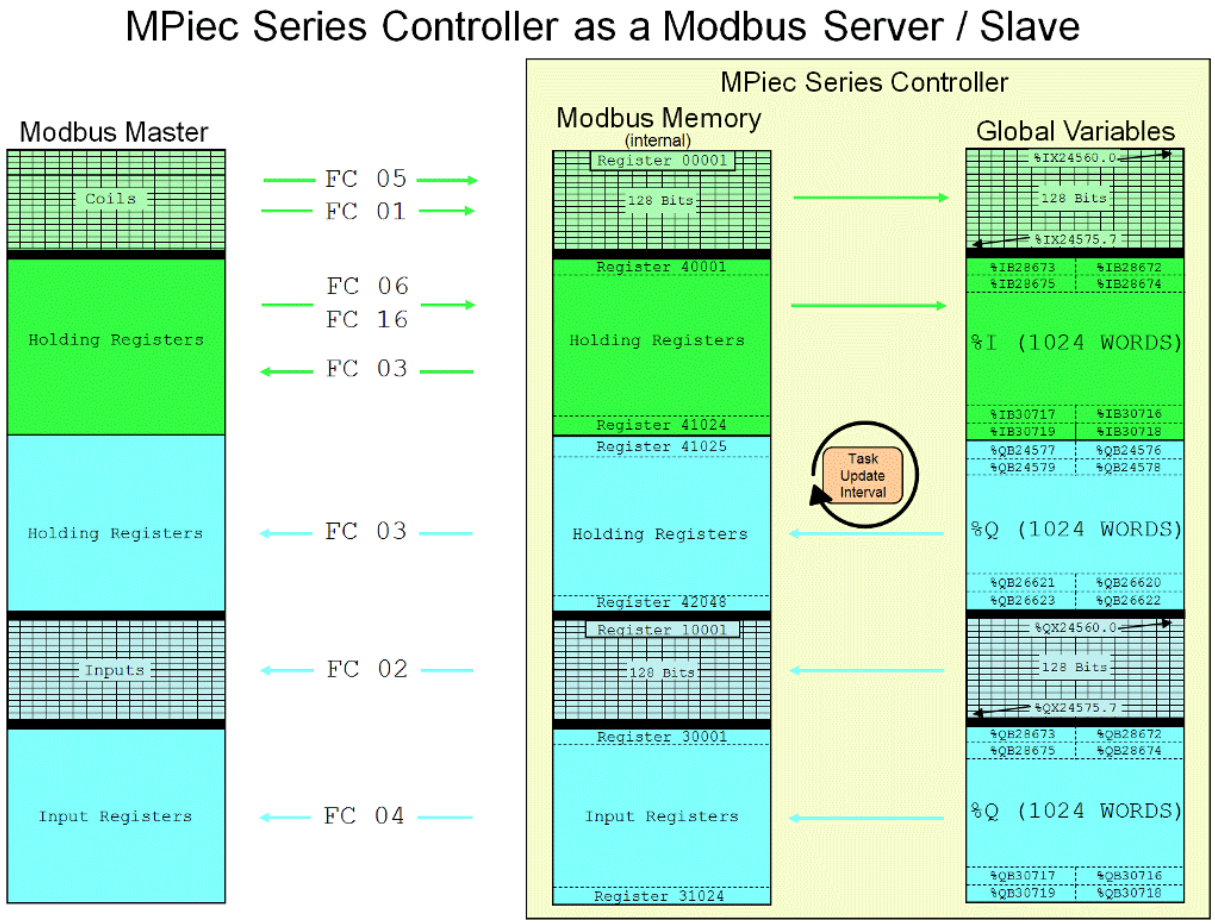
If 'Add Holding Register Outputs' is enabled, the IEC application program can write into MODBUS memory register 41025 from as shown in the figure below

If the master requires a Device ID setting for the server, the MPiec controllers have a device ID of "1".

Other Modbus Driver features:

- The Modbus memory is copied to the Global Variables at the task update rate as configured by the user in the Hardware Configuration.
- Maximum number of clients on the network: Tested 3 clients polling an MPiec controller simultaneously.
- Modbus coil 1 equates to the Global Variable at %IX24560. 128 coils are available.
- Modbus register 40001 equates to the Global Variable at %IW28672. 1024 registers are available.
- Modbus input 10001 equates to the Global Variable at %QX24560. 128 inputs are available.
- Modbus register 30001 equates to the Global Variable at %QW28672. 1024 registers are available.

The figure below shows the relationship between Modbus registers and IEC application memory.



Memory map for Modbus memory when the controller is configured a server / slave.

The following groups are automatically created in the Global Variables worksheet when the controller is configured as a MODBUS server.

Selected Modbus clients and related Application Notes available on www.yaskawa.com :

Red Lion HMI: AN.MCD.08.122

Maple Systems HMI: AN.MP2000iec.06

Yaskawa MP2000: AN.MP2000.01

AB PanelView: AN.MP2000iec.02, E Learning Video: eLV.MP2000iec.01.IECtoPVPlusHMI

Phoenix HMI: AN.MP2000iec.05

Pro-face: AN.MCD.09.124

DigiOne IAP serial to Ethernet converter: AN.MCD.09.093

1.9.3 Adding a Modbus Server/Slave Device

The MPiec controller can communicate with up to 20 unique IP addresses simultaneously using Modbus TCP.

A maximum of 20 data blocks of various function codes can be configured if necessary.

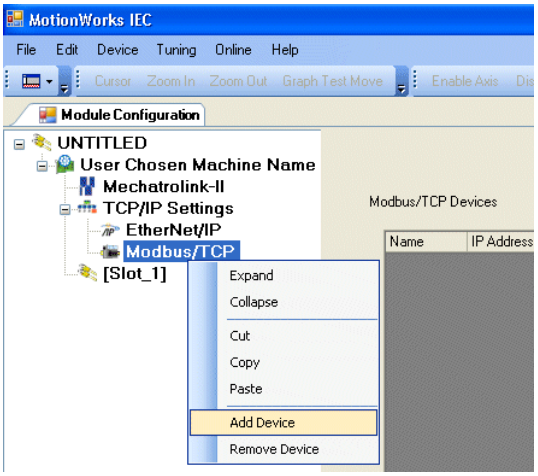
The minimum poll period or update interval is 4 ms (+4 ms tolerance.) Note that MODBUS TCP is not a deterministic protocol. Setting a very fast update interval is not recommended because it will increase the load on the CPU. Fast updates and high priorities should be allocated based on application requirements)

Supported Modbus Function Codes:

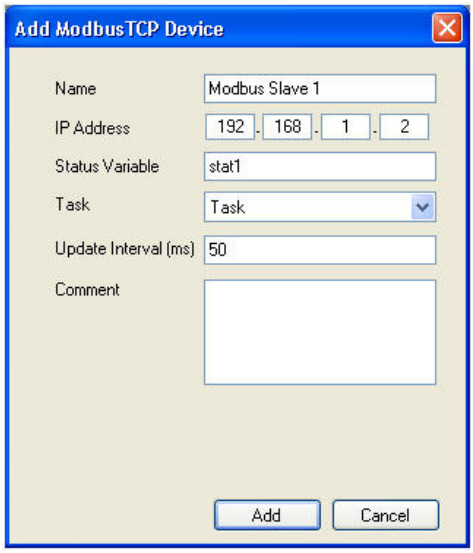
Function Code	Description	Modbus Address Range (On Slave)
1	Read Coils	00001 to 10000
2	Read Inputs	10001 to 20000
3	Read Holding Registers	40001 to 50000
4	Read Input Registers	30001 to 40000
5	Write Single Coil	00001 to 10000
6	Write Single Register	40001 to 50000
16	Write Multiple Registers	40001 to 50000

Step 1: Launch the Hardware Configuration 

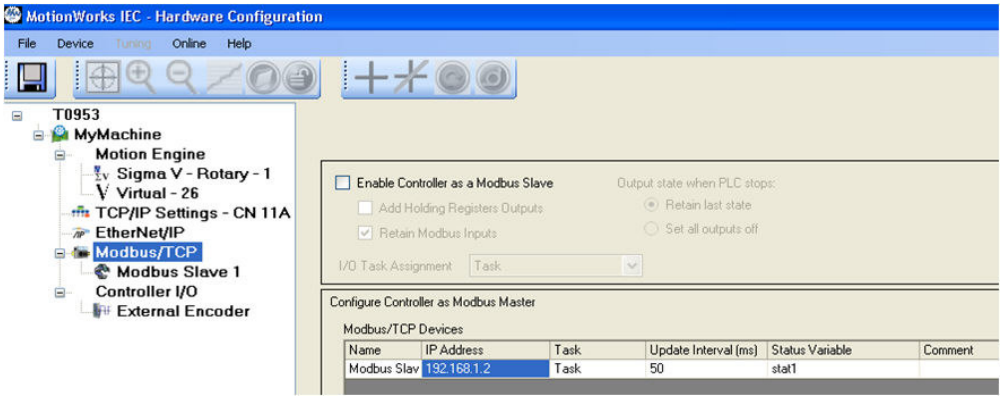
Step 2: Right click on the Configuration tree on the Modbus/TCP item.



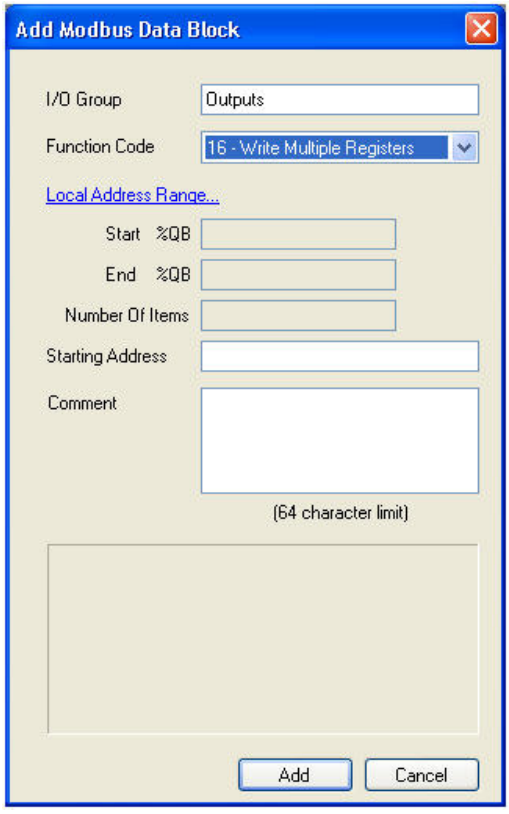
Step 3: The Add Modbus TCP Device window is shown below. Enter a name for the slave device, IP address, status variable name, application task whose update rate will determine the rate at which MODBUS data is updated in the application and update interval. The Status Variable will be automatically entered in the Global Variables section of the IEC Programming Environment. The Status Variable is a WORD. This variable will indicate the status of the connection. Details are described below.



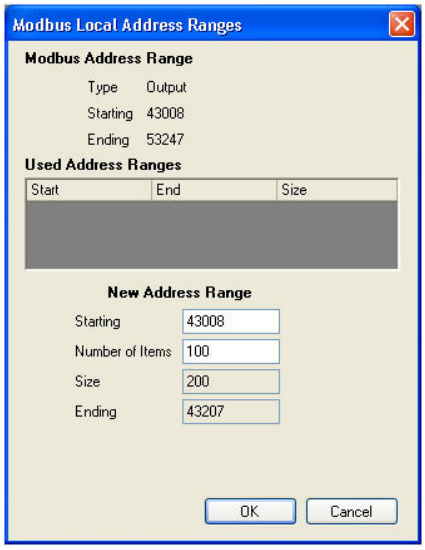
Step 4: After the device details are added, the MODBUS slave device will be displayed in the configuration tree.



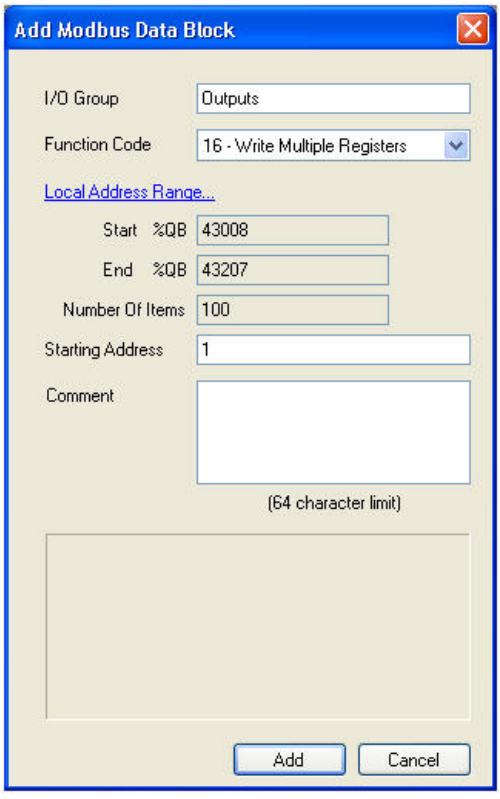
Step 5: Click on the new Modbus Device in the Configuration tree at the left of the screen. Locate the hyperlink at the lower right of the screen to "Add Data Blocks" to the device. Select a name to be associated with the function code. For example, if the device is remote I/O, name the I/O Group "Outputs" for example. There is a seven-character limitation on the I/O Group name. The Starting Address is dependent on the remote device. Consult the documentation for the remote device to understand the register offset required to access its functions.



Click on the Local Address Range link to enter the IEC Global variable's address range for this I/O group. Enter the starting address and number of elements. The used address ranges will assist the programmer in deciding which IEC address to use as starting address.



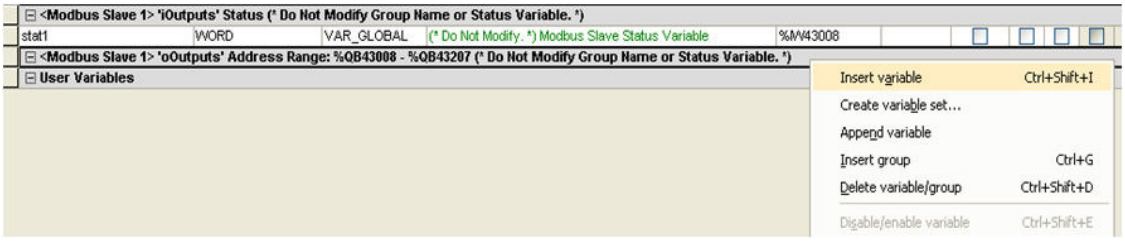
The starting address field is the offset that will be used in the MODBUS slave for the memory area. For example, in the figure shown below, %QW43008 will be mapped to MODBUS register 40001 in the server/slave device.



Step 6: When finished entering data blocks, Save the Configuration. This will create the global memory I/O Group in the IEC Programming Environment.

View of the Global Variables list. Click the Hardware tab in the Project Tree or use the 'View' menu to access. Note the status variable has been created under an input section for this Modbus device even though no input-type function codes were configured.

Step 7: Open the Global Variables list. Right click on the I/O group header to "Insert Variable." This variable can either be a BOOL, WORD, or any other data type that fits the usage within the program. For example, 16 output bits can be defined as one WORD, and in the program, the 4th bit can be accessed as follows: MYWORD.X3. Another example would be 16 individual BOOL variables with unique names.



Inserting a variable into the Modbus group.

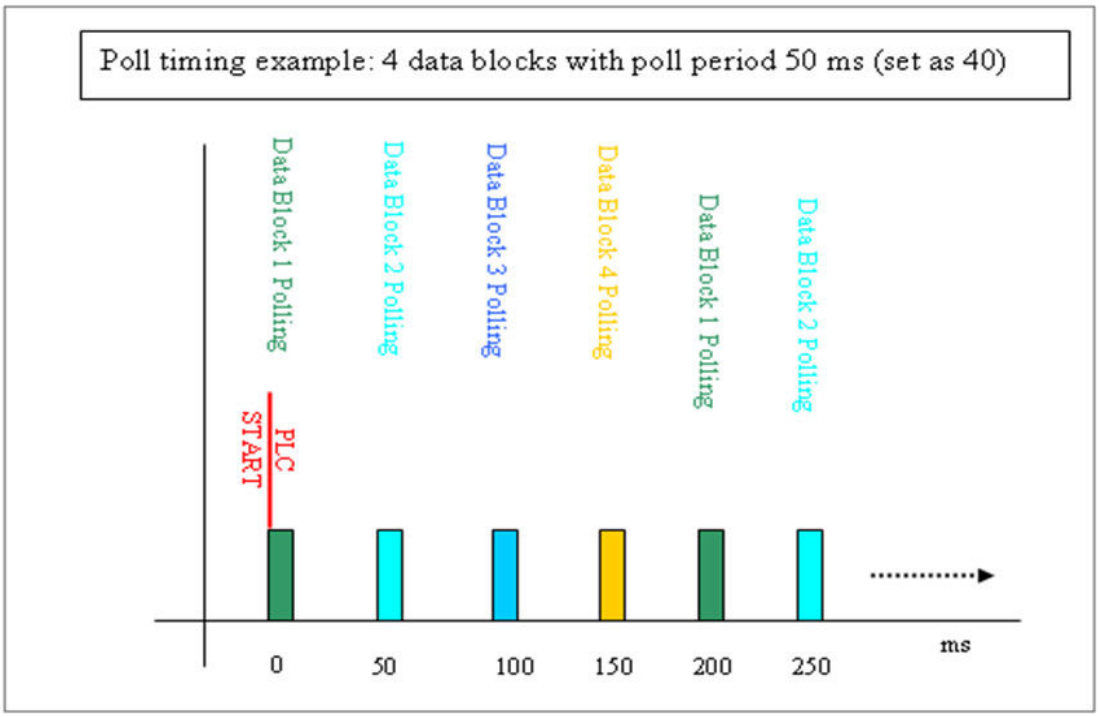
The memory area for this Modbus device is shown in the Group Heading. Bytes %QB43008 - %QB43207 are allocated for the Modbus output registers. Enter the proper memory address for the Modbus memory. If the first bit of the register QB43008 needs to be accessed, enter %QX43008.0. If two bytes QB43008 and QB43009 need to be accessed, it can be done using %QW43008 where W stands for WORD.

Any IEC data type can be transmitted or requested from the remote device, provided the data is interpreted as the same type on the other side.

To determine the memory area allocated for the Modbus connection, look in the MotionWorks IEC's IO_Configuration window in the Hardware section of the Project Tree Window.

Note: Care should be taken to understand and set the timeout period on the server (slave) driver code. The recommended time out period for server driver code is TO > update interval * # of data blocks.

One data block is polled per update interval set in the client (master). For example if the client has four data blocks configured for a particular server with a 50 ms poll period (update interval), the first data block is polled first. After 50 ms the second data block is polled. 50 ms after the second data block, the third data block is polled and so on. The first data block is polled a second time 200 ms after it was polled the previous time as shown in the figure below



Modbus TCP Status Variable

This variable reflects the connection status. It can be used in the application program to determine if the connection to the remote device is active and the data is valid. The status WORD can be compared to 16#1000, which means that the connection is good. If bits 0 or 1 are on, the connection is not active, and the controller is attempting to reconnect to the remote device.

The status variable is only available when the MPiec controller is the client or master of remote devices.

NOTE: If the status variable has a value of zero as observed in the Global Variables list, the controller may not be running the application program.

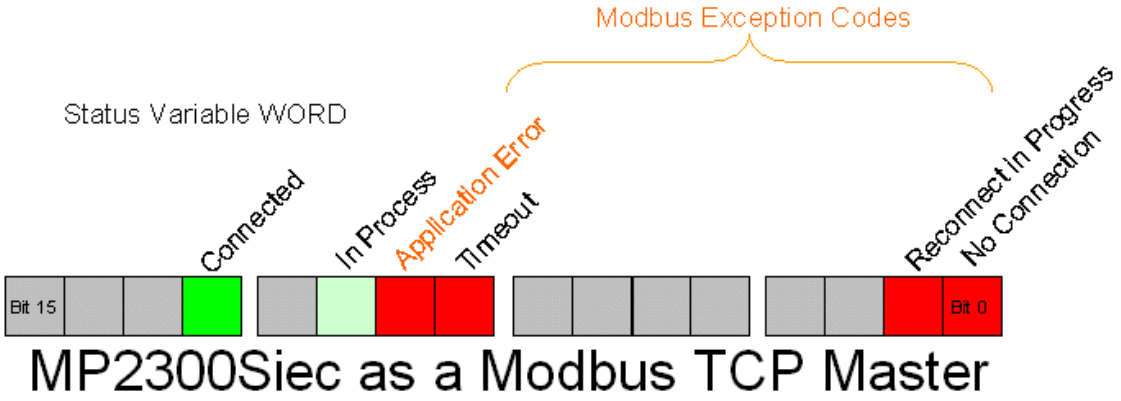


Figure 7: Modbus status WORD

Modbus errors in the lower byte of the status variable ONLY if the Application Error bit is TRUE.

Modbus Exception Codes		
Code (In lower byte of the status variable)	Name	Meaning
01	Illegal Function	The function code received in the query is not an allowable action for the server (or slave). This may be because the function code is only applicable to newer devices, and was not implemented in the unit selected. It could also indicate that the server (or slave) is in the wrong state to process a request of this

		type, for example because it is not configured and is being asked to return register values.
02	Illegal Data Address	The data address received in the query is not an allowable address for the server (or slave). More specifically, the combination of reference number and transfer length is invalid. For a controller with 100 registers, the PDU addresses the first register as 0, and the last one as 99. If a request is submitted with a starting register address of 96 and a quantity of registers of 4, then this request will successfully operate (address-wise at least) on registers 96, 97, 98, and 99. If a request is submitted with a starting register address of 96 and a quantity of registers of 5, then this request will fail with Exception Code 0x02 “Illegal Data Address” since it attempts to operate on registers 96, 97, 98, 99 and 100, and there is no register with address 100.
03	Illegal Data Value	A value contained in the query data field is not an allowable value for server (or slave). This indicates a fault in the structure of the remainder of a complex request, such as that the implied length is incorrect. It specifically does NOT mean that a data item submitted for storage in a register has a value outside the expectation of the application program,

		since the MODBUS protocol is unaware of the significance of any particular value of any particular register.
04	Slave Device Failure	An unrecoverable error occurred while the server (or slave) was attempting to perform the requested action.
05	Acknowledge	Specialized use in conjunction with programming commands. The server (or slave) has accepted the request and is processing it, but a long duration of time will be required to do so. This response is returned to prevent a timeout error from occurring in the client (or master). The client or master) can next issue a Poll Program Complete message to determine if processing is completed.
06	Slave Device Busy	Specialized use in conjunction with programming commands. The server (or slave) is engaged in processing a long–duration program command. The client (or master) should re transmit the message later when the server (or slave) is free.
08	Memory Parity Error	Specialized use in conjunction with function codes 20 and 21 and reference type 6, to indicate that the extended file area failed to pass a consistency check. The server (or slave) attempted to read record file, but

		detected a parity error in the memory. The client (or master) can retry the request, but service may be required on the server (or slave) device.
0A	Gateway Path Unavailable	Specialized use in conjunction with gateways. It indicates that the gateway was unable to allocate an internal communication path from the input port to the output port for processing the request. Usually means that the gateway is mis configured or overloaded.
0B	Gateway Target Device Failed to Respond	Specialized use in conjunction with gateways. It indicates that no response was obtained from the target device. Usually means that the device is not present on the network.

Note: Do not delete automatically created variables or groups. If you must delete a group, be sure to delete the group header (an all of its variables) and the group name as listed under IO_Configuration in the Hardware tab. These two items must remain in sync for project to compile properly

Selected MODBUS Servers and Related Application Notes:

Phoenix MODBUS I/O: AN.MCD.09.045

Wago I/O module: eLV.MotionWorksIEC.01.ModbusSlave

1.9.4 Using an EtherNet/IP Scanner to Communicate to the MPiec Controller as an Adapter

12 pre-configured instances are defined for input and output. The pre-configured instances are listed below. Each instance can be enabled or disabled individually based on application requirements.

Input Assembly Instances (Originator to Target)

Enabled	Instance	Size (bytes)
☐	111	128
☐	112	256
☐	113	128
☐	114	256
☐	115	128
☐	116	256

Output Assembly Instances (Target to Originator)

Enabled	Instance	Size (bytes)
☐	101	128
☐	102	256
☐	103	128
☐	104	256
☐	105	128
☐	106	256

The following diagram shows the groups with memory mappings from the Global Variables sheet in MotionWorks IEC when all input and output instances have been enabled in the MPiec Hardware Configuration.

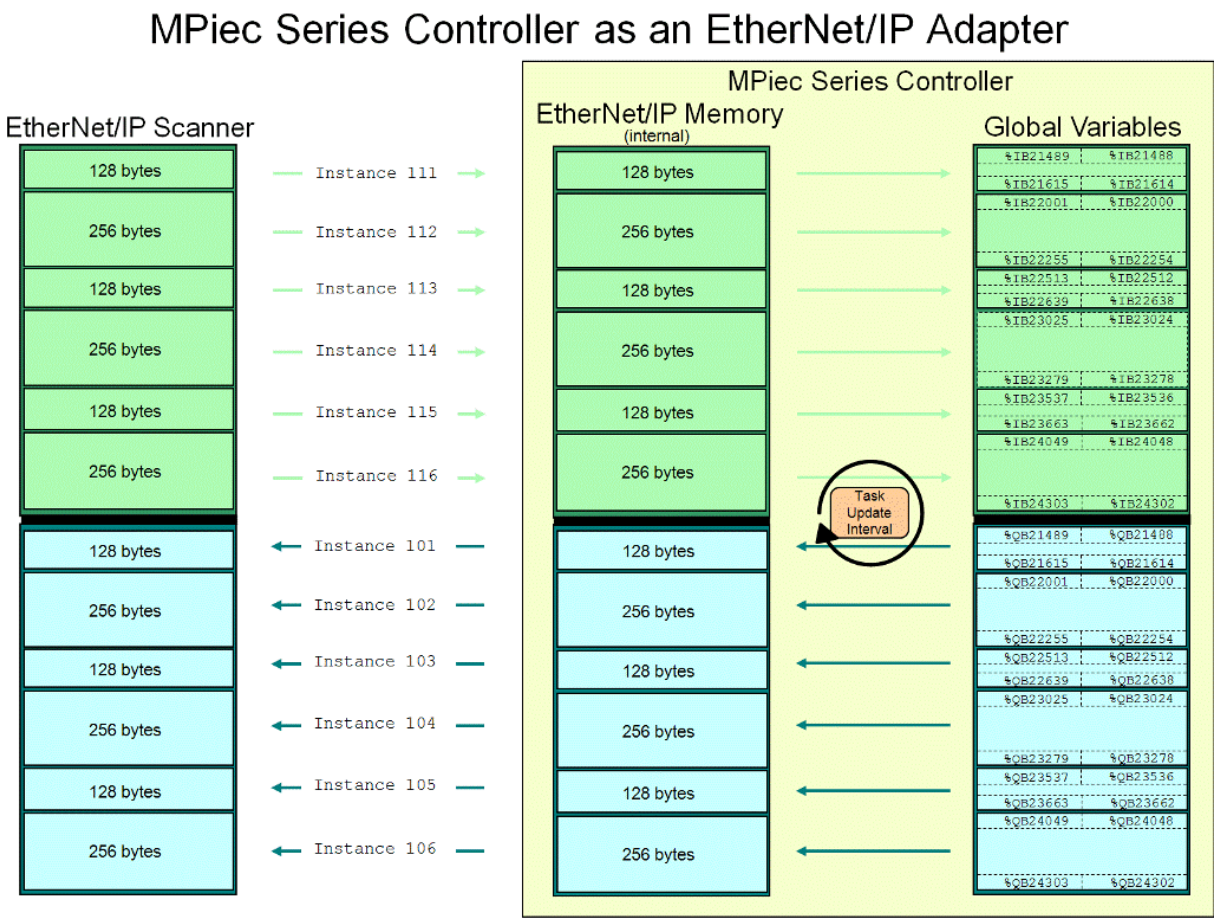
Note: The exact byte size of the instance must be configured on the Scanner side. (The entire 128-byte or 256-byte block must be transferred even if less data is required.)

The controller will automatically respond to incoming EtherNet/IP messages from Scanners requesting to read or write data of the pre-defined instances.

Note: The scanner must configure both an input and output assembly. If the application does not require any data from the MPiec controller, use assembly 128 with a size of zero and set the "Use Run/Idle" checkbox to satisfy this requirement.

Global Variable Groups created when EtherNet/IP adapter communication capabilities are enabled in the Hardware Configuration.

The following diagram shows the relationship of Ethernet/IP instances to Global Variable mapping.



Application Notes for selected EtherNet/IP scanner devices:

AB MicroLogix: AN.MCD.08.108

AB ControlLogix: AN.MCD.08.107

AB CompactLogix: AN.MCD.08.110

AB SLC 5/05: AN.MP2000iec.01

Set up for remote EtherNet/IP connection using routers: AN.MP2000iec.04

1.9.5 Adding an Ethernet/IP Adapter

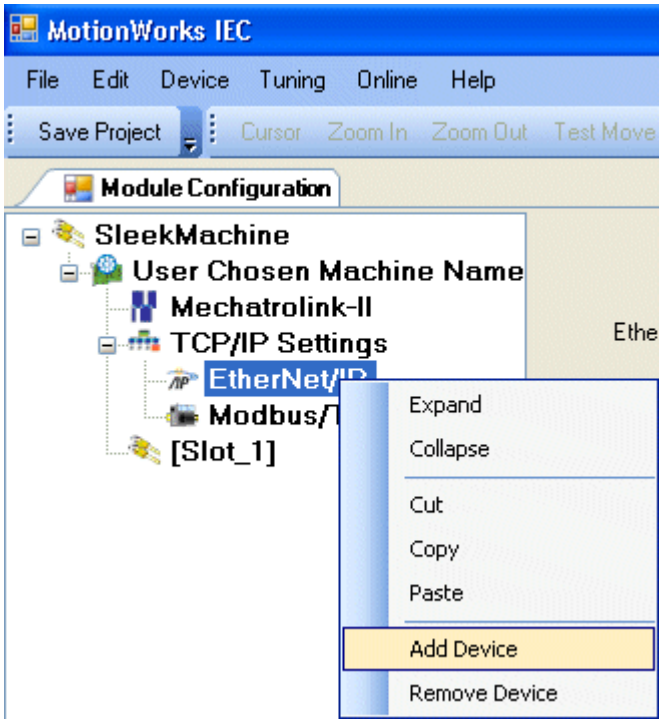
EtherNet/IP data is referred to as an Instance. Each device manufacturer defines the type of data contained and the instances supported. Refer to the specific adapter documentation for details regarding successful communication.

- The MPiec controllers can communicate with up to 20 unique IP addresses simultaneously using the EtherNet/IP protocol.
- Explicit Messaging is supported by using the Explict_Message function block provided in the Yaskawa Toolbox v202 or higher. Explicit Messaging does not require setup in the Hardware Configuration.
- The minimum poll period or update interval is 2 ms. (Note that EtherNet/IP is not a deterministic protocol. Setting a very fast update interval is not recommended because it will increase the load on the CPU. Fast updates and high priorities should be allocated based on application requirements.)

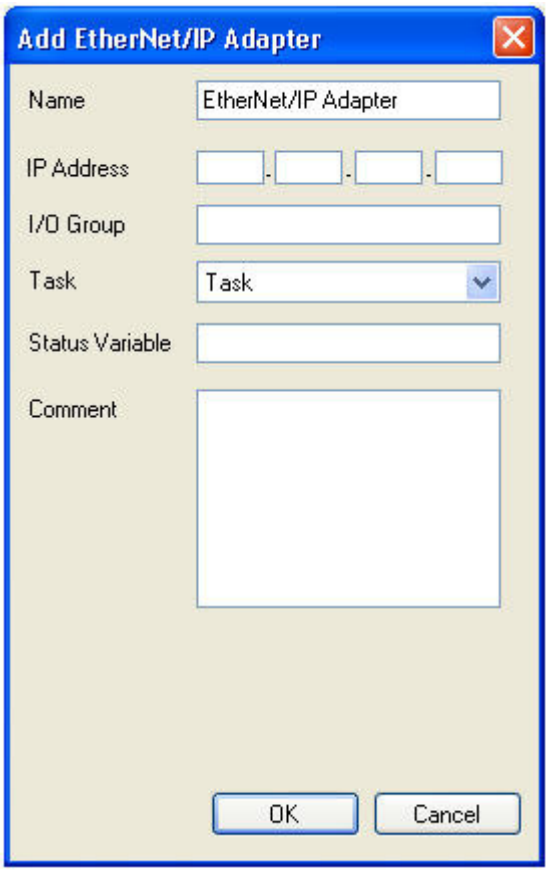
Steps to add an EtherNet/IP adapter:

Step 1: Launch the Hardware Configuration

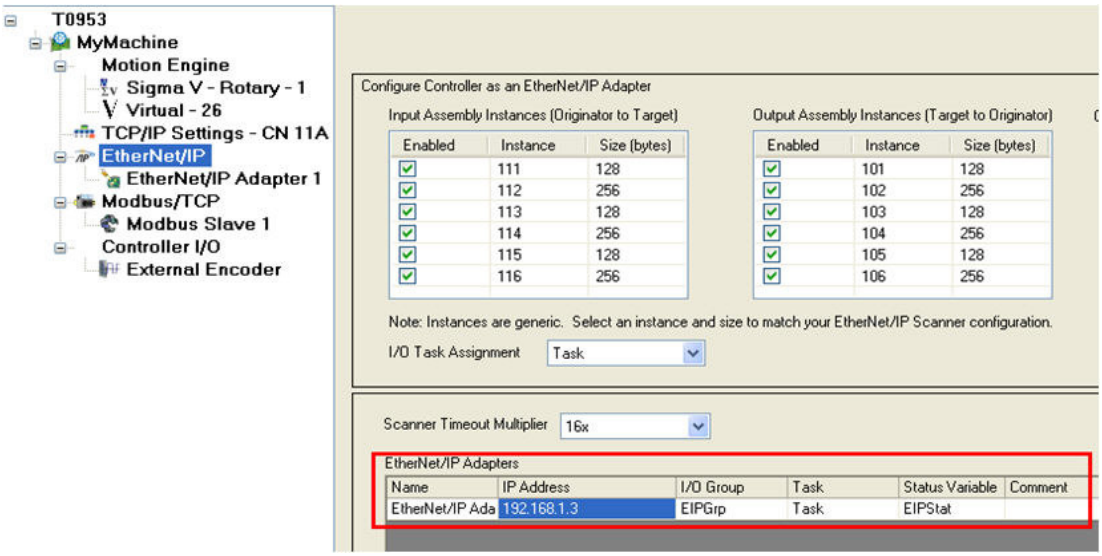
Step 2: Right click on the Configuration tree on the Ethernet/IP item and select 'Add Device'.



Step 3: Enter the Adapter details in the "Add EtherNet/IP" Adapter dialog box.



Step 4: Once the adapter device has been configured, the adapter device is shown in the configuration tree as shown below.



Step 5: Click on the adapter device and add I/O assembly instances. Please refer to the adapter device manual for details regarding instance numbers and sizes. Some adapter devices require "Configuration" assembly instances.

Step 6: Save the Configuration. This will create the global memory I/O Group in the IEC Programming Environment.

Step 7: Switch to the Online mode and "Send the Offline Configuration." Save the configuration to the controller and cycle power. The controller will start to communicate with the adapter device.

Step 8: Open the Global Variables list. Right click on the I/O group header to "Insert Variable." Variables can be any data type that fits the usage within the program. For example, a structure can be created to match the data size of the instance as described in the documentation for the adapter device.

⊟ <EtherNet/IP Adapter 1> 'iEIPGrp' Address Range: %IB32768 - %IB32807 (* Do Not Modify Group Name or Status Variable. *)				
EIPStat	WORD	VAR_GLOBAL	(* Do Not Modify. *) EtherNet/IP Adapter Status Variable	%MW32808
⊟ <EtherNet/IP Adapter 1> 'oEIPGrp' Address Range: %QB32768 - %QB32806 (* Do Not Modify Group Name or Status Variable. *)				

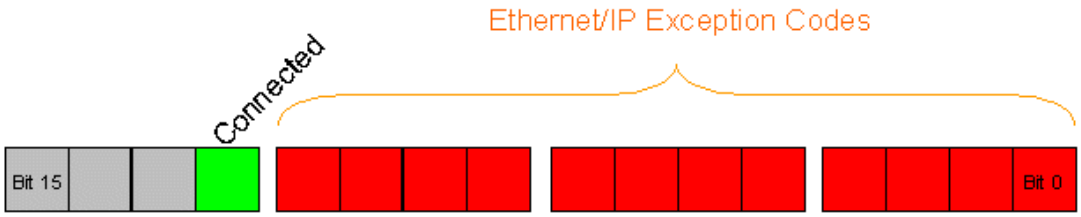
NOTE: When creating user defined datatype STRUCTs, the minimum amount of space a single data element will occupy is a BYTE, so it is not possible to create BOOL type data in the STRUCT that will match the memory map of the EtherNet/IP instance.

Ethernet/IP Status Variable

This variable reflects the connection status. It can be used in the IEC application program to determine if the connection to the remote device is active and the data is valid. The status WORD can be compared to 16#1000, which means that the connection is good. If bits 0 or 1 are on, the connection is not active, and the controller is attempting to reconnect to the remote device.

This status variable is only available when the MPiec controller is the client or master of a remote device.

NOTE: If the status variable has a value of zero as observed in the Global Variables list, the controller may not be running the IEC application program.



Lower 3 Nibbles	Description
0x001	Unable to connect (timeout)
0x002	I/O Timeout
0x003	Reconnect In Progress
0x004	Connection Failed (invalid response from server)
0x005	Connection Failed (out of resources)
0x100	Connection in Use or Duplicate Forward Open
0x103	Transport Class and Trigger combination not supported
0x106	Ownership Conflict: There is another master communicating to this adapter with an exclusive ownership setting.
0x107	Connection not found at target application
0x108	Invalid Connection Type. Indicates a problem with

Lower 3 Nibbles	Description
	either the Connection Type or Priority of the Connection.
0x109	Invalid Connection Size
0x110	Device not configured
0x111	RPI not supported. May also indicate problem with connection time-out multiplier, or production inhibit time.
0x113	Connection Manager cannot support any more connections
0x114	Either the Vendor Id or the Product Code in the key segment did not match the device
0x115	Product Type in the key segment did not match the device
0x116	Major or Minor Revision information in the key segment did not match the device
0x117	Invalid Connection Point
0x118	Invalid Configuration Format
0x119	Connection request fails since there is no controlling connection currently open.

Lower 3 Nibbles	Description
0x11A	Target Application cannot support any more connections
0x11B	RPI is smaller than the Production Inhibit Time.
0x203	Connection cannot be closed since the connection has timed out
0x204	Unconnected Send timed out waiting for a response
0x205	Parameter Error in Unconnected Send Service
0x206	Message too large for Unconnected message service
0x207	Unconnected acknowledge without reply
0x301	No buffer memory available
0x302	Network Bandwidth not available for data
0x303	No Tag filters available
0x304	Not Configured to send real-time data
0x311	Port specified in Port Segment Not Available
0x312	Link Address specified in Port Segment Not Available
0x315	Invalid Segment Type or Segment Value in Path. An unsupported instance may be requested from the

Lower 3 Nibbles	Description
	adapter.
0x316	Path and Connection not equal in close
0x317	Either Segment not present or Encoded Value in Network Segment is invalid.
0x318	Link Address to Self Invalid
0x319	Resources on Secondary Unavailable
0x31A	Connection already established
0x31B	Direct connection already established
0x31C	Miscellaneous
0x31D	Redundant connection mismatch
0x31E	No more consumer resources available in the producing module
0x31F	No connection resources exist for target path

Note: Do not delete automatically created variables or groups. If you must delete a group, be sure to delete the group header (an all of its variables) and the group name as listed under IO_Configuration in the Hardware tab. These two items must remain in sync for project to compile properly.

Application Notes/Example Code on selected EtherNet/IP adapter devices

Please refer to subsection 1.9.5.1 for configurations required for selected EtherNet/IP adapter devices.

Motoman NX100: AN.MCD.08.158

Yaskawa V1000: EC.V1000.02

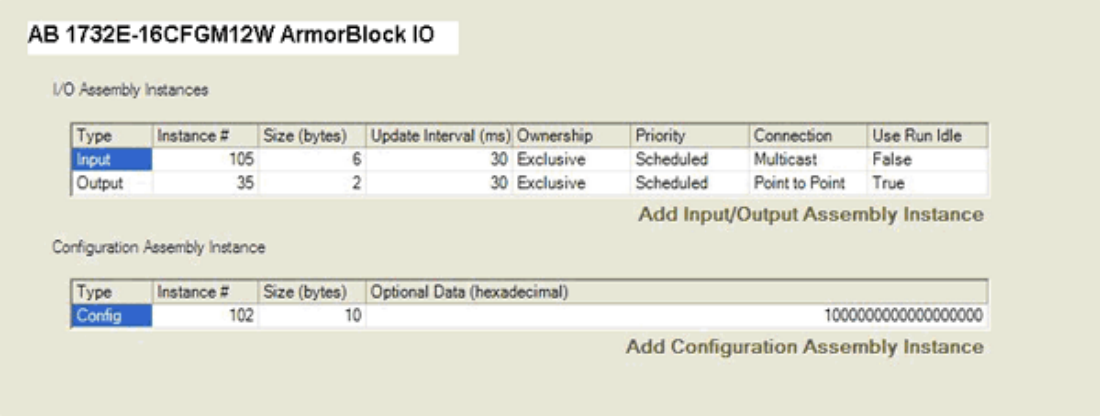
SMC pneumatics: AN.MP2000iec.03

Numatics: AN.MCD.09.092

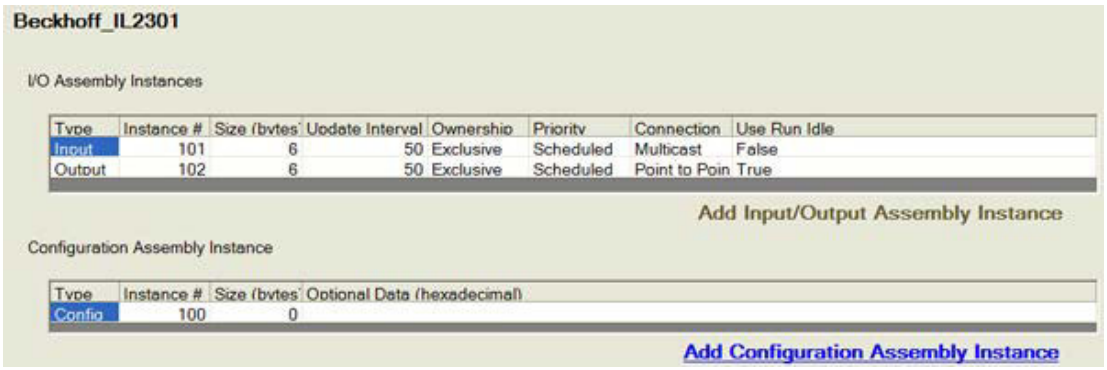
DeviceNet slaves: PN.MCD.09.101

1.9.5.1 Adapter Settings for Selected Products

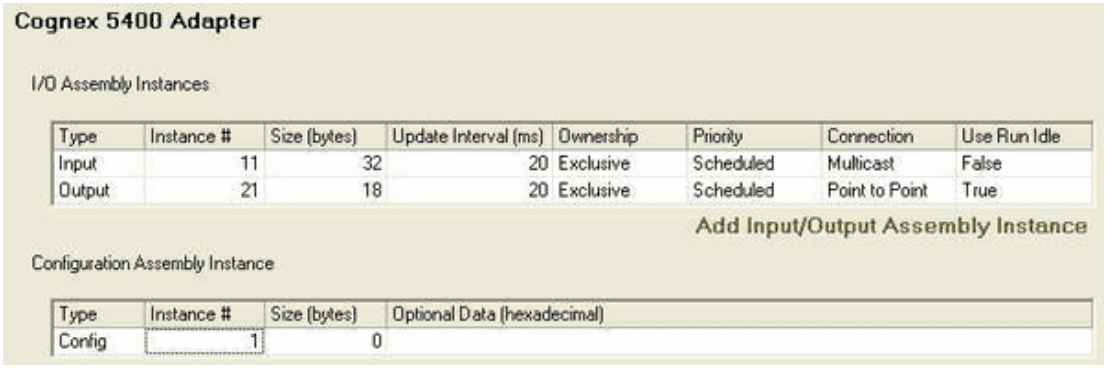
Allen Bradley Armor Block IO



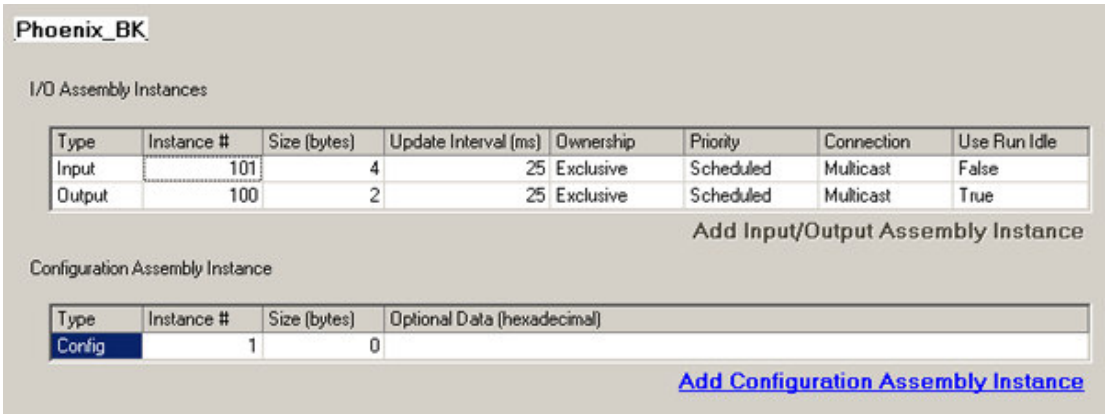
Beckhoff IO



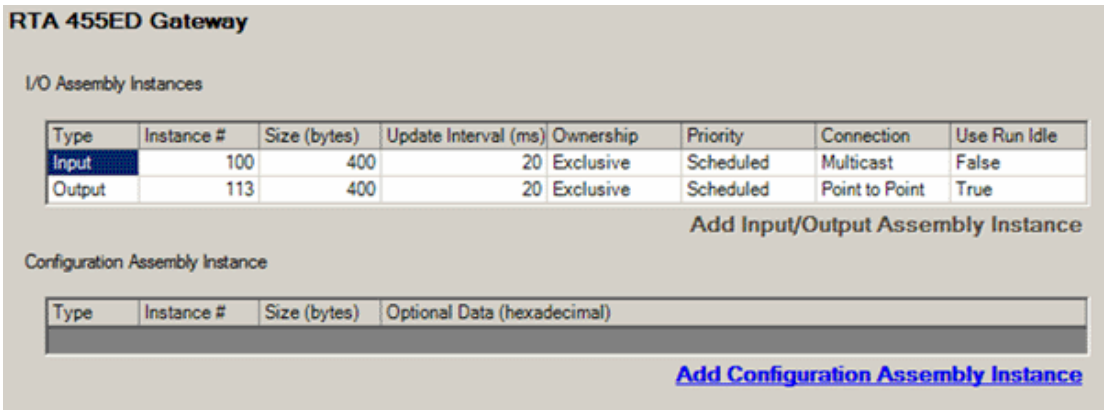
Cognex Vision System



Phoenix EtherNet/IP module



RTA Gateway



RTA 455ED Gateway

I/O Assembly Instances

Type	Instance #	Size (bytes)	Update Interval (ms)	Ownership	Priority	Connection	Use Run Idle
Input	100	400	20	Exclusive	Scheduled	Multicast	False
Output	113	400	20	Exclusive	Scheduled	Point to Point	True

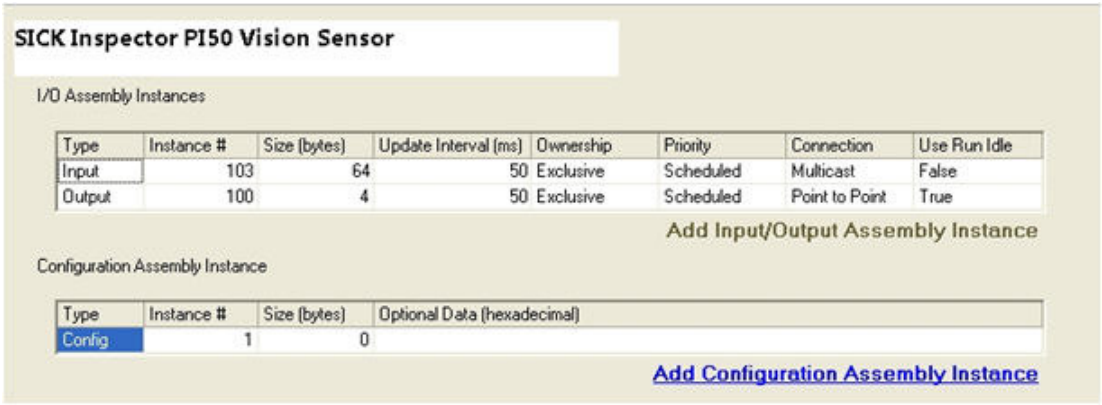
Add Input/Output Assembly Instance

Configuration Assembly Instance

Type	Instance #	Size (bytes)	Optional Data (hexadecimal)

Add Configuration Assembly Instance

SICK Vision Sensor



SICK Inspector PI50 Vision Sensor

I/O Assembly Instances

Type	Instance #	Size (bytes)	Update Interval (ms)	Ownership	Priority	Connection	Use Run Idle
Input	103	64	50	Exclusive	Scheduled	Multicast	False
Output	100	4	50	Exclusive	Scheduled	Point to Point	True

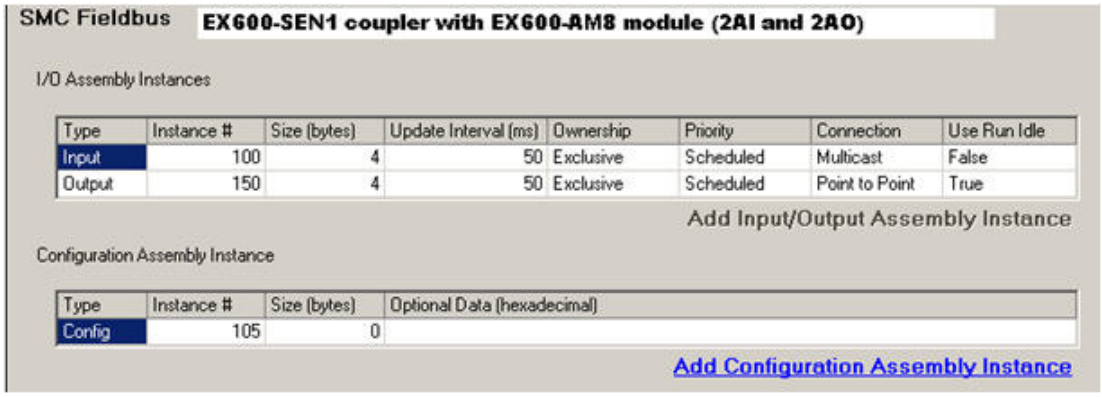
Add Input/Output Assembly Instance

Configuration Assembly Instance

Type	Instance #	Size (bytes)	Optional Data (hexadecimal)
Config	1	0	

Add Configuration Assembly Instance

SMC IO



SMC Fieldbus **EX600-SEN1 coupler with EX600-AM8 module (2AI and 2AO)**

I/O Assembly Instances

Type	Instance #	Size (bytes)	Update Interval (ms)	Ownership	Priority	Connection	Use Run Idle
Input	100	4	50	Exclusive	Scheduled	Multicast	False
Output	150	4	50	Exclusive	Scheduled	Point to Point	True

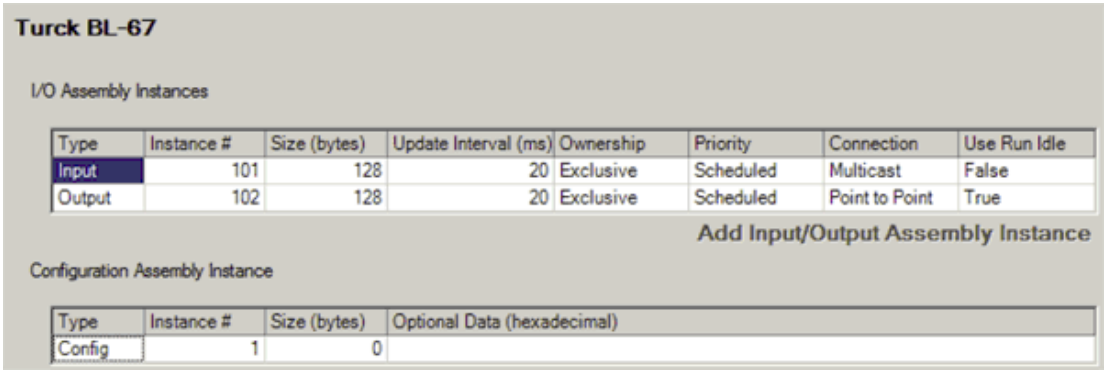
Add Input/Output Assembly Instance

Configuration Assembly Instance

Type	Instance #	Size (bytes)	Optional Data (hexadecimal)
Config	105	0	

Add Configuration Assembly Instance

Turck IO



Turck BL-67

I/O Assembly Instances

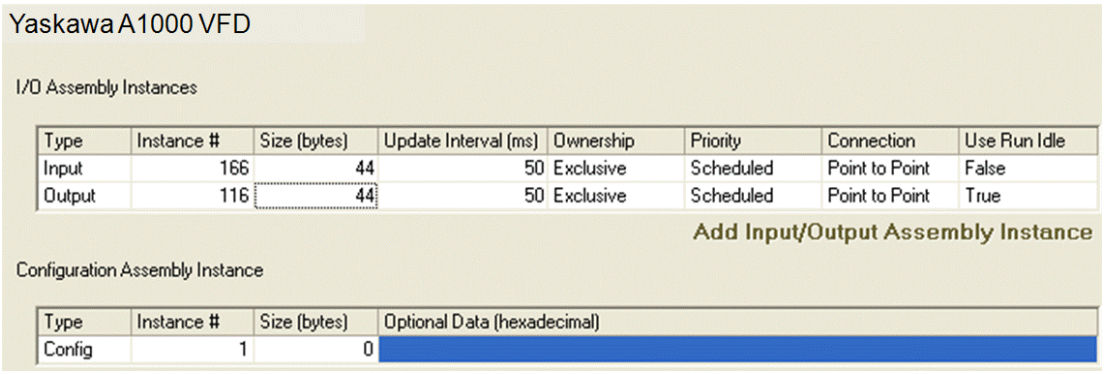
Type	Instance #	Size (bytes)	Update Interval (ms)	Ownership	Priority	Connection	Use Run Idle
Input	101	128	20	Exclusive	Scheduled	Multicast	False
Output	102	128	20	Exclusive	Scheduled	Point to Point	True

Add Input/Output Assembly Instance

Configuration Assembly Instance

Type	Instance #	Size (bytes)	Optional Data (hexadecimal)
Config	1	0	

Yaskawa VFD



Yaskawa A1000 VFD

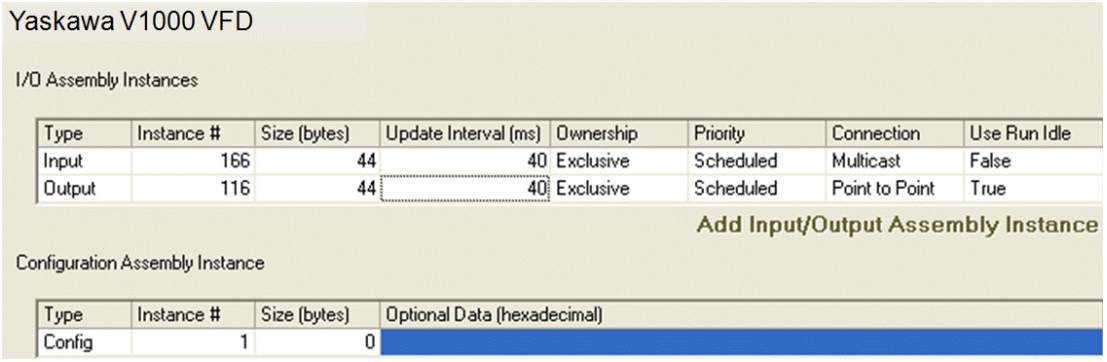
I/O Assembly Instances

Type	Instance #	Size (bytes)	Update Interval (ms)	Ownership	Priority	Connection	Use Run Idle
Input	166	44	50	Exclusive	Scheduled	Point to Point	False
Output	116	44	50	Exclusive	Scheduled	Point to Point	True

Add Input/Output Assembly Instance

Configuration Assembly Instance

Type	Instance #	Size (bytes)	Optional Data (hexadecimal)
Config	1	0	



Yaskawa V1000 VFD

I/O Assembly Instances

Type	Instance #	Size (bytes)	Update Interval (ms)	Ownership	Priority	Connection	Use Run Idle
Input	166	44	40	Exclusive	Scheduled	Multicast	False
Output	116	44	40	Exclusive	Scheduled	Point to Point	True

Add Input/Output Assembly Instance

Configuration Assembly Instance

Type	Instance #	Size (bytes)	Optional Data (hexadecimal)
Config	1	0	

Yaskawa V7 VFD

I/O Assembly Instances

Type	Instance #	Size (bytes)	Update Interval (ms)	Ownership	Priority	Connection	Use Run Idle
Input	155	40	40	Exclusive	Scheduled	Point to Point	False
Output	115	40	40	Exclusive	Scheduled	Point to Point	True

Add Input/Output Assembly Instance

Configuration Assembly Instance

Type	Instance #	Size (bytes)	Optional Data (hexadecimal)

Wago Coupler

Wago 750-341 EtherNet/IP coupler

I/O Assembly Instances

Type	Instance #	Size (bytes)	Update Interval (ms)	Ownership	Priority	Connection	Use Run Idle
Input	107	29	50	Exclusive	Scheduled	Multicast	False
Output	101	25	50	Exclusive	Scheduled	Point to Point	True

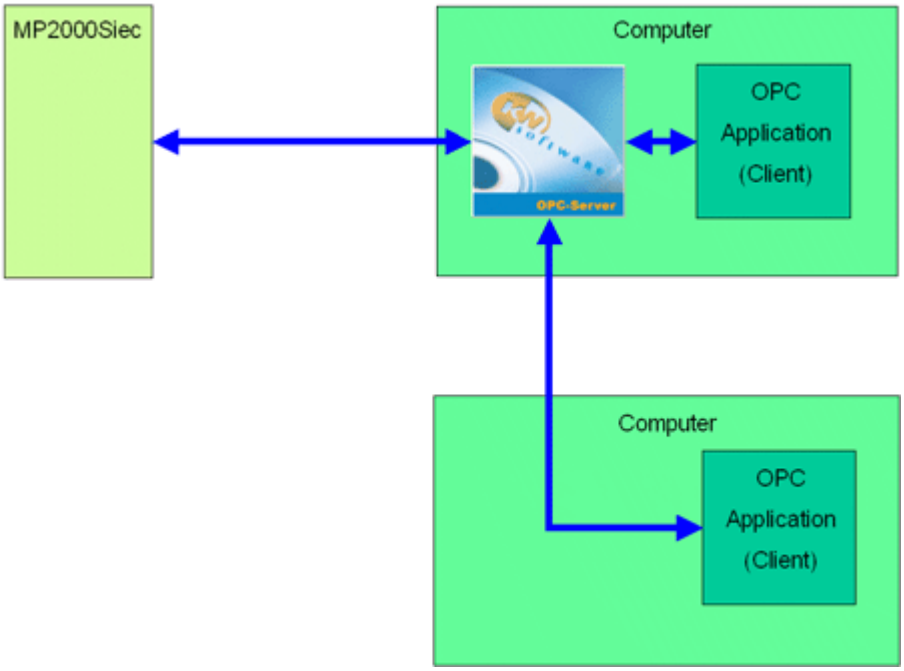
Add Input/Output Assembly Instance

Configuration Assembly Instance

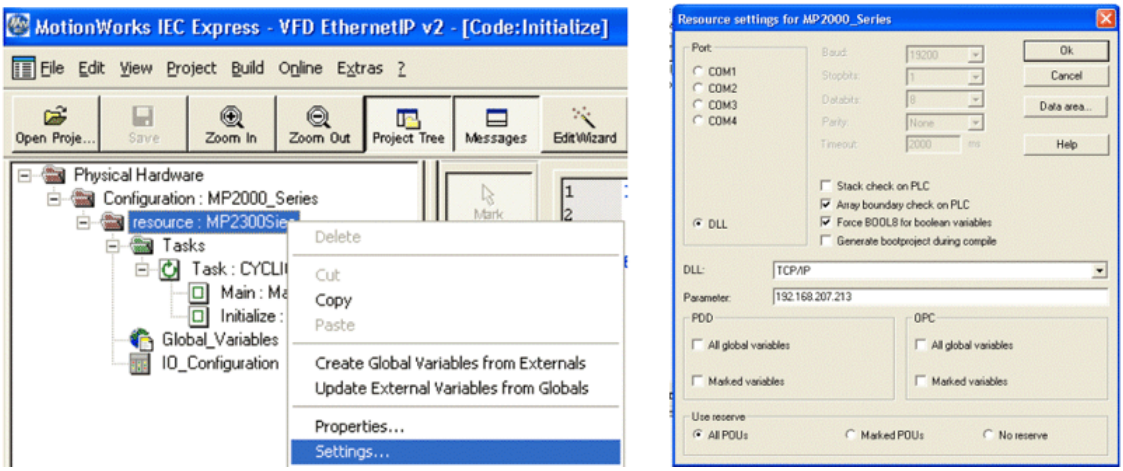
Type	Instance #	Size (bytes)	Optional Data (hexadecimal)
Config	1	0	

Add Configuration Assembly Instance

1.9.6 OPC Server

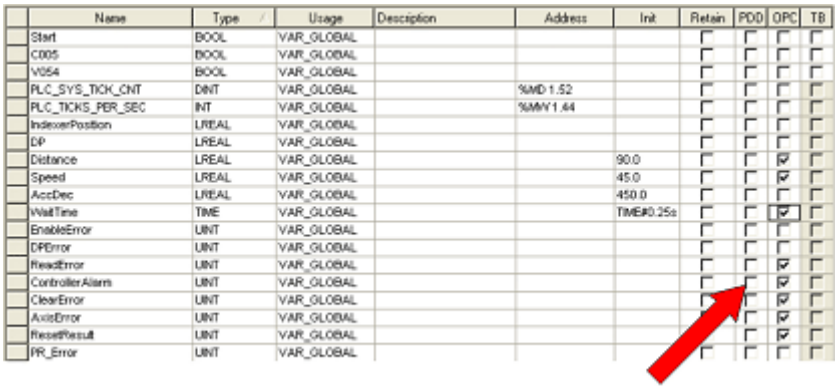


By default, all global variables are transmitted as OPC data. To disable this feature, click the hardware tab, right-click the resource folder, and select Settings. (See figure below)



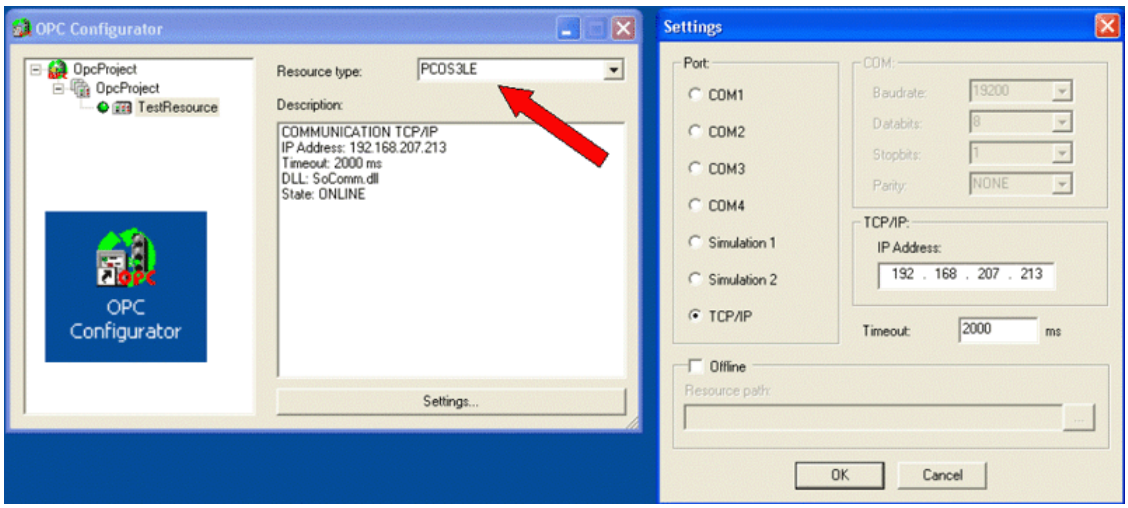
OPC Configuration

Any data in the application program can be set as OPC data by simply clicking the checkbox in the variable definition screen in the IEC development environment.



	Name	Type	Usage	Description	Address	Init	Retain	PDD	OPC	TB
	Start	BOOL	VAR_GLOBAL				☐	☐	☐	☐
	C005	BOOL	VAR_GLOBAL				☐	☐	☐	☐
	V054	BOOL	VAR_GLOBAL				☐	☐	☐	☐
	PLC_SYS_TICK_CNT	DINT	VAR_GLOBAL		%MD1.52		☐	☐	☐	☐
	PLC_TICKS_PER_SEC	INT	VAR_GLOBAL		%MW1.44		☐	☐	☐	☐
	IndexerPosition	LREAL	VAR_GLOBAL				☐	☐	☐	☐
	DP	LREAL	VAR_GLOBAL				☐	☐	☐	☐
	Distance	LREAL	VAR_GLOBAL			90.0	☐	☐	☑	☐
	Speed	LREAL	VAR_GLOBAL			45.0	☐	☐	☑	☐
	AccDec	LREAL	VAR_GLOBAL			450.0	☐	☐	☐	☐
	WaitTime	TIME	VAR_GLOBAL			TIME#0.25s	☐	☐	☑	☐
	EnableError	UINT	VAR_GLOBAL				☐	☐	☐	☐
	DPError	UINT	VAR_GLOBAL				☐	☐	☐	☐
	ReadError	UINT	VAR_GLOBAL				☐	☐	☑	☐
	ControllerAlarm	UINT	VAR_GLOBAL				☐	☐	☑	☐
	ClearError	UINT	VAR_GLOBAL				☐	☐	☑	☐
	AxisError	UINT	VAR_GLOBAL				☐	☐	☑	☐
	ResetResult	UINT	VAR_GLOBAL				☐	☐	☑	☐
	PR_Error	UINT	VAR_GLOBAL				☐	☐	☐	☐

Variable Definition Window



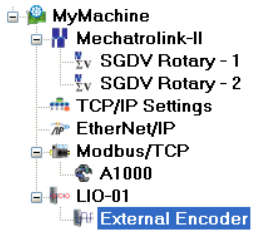
OPC Server Configurator

Application Notes

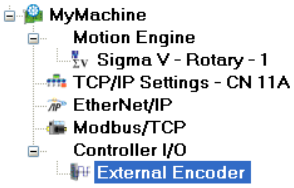
Phoenix HMI: [AN.MP2000iec.08]

1.10 External Encoders

Option cards LIO-01, LIO-02, and LIO-06 have an encoder input available for use with the PLCopen function blocks. When any of these cards are configured, external encoder functionality is available.

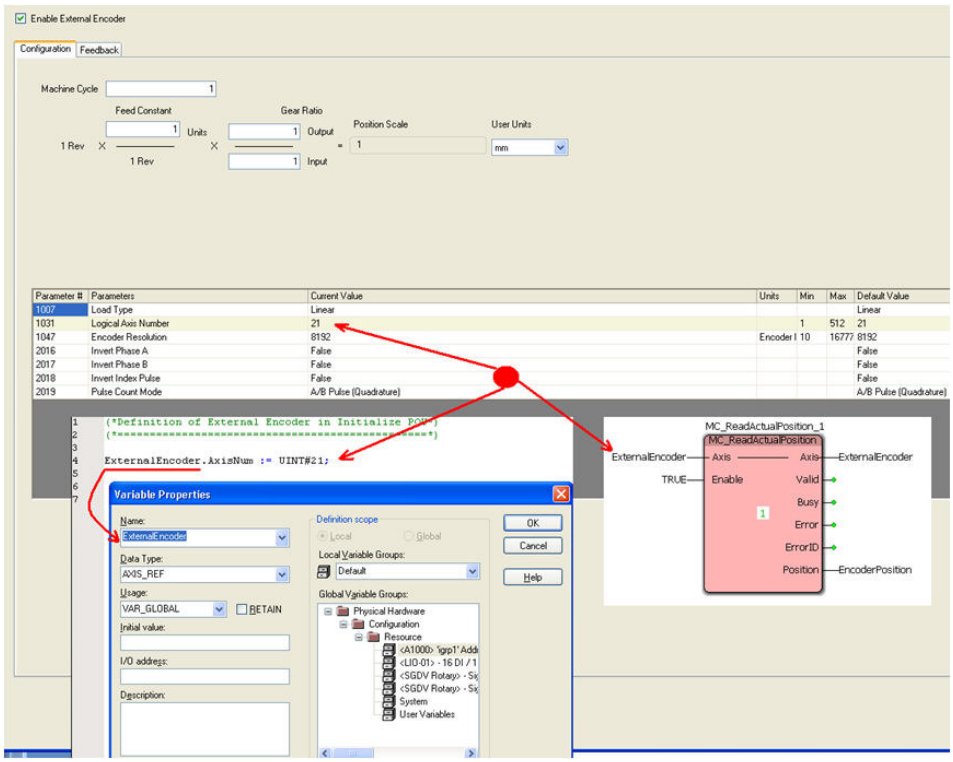


MECHATROLINK controller



MP2600iec

To use the encoder, check the 'Enable External Encoder' selection and identify the logical axis number. Use the logical axis number in the IEC application as the AXIS_REF.AxisNum value when referring to the external encoder axis. Changes to the user unit parameters will not take effect until power is cycled.



Steps to configure an external encoder

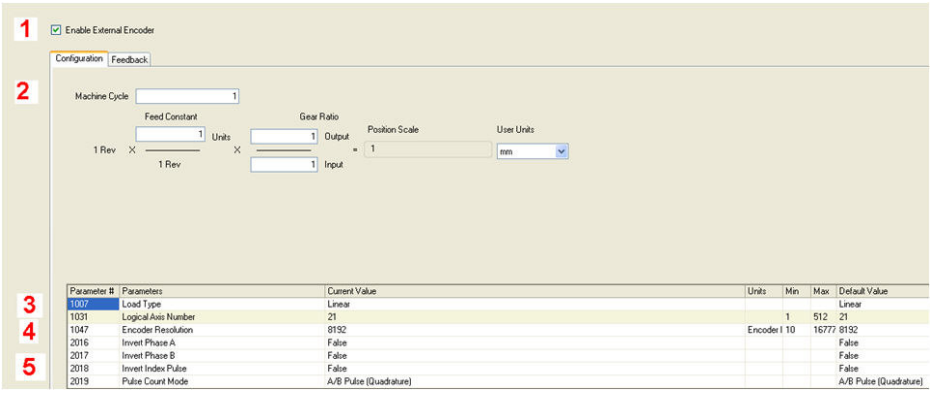
1) Enable the External Encoder

2) Set User Units

3) Set Load Type

4) Set the Encoder Resolution

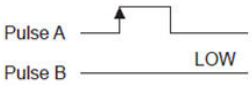
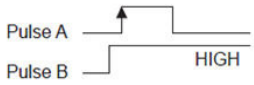
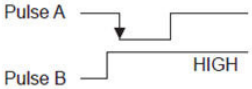
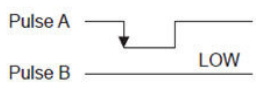
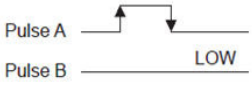
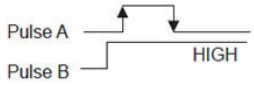
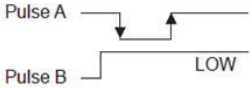
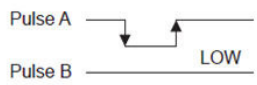
5) Set the Pulse Count Mode

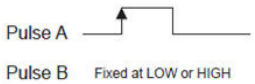
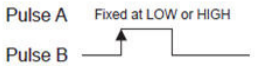
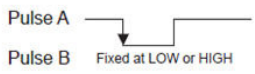
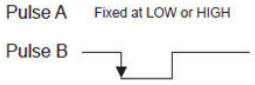
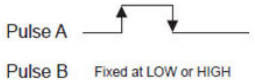
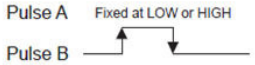
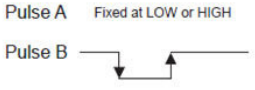


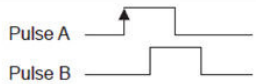
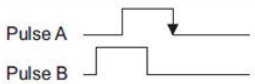
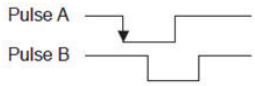
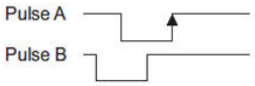
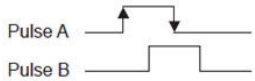
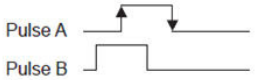
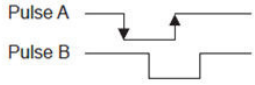
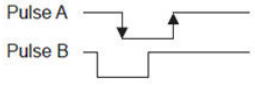
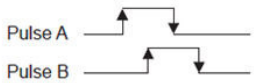
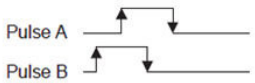
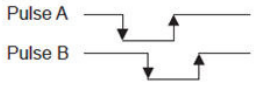
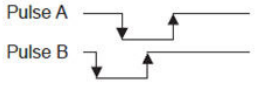
Three pulse counting methods are supported:

- Sign (One channel counts, the other indicates the direction.)
- Up/Down (One channel indicates forward, the other channel indicates reverse.)
- A/B (Quadrature)

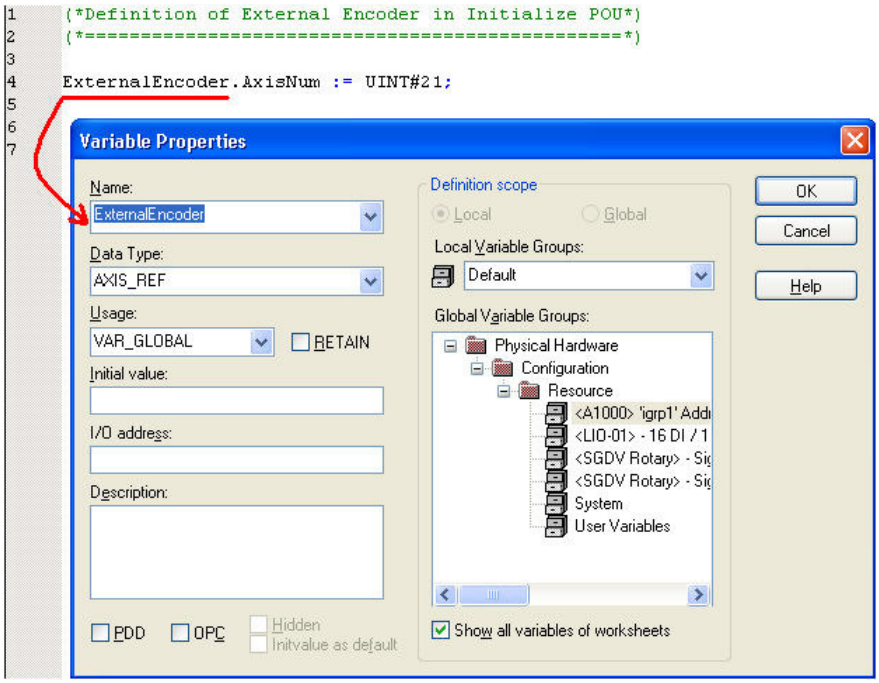
This section describes the details on each pulse counting method:

Pulse Counting Method	Polarity	UP Count (Forward)	DOWN Count (Reverse)
Sign (×1)	Positive logic		
	Negative logic		
Sign (×2)	Positive logic		
	Negative logic		

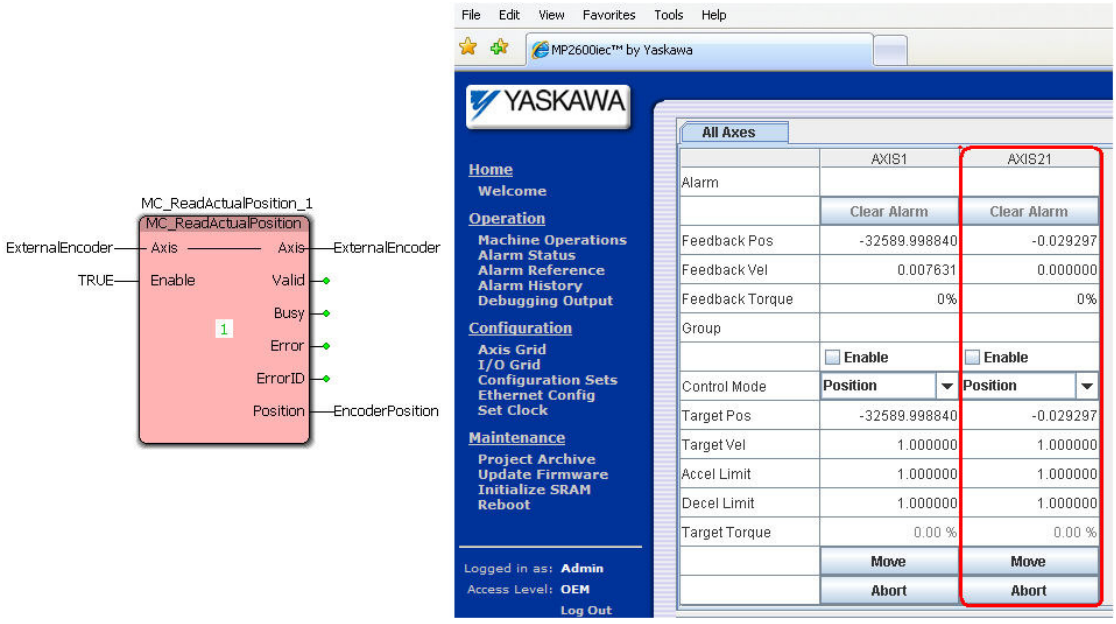
Pulse Counting Mode	Polarity	UP Count (Forward)	DOWN Count (Reverse)
UP/DOWN (×1)	Positive logic		
	Negative logic		
UP/DOWN (×2)	Positive logic		
	Negative logic		

Pulse Counting Mode	Polarity	UP Count (Forward)	DOWN Count (Reverse)
A/B (×1)	Positive logic		
	Negative logic		
A/B (×2)	Positive logic		
	Negative logic		
A/B (×4)	Positive logic		
	Negative logic		

AXIS_REF assignment in IEC Application code:



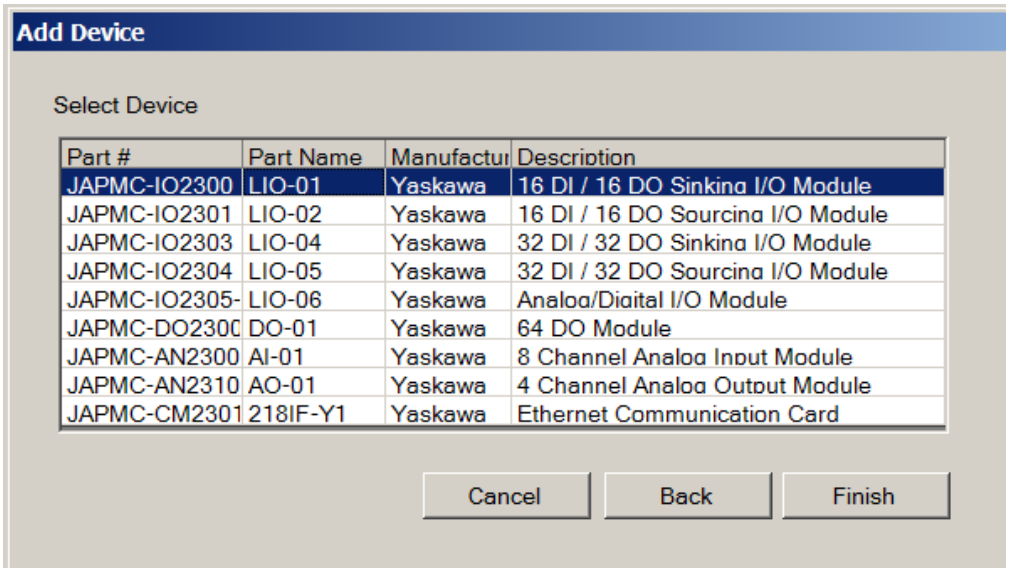
Once the configuration is complete and power cycled, the external encoder can be verified via the IEC Application (using the MC_ReadActualPosition function block) or through the Web Server's Machine Operations page.



1.11 Option Slots

Each slot in the controller can optionally contain a module, or remain empty.

The following option cards are supported:



Global variables for the following remote I/O devices with a fixed number of I/O will automatically be entered in the Global Variables grid of the IEC Programming Environment when the user presses 'Save' in the Hardware Configuration:

AO-01	LIO-01	LIO-05
AI-01	LIO-02	LIO-06
DO-01	LIO-04	

Note: Do not delete automatically created variables or groups. If you must delete a group, be sure to delete the group header (and all of its variables) and the group name as listed in the Project Tree Window's 'IO_Configuration' in the Hardware tab, then press Save in the Hardware Configuration once again to refresh. These two items (Group Name and group listing in IO_Configuration) must remain in sync for project to compile and run properly.

1.12 Task Priority Planning

The following table serves as a guide to architect the execution priority of the various parts of the application program. This table is only applicable to programs that utilize MotionWorks IEC Professional. MotionWorks IEC Express only supports 1 task.

Controller Task	Overall Priority	Note
System Tasks with higher priority than IEC Tasks	0	System Tasks
	0	
	0	
	0	
System Tasks with higher priority than IEC Tasks	8	
	9	
	10	
	10	
	11	
	13	
	20	
System Tasks with higher priority than IEC Tasks	21	
Highest Priority IEC Application Task - Priority 0	42	These PLC Tasks are not interrupted by network activity

IEC Application Task - Priority 1	43	
IEC Application Task - Priority 2	44	
IEC Application Task - Priority 3	45	
IEC Application Task - Priority 4	46	
IEC Application Task - Priority 5	47	
IEC Application Task - Priority 6	48	PLC Tasks, round robin with MECHATROLINK Work Task
MECHATROLINK Work Task	48	MECHATROLINK alarm polling Task, reads all alarms from drives
Alarm Task	48	Executes lower priority alarm handlers
IEC Application Task - Priority 7	49	PLC Tasks interrupted by MECHATROLINK work q
IEC Application Task - Priority 8	50	PLC Tasks interrupted by MECHATROLINK work q; round robin with inbound net activity
Network Communication Task	50	All inbound traffic comes in at this Priority. Outbound is handled by the driver Tasks
IEC Application Task - Priority 9	51	These PLC Tasks interrupted by network, use for custom network driver
IEC Application Task - Priority 10	52	
IEC Application Task - Priority 11	53	This PLC Task is interrupted by network, round robin with EIP Communication Task
E/IP Communication Task	53	EthernetIP communication driver

IEC Application Task - Priority 12	54	These PLC Tasks interrupted by network and EIP
IEC Application Task - Priority 13	55	
IEC Application Task - Priority 14	56	This PLC Task is interrupted by network and EIP; Round robin with Modbus TCP Task
Modbus TCP Communication Task	56	Modbus communication driver
IEC Application Task - Priority 15	57	This PLC Task is interrupted by Modbus and EIP; but not interrupted by OPC or RMI
Lowest Priority IEC Application Task - Priority 16	58	Interrupted by Modbus and EIP; not OPC or RMI
IEC Application Idle Task	60	MotionWorks IEC "Default" Task.
ProConOS Communication Task	70	PLC communication: OPC and MotionWorks IEC debug
ProConOS Communication Task	70	
ProConOS Communication Task	70	
ProConOS Communication Task	70	
ProConOS Task for Application "Download Changes"	73	
ProConOS Task for MotionWorks IEC communication	74	
ProConOS debugging Task	76	
ProConOS Task for managing code	77	
ProConOS Task for Run/Stop mode	78	
System Tasks with lower priority	80	Applet / Hardware Configuration / Web

than IEC Tasks	81	Server communication
	82	
	83	
System Tasks with lower priority than IEC Tasks	85	
	85	
	85	
	85	

Color Codes:

Hardware Operating System Tasks

Hardware Operating System Tasks

IEC Operating System Tasks

IEC Application Tasks

Network Communication Driver (Incoming Traffic)

Tasks for Hardware Configuration

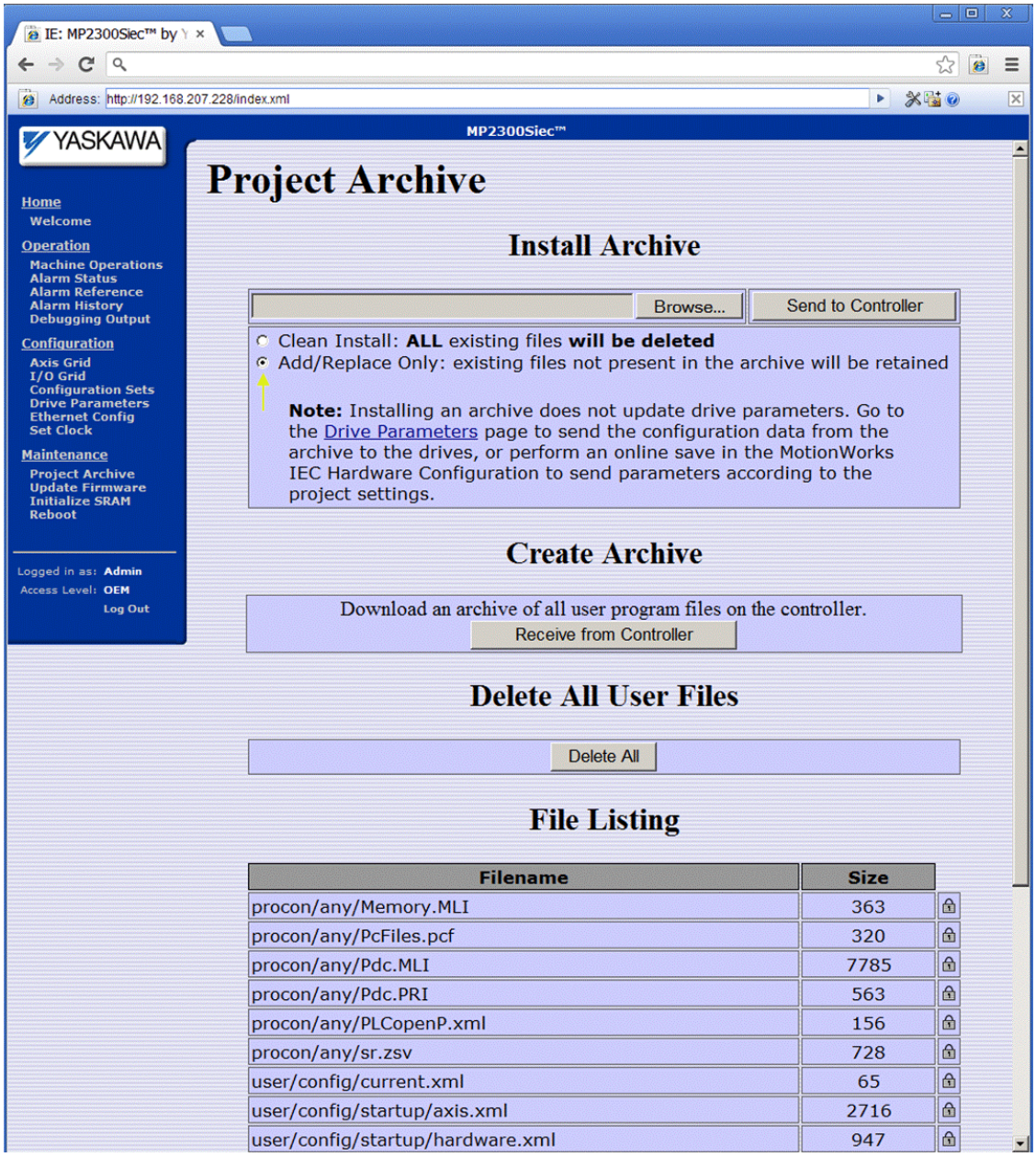
Network Communication Tasks

1.13 Creating an Archive.ZIP

In MotionWorks IEC version 2.5.0 and greater, a new feature was added to create an Archive.ZIP from an icon on the Configuration toolbar shown below.

Click the Icon on the toolbar to create an Archive.ZIP. This feature is intended to allow users to make minor changes to completed applications and deploy an updated Archive.ZIP to a machine in the field.

Warning: The user must ensure that the offline Hardware Configuration parameters are valid for the machine in which the Archive.ZIP will be installed. The Archive.ZIP file contains all necessary files for the application and will overwrite the XML configuration files, with the exception of any user files such as cam or csv. If user files are required for the application, it may be necessary to instruct the Archive.ZIP installer to use the settings as shown below for "Add or Replace Only."


IE: MP2300Siec™ by
Address: http://192.168.207.228/index.xml
YASKAWA
MP2300Siec™
Home
Welcome
Operation
Machine Operations
Alarm Status
Alarm Reference
Alarm History
Debugging Output
Configuration
Axis Grid
I/O Grid
Configuration Sets
Drive Parameters
Ethernet Config
Set Clock
Maintenance
Project Archive
Update Firmware
Initialize SRAM
Reboot
Logged in as: Admin
Access Level: OEM
Log Out
Project Archive
Install Archive
Browse...
Send to Controller
Clean Install: ALL existing files will be deleted
Add/Replace Only: existing files not present in the archive will be retained
Note: Installing an archive does not update drive parameters. Go to the Drive Parameters page to send the configuration data from the archive to the drives, or perform an online save in the MotionWorks IEC Hardware Configuration to send parameters according to the project settings.
Create Archive
Download an archive of all user program files on the controller.
Receive from Controller
Delete All User Files
Delete All
File Listing
Filename
Size
procon/any/Memory.MLI 363
procon/any/PcFiles.pcf 320
procon/any/Pdc.MLI 7785
procon/any/Pdc.PRI 563
procon/any/PLCopenP.xml 156
procon/any/sr.zsv 728
user/config/current.xml 65
user/config/startup/axis.xml 2716
user/config/startup/hardware.xml 947

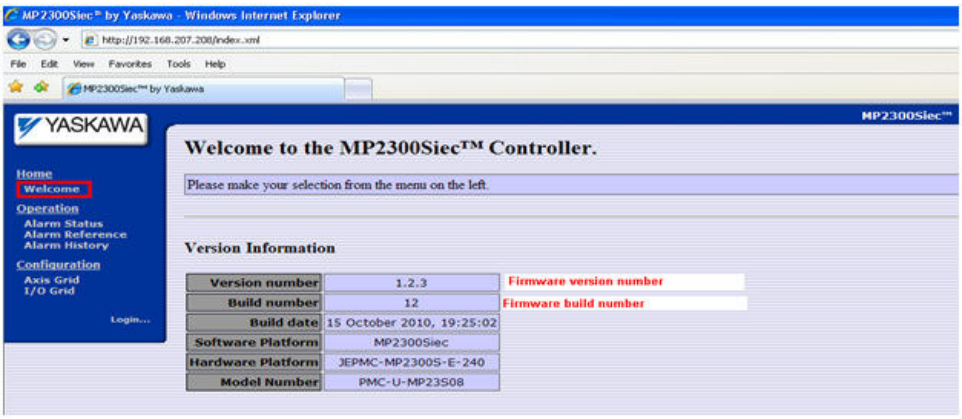
2. Web Server

Web Server Overview

The Web Server is built into the controller firmware and allows the user to locally or remotely perform various activities. By default, there are two access levels to the controller via the web server; the second level requires a password to access features such as firmware upgrade utilities.

Capabilities include:

- Multiple levels of security. By default, there are some functions available without login, and other that require a password. The default UserName and Password can be edited and additional levels of security can be added by the user.
- Part number and axis count capability.
- Firmware version verification and upgrade.
- Alarm history with time stamp.
- Basic motion verification via the Machine Operations page.
- Basic data logging via the Machine operations page.
- Amplifier parameter read / write, including absolute encoder reset and MECHATROLINK network reset.
- I/O verification.
- IP address configuration.
- Real time clock settings.



The web server's factory default logins, passwords, and access levels can be changed to create additional security levels. Please refer to AN.MCD.09.069 for details on how this can be accomplished.

Computer Requirements

The MPiec Series Controllers support a web server feature that has the following requirements:

1. Sun Microsystems Java Virtual Machine 1.4.1 or higher.
2. Internet Explorer 6 or higher. Other browsers such as Mozilla Firefox and Google Chrome will only work if an Internet Explorer compatibility mode is installed.

2.3 Web Server Functionality

By default, there are some functions available without login, and other that require a password. The default UserName and Password can be edited and additional levels of security can be added by the user.

The functions available without logging in are:

1) Welcome Page (displays Firmware version and axis count)

2) Alarm Status

3) Alarm Reference (Common alarms, causes and ways to clear alarms)

4) Alarm History (Alarm IDs with time stamps controller)

5) Axis Grids

6) I/O Grid

Additional functions available after the user logs in are:

7) Machine Operations

8) Debugging Output

9) Configuration Sets

10)Ethernet Configuration

11) Set clock

12) Project Archive

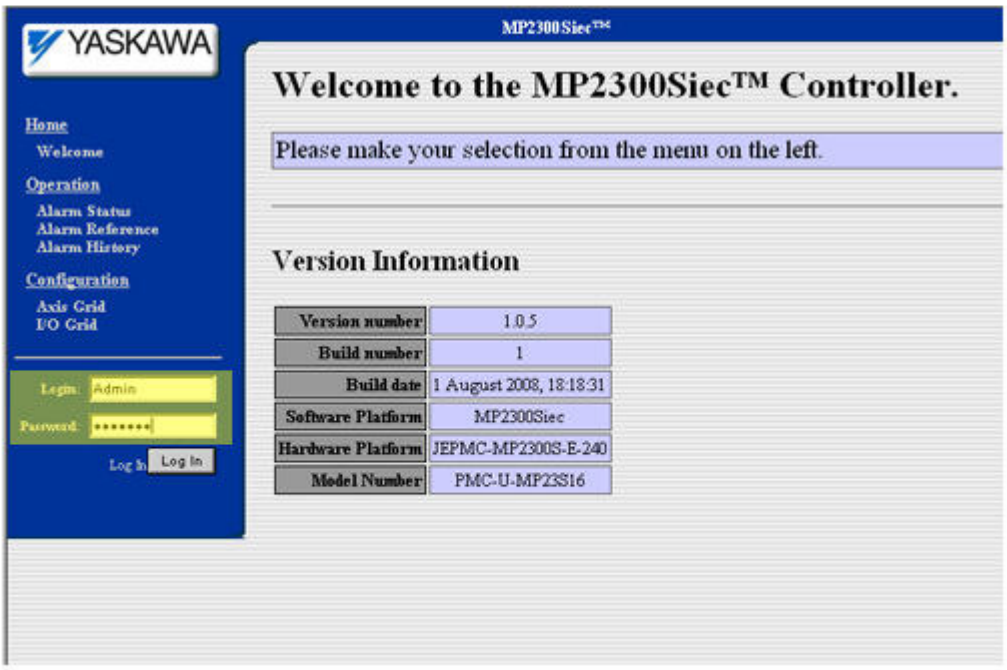
13) Update Firmware

14) Initialize SRAM

15) Reboot

Level 2 (Additional functions) of the controller web server can be accessed using the following login and password.

Controller	Login	Password
MP2300Siec	Admin	MP2300S
MP2310iec	Admin	MP2300S
MP2600iec	Admin	MP2600



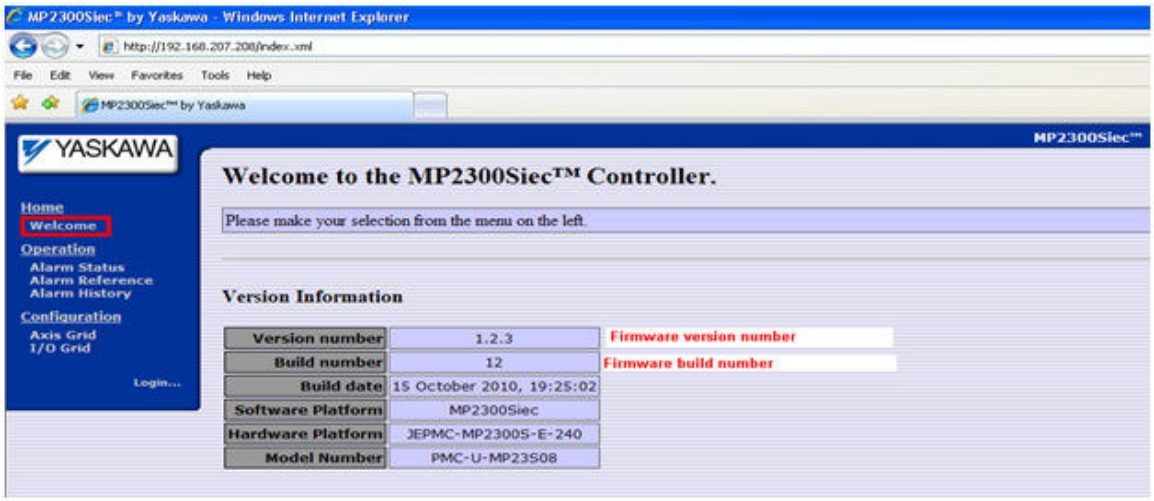
Note that the factory default logins, passwords, and even access levels can be changed and edited to allow OEMS and machine builders create secure

levels in the controller's web server. Please refer to AN.MCD.09.069 for details on how this can be accomplished.

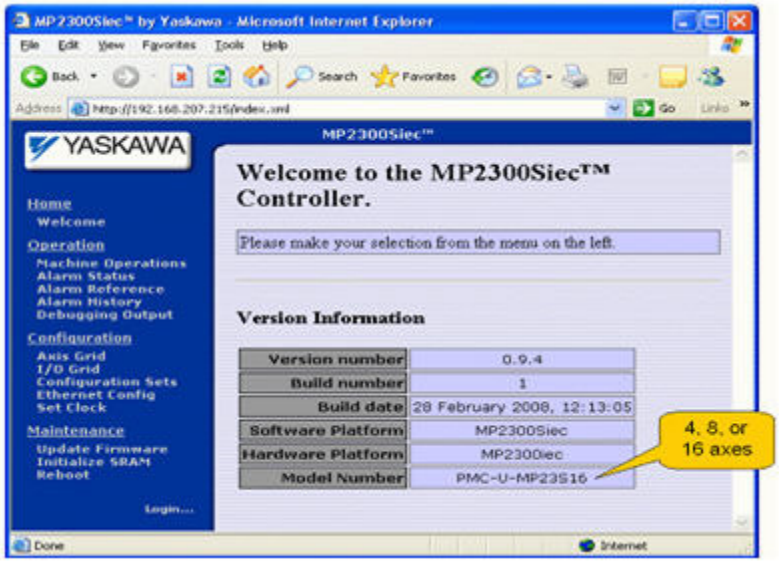
Level 1 of Web Server

Welcome Page

The Welcome page opens when the user connects to an MPiec controller using Internet Explorer. Details about the controller's firmware version can be obtained from the web server welcome page.



Use the Welcome page to confirm the firmware version, model number, and axis count capability.



Welcome Page

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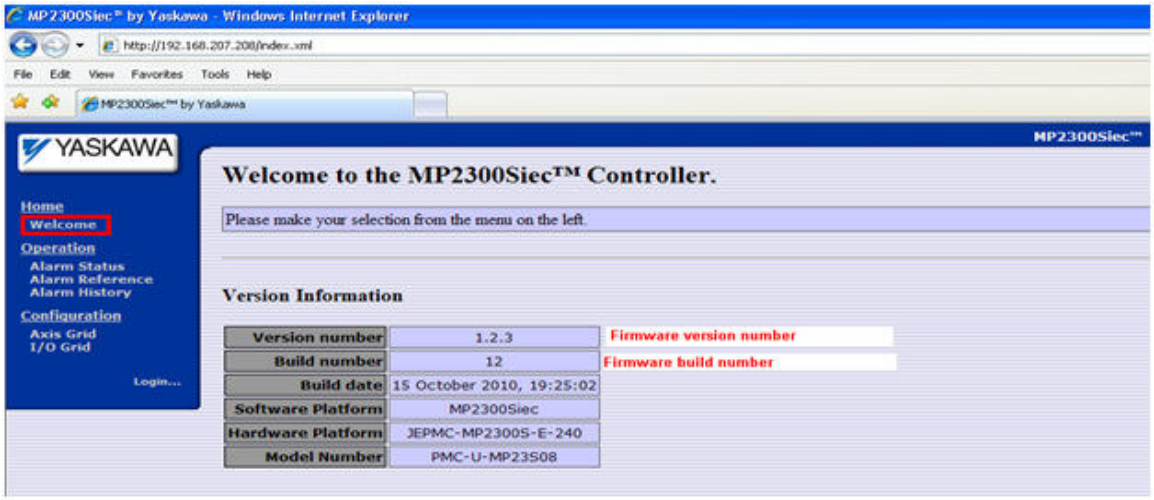
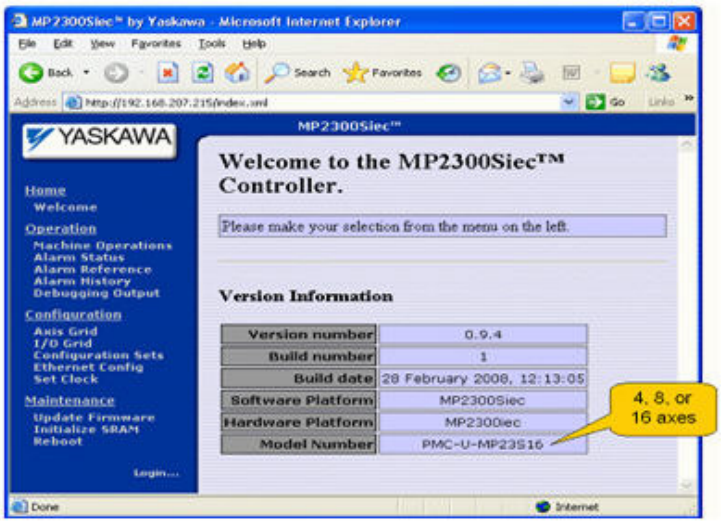
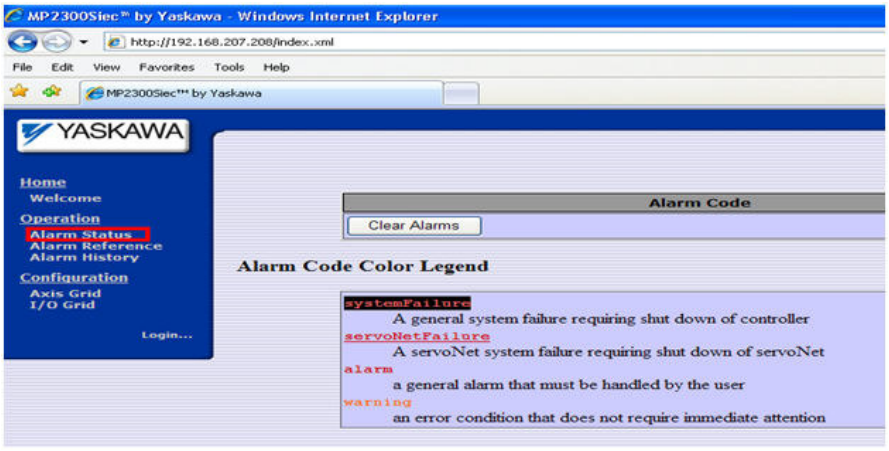


Use the Welcome page to confirm the firmware version, model number, and axis count capability.



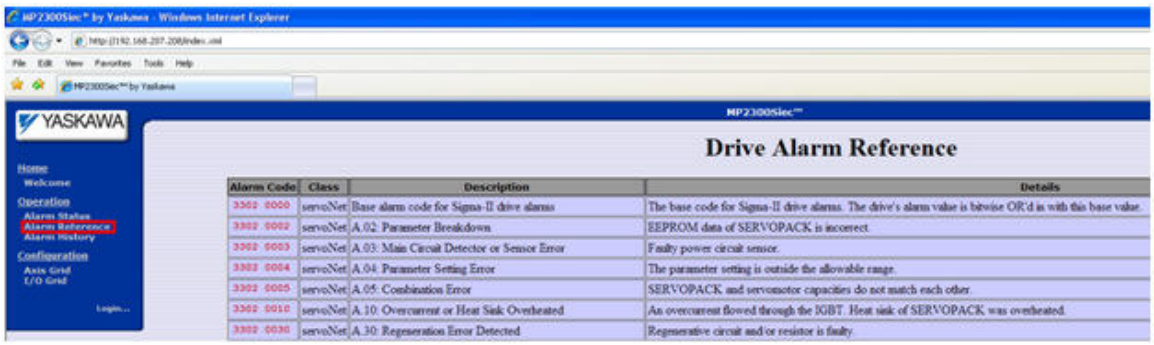
Alarm Status

This page displays current controller and drive alarms from all connected motion axes. Resettable alarms (such as a ServoPack Overspeed alarm A.510) can be cleared using the Clear Alarms button. Certain alarms, such as ServoPack A.C9: 'Encoder Communication Error' require power cycle to be cleared. Check the Sigma manuals for details regarding clearable alarms.



Alarm Reference

Common amplifier alarms are listed on the Alarm Reference page.



If the upper 2 bytes (ErrorClass) has a value of 16#3302, 16#3303, 16#4302, or 16#4403, then the source of the alarm is the Sigma Servopack.

Please refer to the following manuals for details regarding Sigma servo amplifier alarms:

- Sigma II with NS115: SIEPC71080001, see section 9.3
- Sigma III: YEA-SIA-S800-11, see section 10.1.4

- Sigma-5 with rotary motor: SIEPS8000043, see Section 6.1
- Sigma-5 with linear motor: SIEPS8000044, see Section 6.1

If the upper 2 bytes (ErrorClass) has a value of 16#3312, then the source of the alarm is the variable frequency drive.

Please refer to the following manuals for details regarding Variable Frequency Drive alarms:

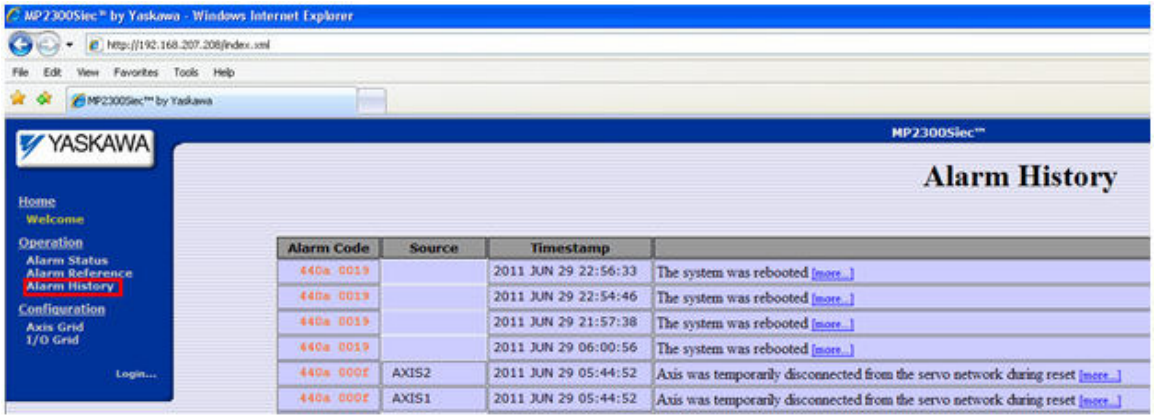
- A1000: SIEP C710616 41, see section 6.3
- V1000: SIEP C710606 18, see section 6.5

If the upper 2 bytes (ErrorClass) has a value of 16#3313, 16#3314 or 16#3315, then the source of the alarm is a stepper amplifier.

Please refer to the appropriate stepper amplifier documentation for alarm descriptions.

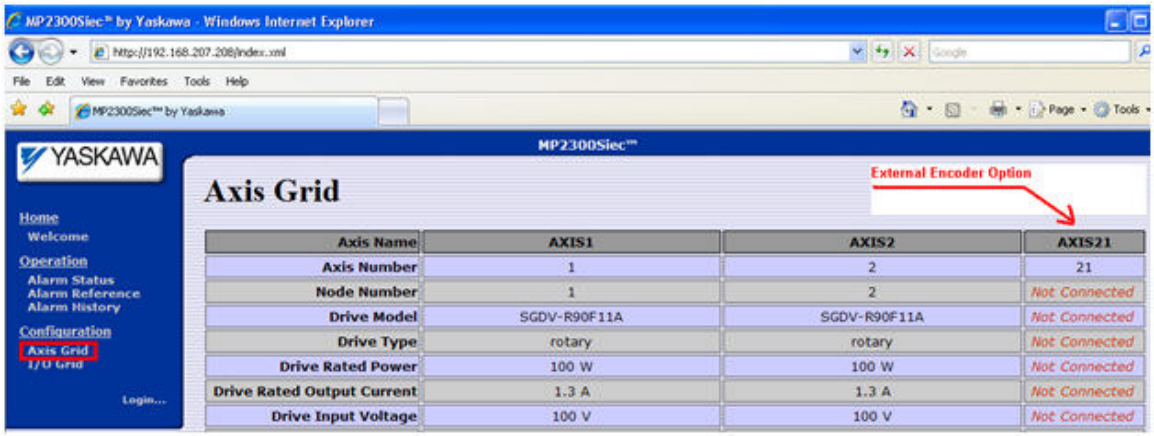
Alarm History

Alarms are saved in SRAM with a time stamp. This can help in troubleshooting possible failure modes if an axis is down on a machine. It is possible to save the alarm log as an HTM file by pressing the Save button on the Alarm History page.



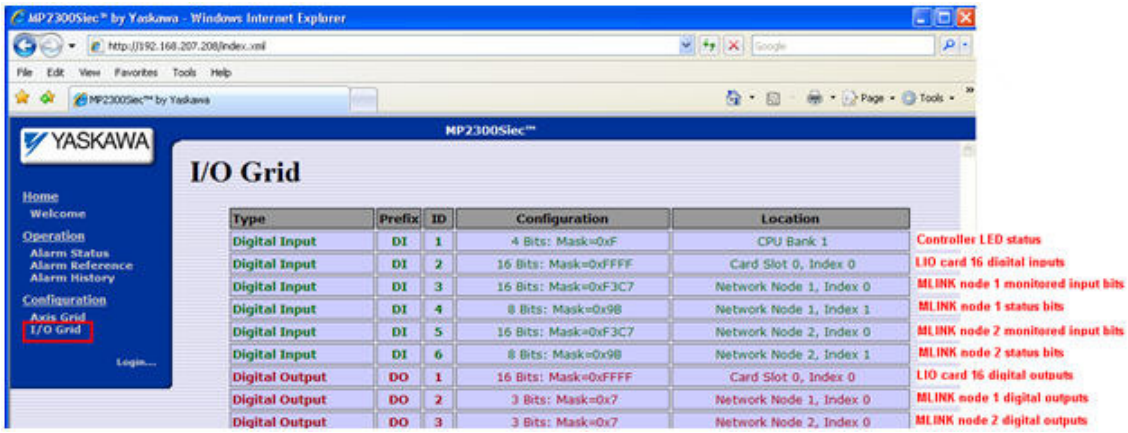
Axis Grid

The axis grid page provides details about the axes connected to the controller. In the figure shown below, the two axes at nodes 1 and 2 are SGDV servos. Axis 21 is an external encoder available in the LIO card in the controller.



I/O Grid

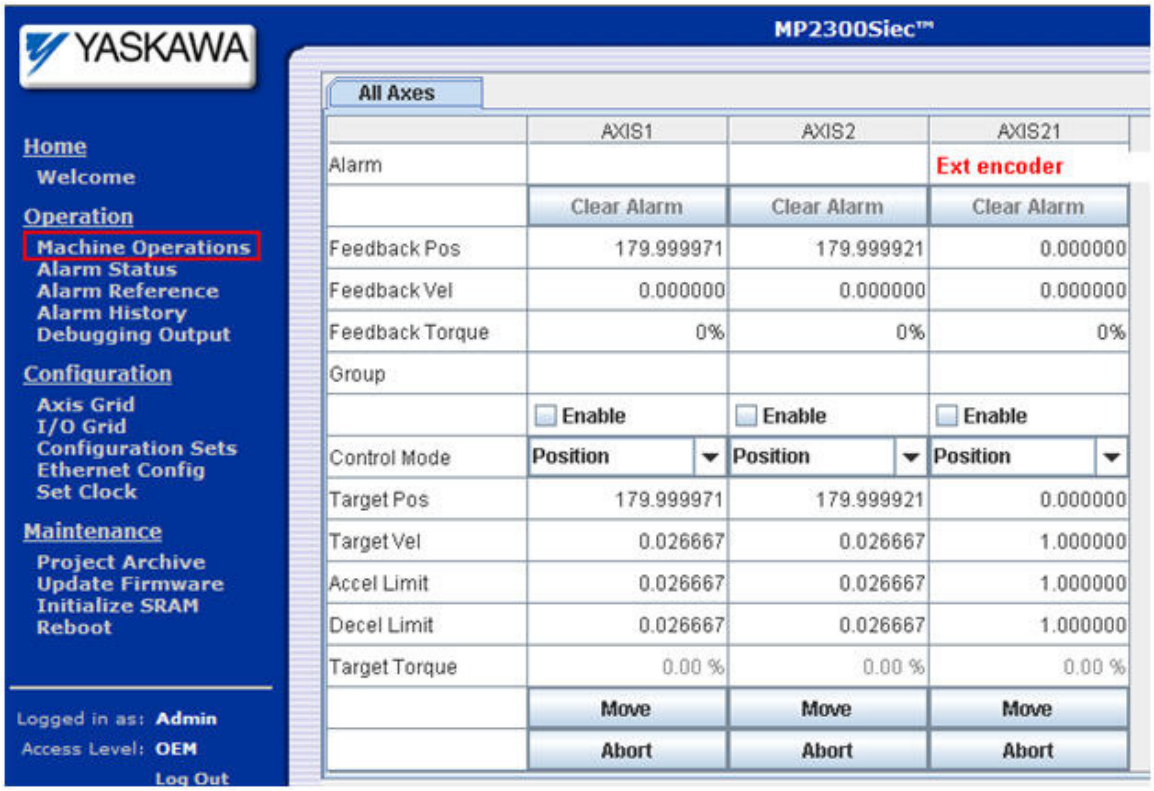
A sample I/O grid of a MP2300Siec motion control system including an LIO option card and two Sigma Servopacks is shown here. The digital I/O are explained in detail under the I/O tab in the Machine Operations help section.



Level 2 of Web Server

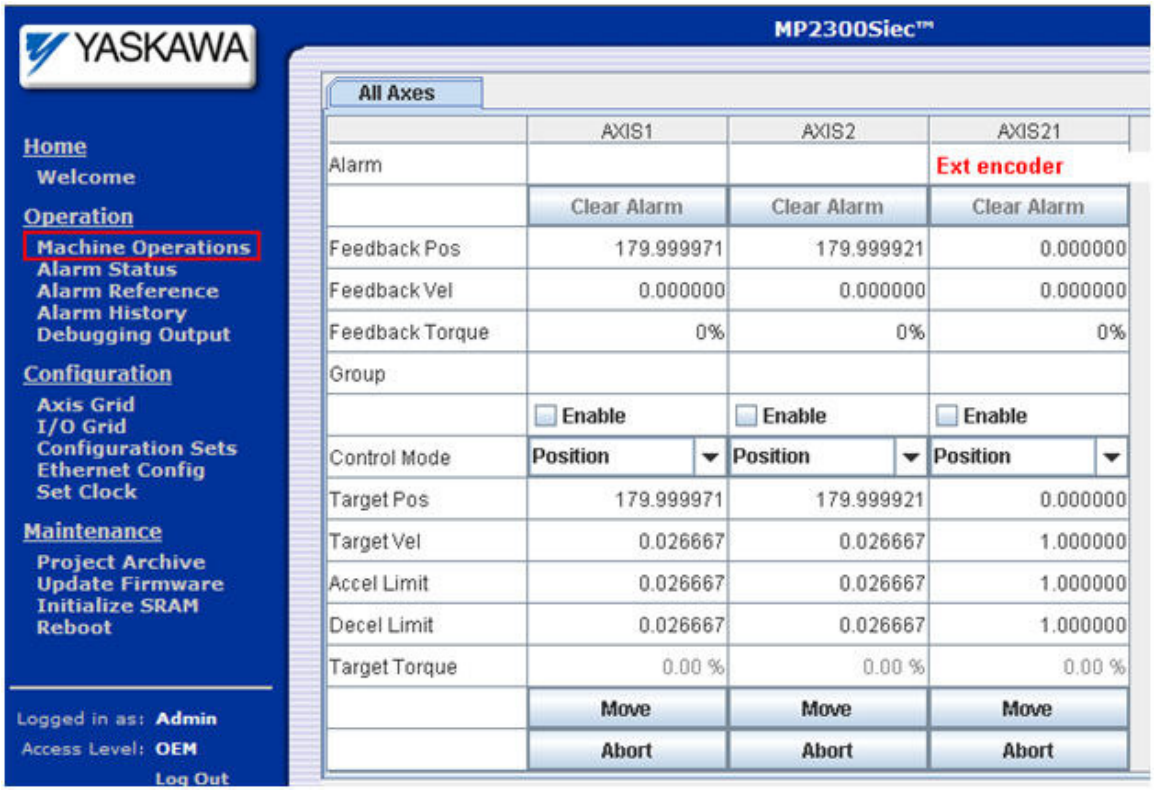
Machine Operations

Feedback position in user units, velocity in user units/sec, and torque feedback (in % of rated torque) can be monitored on the Machine Operations page. Position, velocity, or torque test moves can be performed. Before starting a test move via the web server, ensure that the IEC Application program is not running by either turning off the Run DIP switch on the controller or stopping the PLC from the Resource Dialog box. Also confirm that no Test Move commands from the Hardware Configuration are taking place. Target parameters like position, velocity acceleration and deceleration must be specified. Set the Enable checkbox before the test move is commanded by pressing the 'MOVE' button.



Machine Operations

Feedback position in user units, velocity in user units/sec, and torque feedback (in % of rated torque) can be monitored on the Machine Operations page. Position, velocity, or torque test moves can be performed. Before starting a test move via the web server, ensure that the IEC Application program is not running by either turning off the Run DIP switch on the controller or stopping the PLC from the Resource Dialog box. Also confirm that no Test Move commands from the Hardware Configuration are taking place. Target parameters like position, velocity acceleration and deceleration must be specified. Set the Enable checkbox before the test move is commanded by pressing the 'MOVE' button.

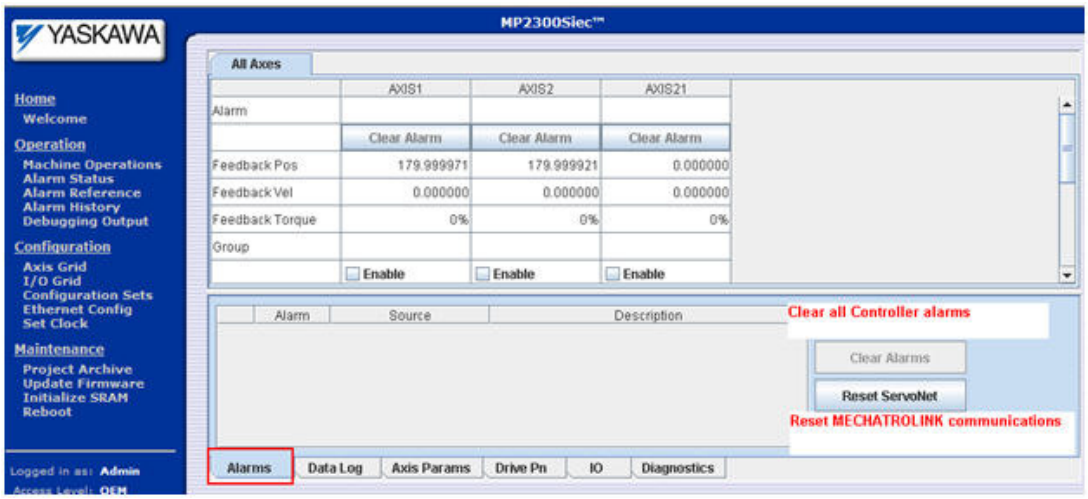


Machine Operations

Alarms

The Alarms tab on the Machine Operations page lists all current alarms in the controller and amplifiers. If the alarms listed are clearable without power cycle, the Clear Alarms button will clear the alarms.

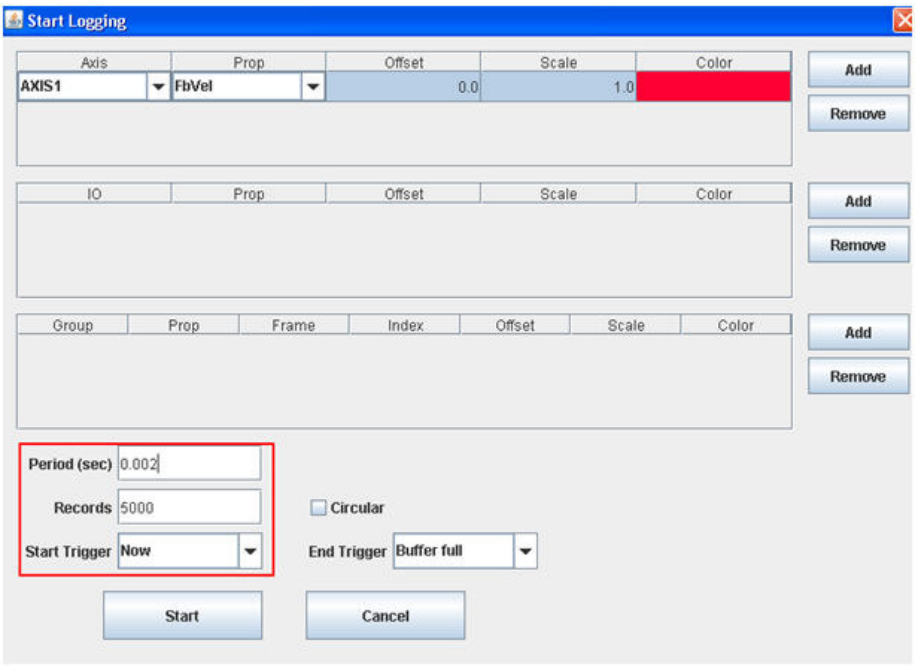
The 'Reset ServoNet' button will reset MECHATROLINK communications and rediscover all devices on the network. This feature will also soft reboot the amplifiers.



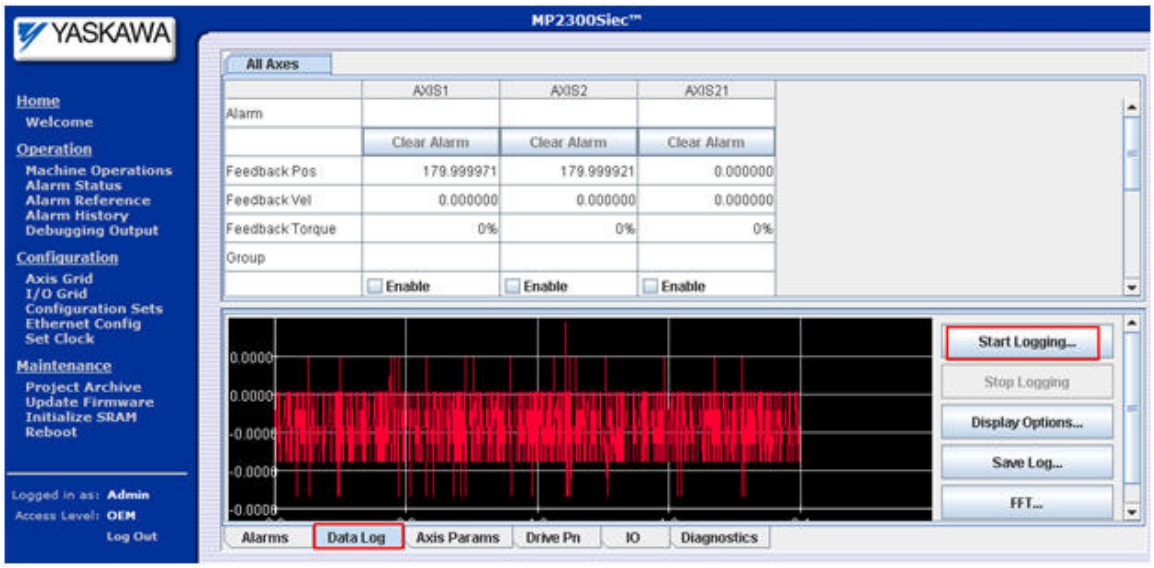
Data Logs

Feedback position, velocity, torque, commanded position, velocity, torque and position error can be recorded at the MECHTROLINK update rate using the Data log function.

Start the logging procedure by pressing 'Start Logging'. Options to trigger the data capture and number of data points can be set in this page.



Once the End Trigger condition is satisfied, the log is automatically displayed. The data can be saved as a CSV file (using the Save Log button.)

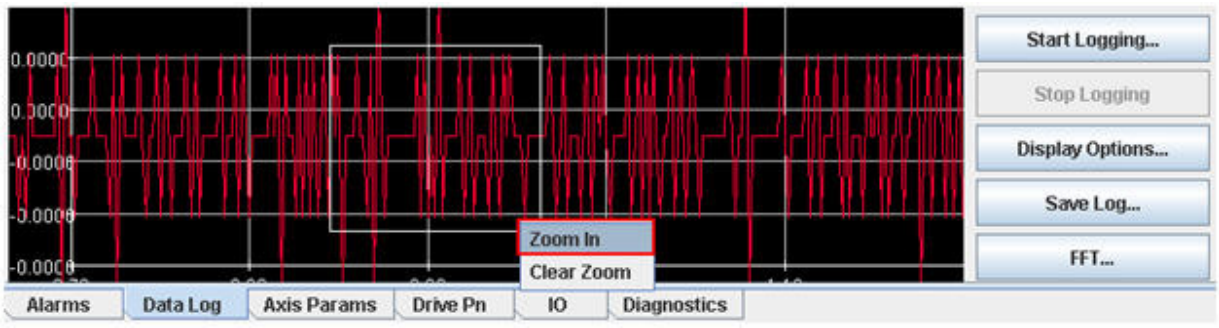


The data log can be zoomed by:

1) Left mouse click and drag diagonally down across the area to be zoomed.

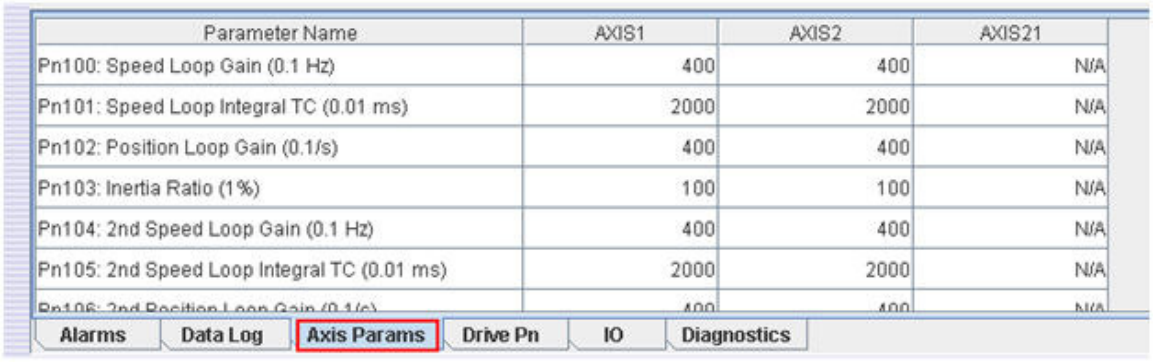
2) Right click and select Zoom In.

To clear the zoom, right mouse click and select 'Clear zoom'



Axis Parameters

Select drive parameters are displayed on the Axis Params tab of the Machine Operations page. Drive parameters can be written to the device by editing the values and entering the edited data.

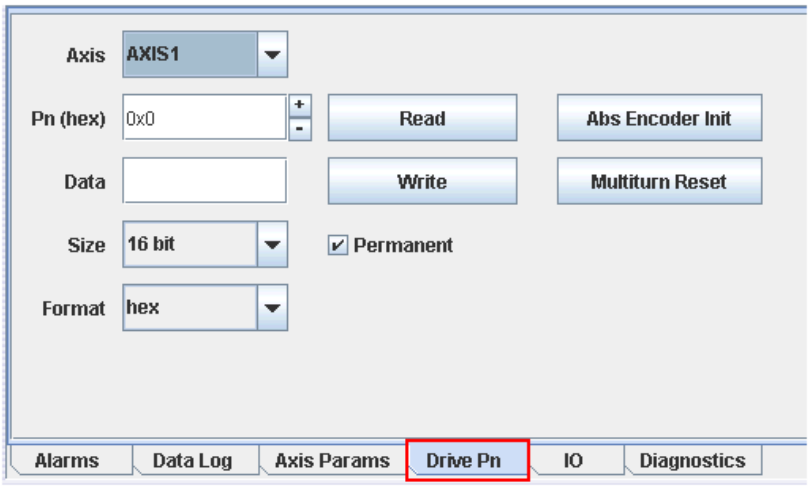


Drive Pns

All parameters can be read and written from corresponding drives listed in the Drive Pn tab of the Machine Operations page.

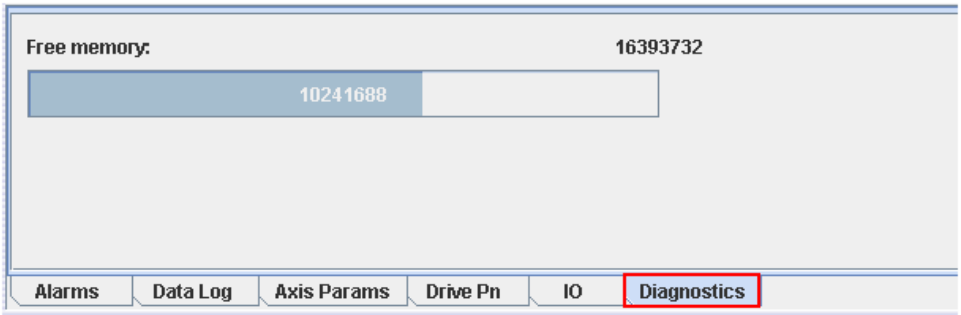
Edits made to drive parameters can be made permanent (by writing to the drive's flash memory) if the Permanent box is checked.

Absolute encoder reset (using Abs Encoder Init) and clearing the multiturn mismatch alarm: A.CC (using Multiturn Reset) can be performed from this tab. The function block Y_ResetAbsoluteEncoder performs the same functions as the buttons on this page.



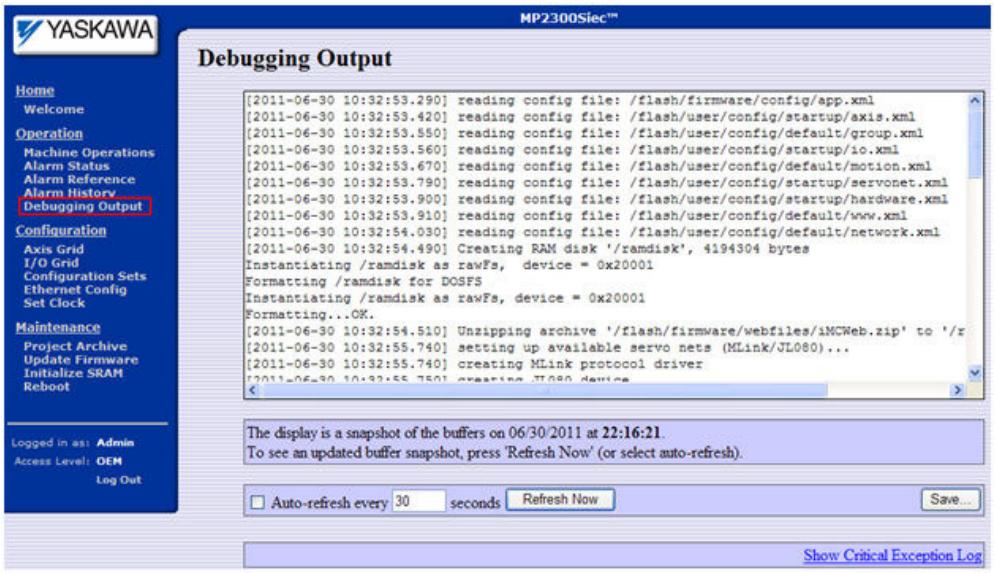
Diagnostics

The Diagnostics tab shows the total free memory (1.6 MB in the figure below) and the memory being used by the application project running on the controller (1.02 MB in the example shown below)



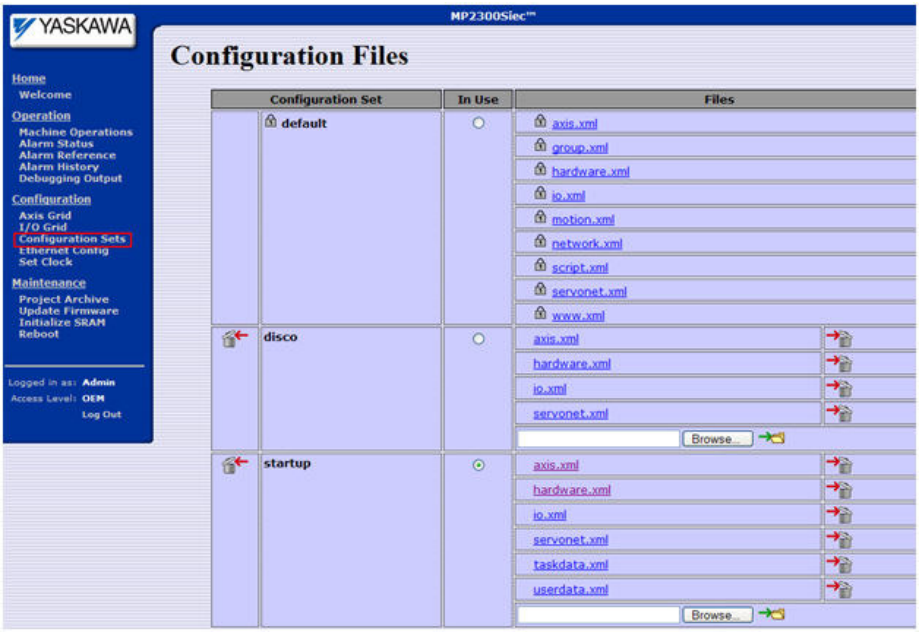
Debugging Output

The debugging outputs page window shows a log of events encountered and tasks performed during the latest power up of the controller. For example the list of motion axes and I/O units that were discovered, the communication drivers that were started, the configuration files read, etc. are listed in this log.


YASKAWA
MP2300Siec™
Debugging Output
Home
Welcome
Operation
Machine Operations
Alarm Status
Alarm Reference
Alarm History
Debugging Output
Configuration
Axis Grid
I/O Grid
Configuration Sets
Ethernet Config
Set Clock
Maintenance
Project Archive
Update Firmware
Initialize SRAM
Reboot
Logged in as: Admin
Access Level: OEM
Log Out
[2011-06-30 10:32:53.290] reading config file: /flash/firmware/config/app.xml
[2011-06-30 10:32:53.420] reading config file: /flash/user/config/startup/axis.xml
[2011-06-30 10:32:53.550] reading config file: /flash/user/config/default/group.xml
[2011-06-30 10:32:53.560] reading config file: /flash/user/config/startup/io.xml
[2011-06-30 10:32:53.670] reading config file: /flash/user/config/default/motion.xml
[2011-06-30 10:32:53.790] reading config file: /flash/user/config/startup/servonet.xml
[2011-06-30 10:32:53.900] reading config file: /flash/user/config/startup/hardware.xml
[2011-06-30 10:32:53.910] reading config file: /flash/user/config/default/www.xml
[2011-06-30 10:32:54.030] reading config file: /flash/user/config/default/network.xml
[2011-06-30 10:32:54.490] Creating RAM disk '/ramdisk', 4194304 bytes
Instantiating /ramdisk as rawFs, device = 0x20001
Formatting /ramdisk for DOSFS
Instantiating /ramdisk as rawFs, device = 0x20001
Formatting...OK.
[2011-06-30 10:32:54.510] Unzipping archive '/flash/firmware/webfiles/iMCWeb.zip' to '/r
[2011-06-30 10:32:55.740] setting up available servo nets (MLink/JL080)...
[2011-06-30 10:32:55.740] creating MLink protocol driver
The display is a snapshot of the buffers on 06/30/2011 at 22:16:21.
To see an updated buffer snapshot, press 'Refresh Now' (or select auto-refresh).
Auto-refresh every 30 seconds
Refresh Now
Save...
Show Critical Exception Log

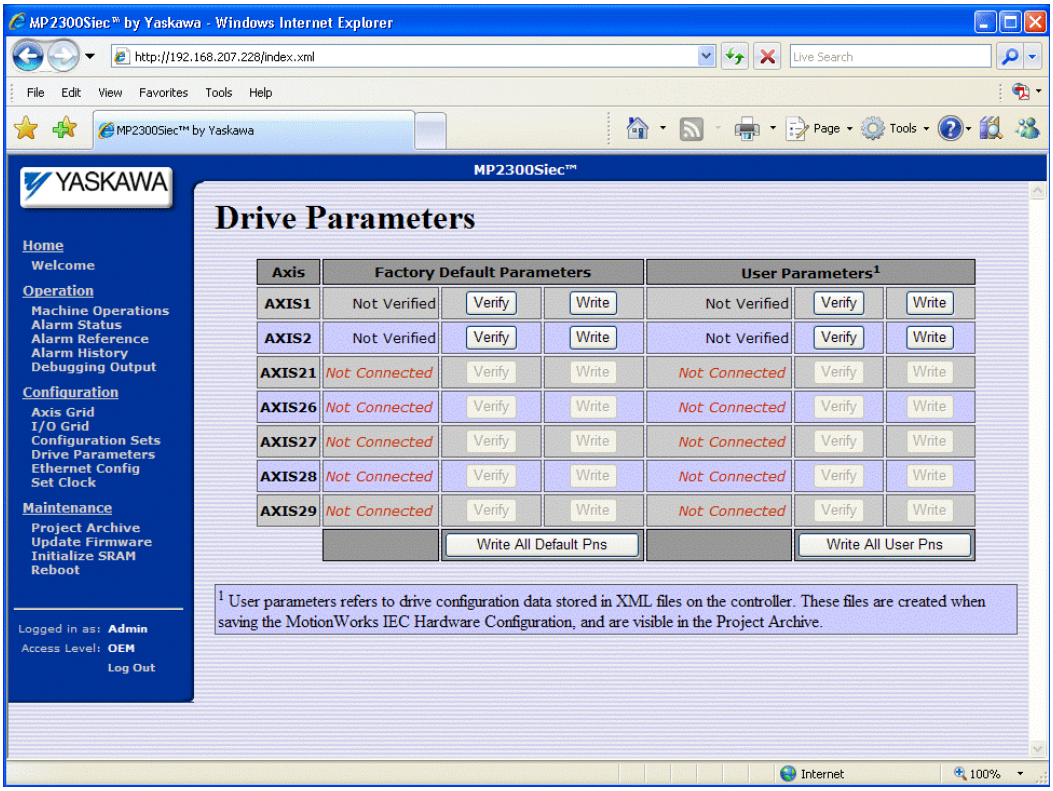
Configuration Sets

The Configuration Sets page contains a listing of all the XML configuration files on the controller. The disco folder contains files that were created when the controller powered up and discovered devices on the MECHATROLINK network and other I/O connected to the controller. The startup folder is created when the Hardware Configuration is online and saved by the user. This is the only configuration that can be run successfully with an IEC application. This page and the files listed are strictly for troubleshooting purposes and should not be edited by the user.



Drive Parameters

Starting in firmware version 2.2.1, the web server has a new page to send drive parameters to the corresponding MECHATROLINK drives in the system. This feature is useful in machine commissioning operations by eliminating the need to configure the drives with either SigmaWin, DriveWizard, the Hardware Configuration, or the Y_WriteDriveParameters function block.



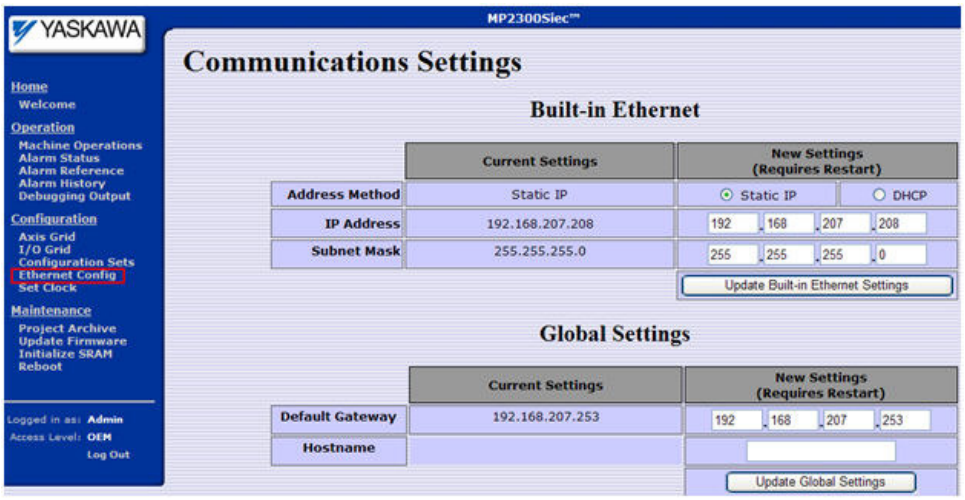
Ethernet Configuration

The following Ethernet Configuration details of the controller can be identified and set:

- IP Address(es)
- Subnet Mask
- Default Gateway

These fields must not be left blank. Versions of the Hardware Configuration before v1.2.3 could not connect to a controller if Ethernet configuration fields were left blank.

If the Ethernet configuration is changed, the controller must be rebooted for the new settings to take effect.

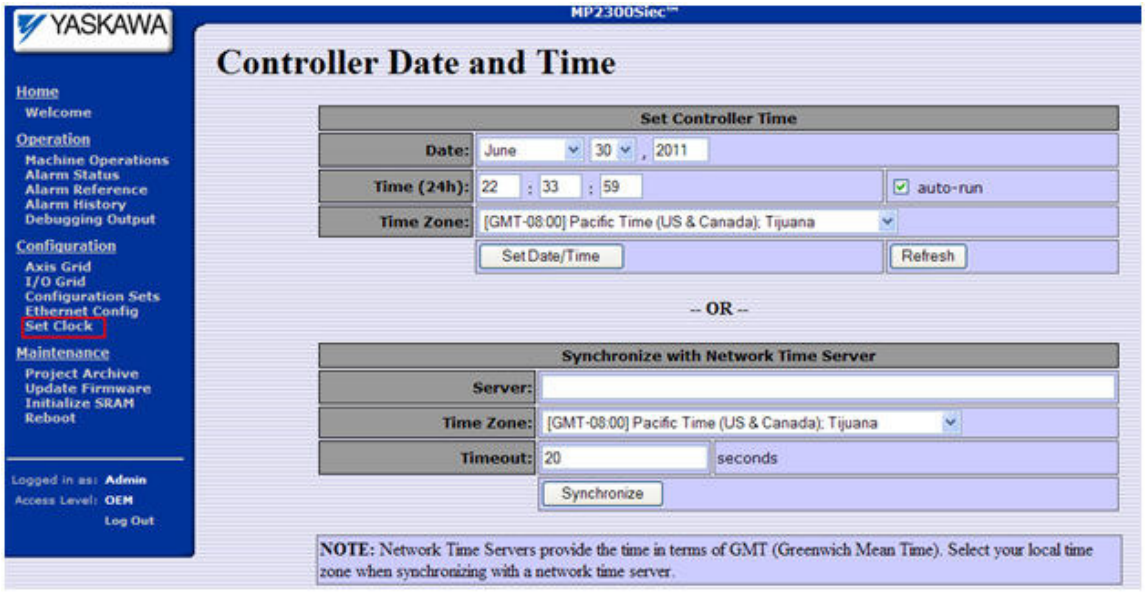


MP2600iec Ethernet Configuration

The MP2600iec has two Ethernet connections, Cn11A and Cn11B. Each of these connections are physically separate in the controller hardware, meaning they each have their own MAC addresses, and must be connected to separate networks. This means that the subnet portions of the IP address of each port must be different. Also note that the default gateway is only related to Cn11A, so the subnet mask portion of the default gateway must match the IP address of the Cn11A port.

Set Clock

Set and view the controller's real time clock. This time will be used for all alarm time stamps, and is also available in the IEC application program via the RTC_S function block from the ProConOS firmware library or the RealTimeClock function block available in the Yaskawa Toolbox.



Project Archive

It is possible to download or upload the complete application image to / from an MPiec controller without using MotionWorks IEC or the Hardware Configuration. A single file called "Archive.Zip" contains all the Hardware Configuration Data and the IEC Application Program, including any data files that may be used by the application that were downloaded to flash using the "Download File" button from the MotionWorks IEC Resource Dialog or via HTTP file transfer to the controller.

To install an application archive on the controller, follow these steps.

1) Connect to the controller using Internet Explorer.

2) Enter the Login and Password.

3) Under the Maintenance section on the left hand of the screen, click Project Archive

4) Click Browse to locate a previously stored archive.zip file.

5) Click the Upload button to send the file to the controller. It will extract and replace all files shown in the file listing.

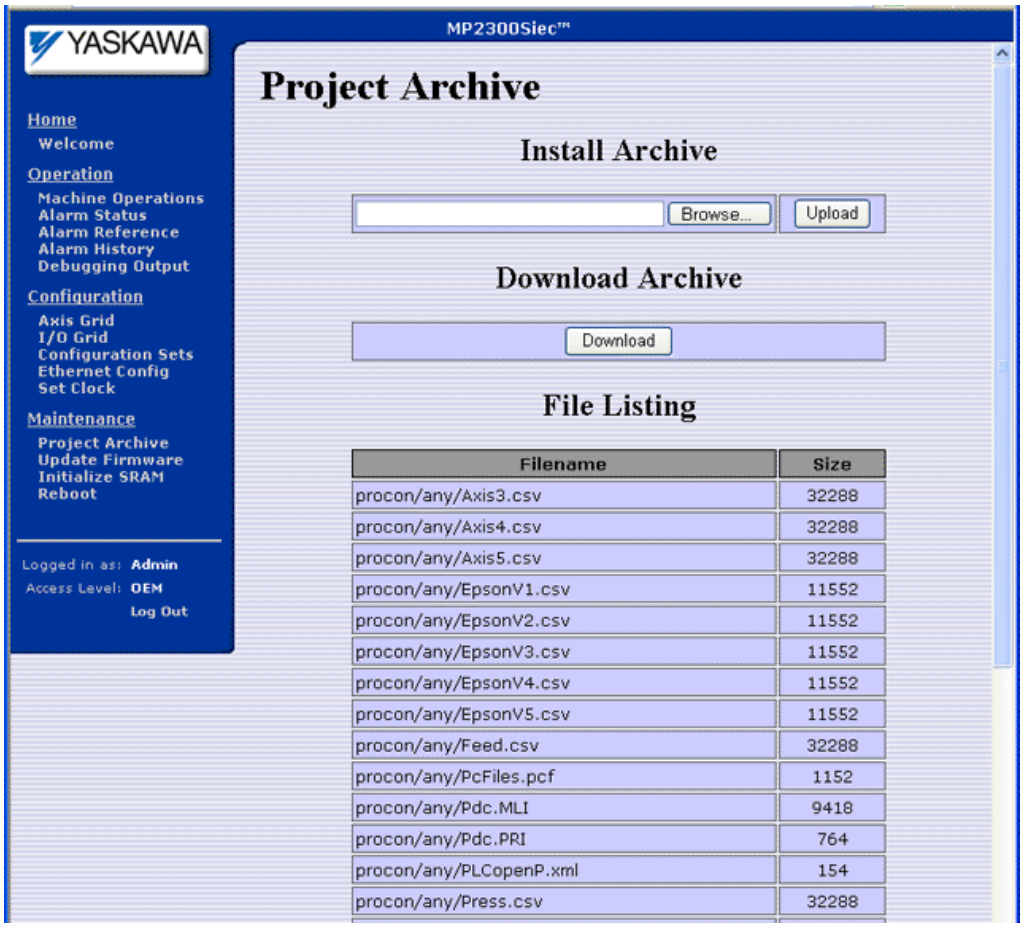
6) Reboot is necessary for the configuration and application program to become operable.

WARNING: If the application has absolute encoders, the absolute encoder offset stored when the MC_SetPosition function block is executed is not part of the archive.zip. If the archive.zip file is loaded into another controller, and the application uses absolute encoders, axis calibration (homing) must be performed to be sure that the application will operate properly on the new controller.

Machine Commissioning Note

Sending archive.zip to the controller does not send parameters to the MECHATROLINK amplifers. A function block called Y_WriteDriveParameters can be included in the application program, which will send amplifier parameters listed in XML files on the controller to the referenced MECHATROLINK amplifier when executed.

Starting in firmware version 2.2.1, it is possible to send the amplifier parameters to the MECHATROLINK amplifiers via the web server. See the Drive Parameters page.



Update Firmware

Firmware should not be upgraded on machines running in production environment unless recommended by an authorized Yaskawa representative.

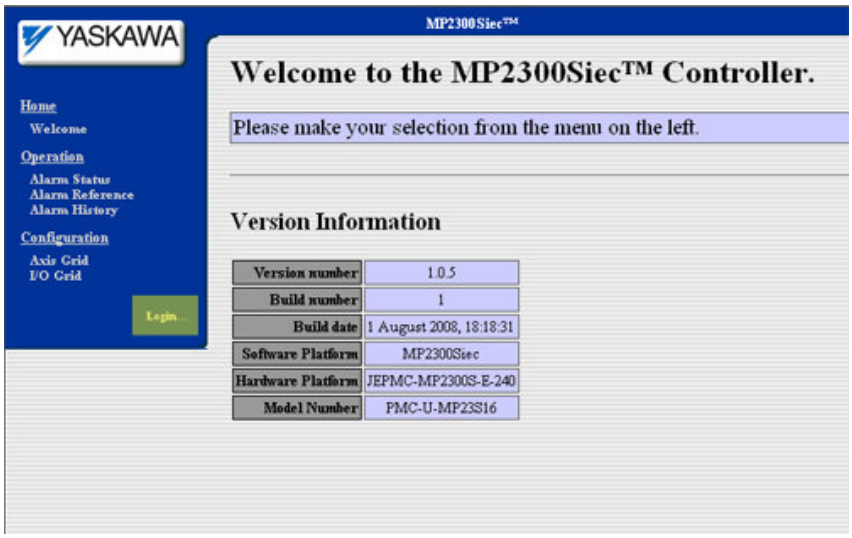
Firmware revisions are available at www.yaskawa.com/iecfw.

NOTE: DO NOT EXTRACT THE FILES FROM THE ZIP. THE CONTROLLER WILL EXTRACT THE FILE ITSELF.

The controller must be in "Supervisor Mode" before the firmware update can begin. This mode can be entered by either turning on the SUP DIP switch on the front of the unit, or by enabling it via software from the **Update Firmware** page. Both methods are equivalent, however enabling Supervisor Mode via software is recommended because the mode will automatically be cancelled upon the next reboot.

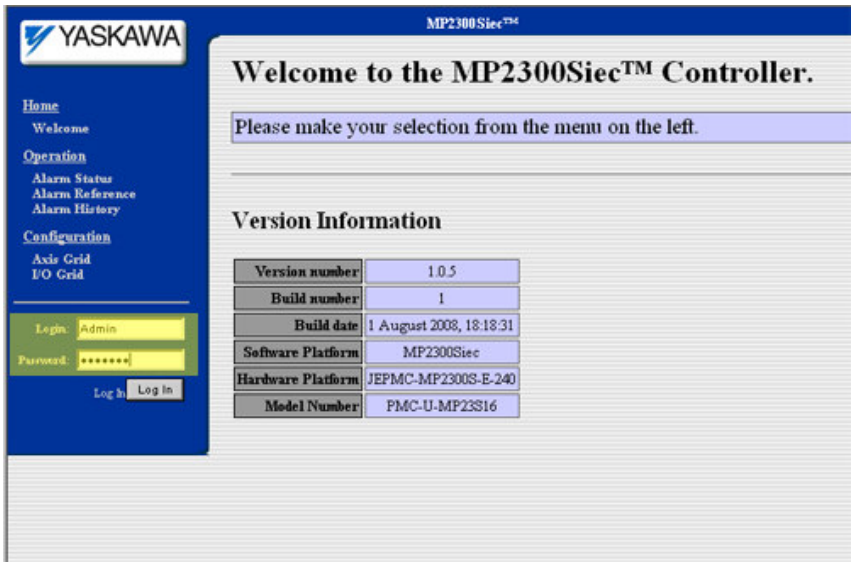
Updating the Firmware:

1. If choosing to use the physical SUP switch, turn it on and reboot the controller.
2. Open the web interface in a web browser and connect to the controller by entering the controller IP Address in the Address field.
3. Select Login from the left menu bar.



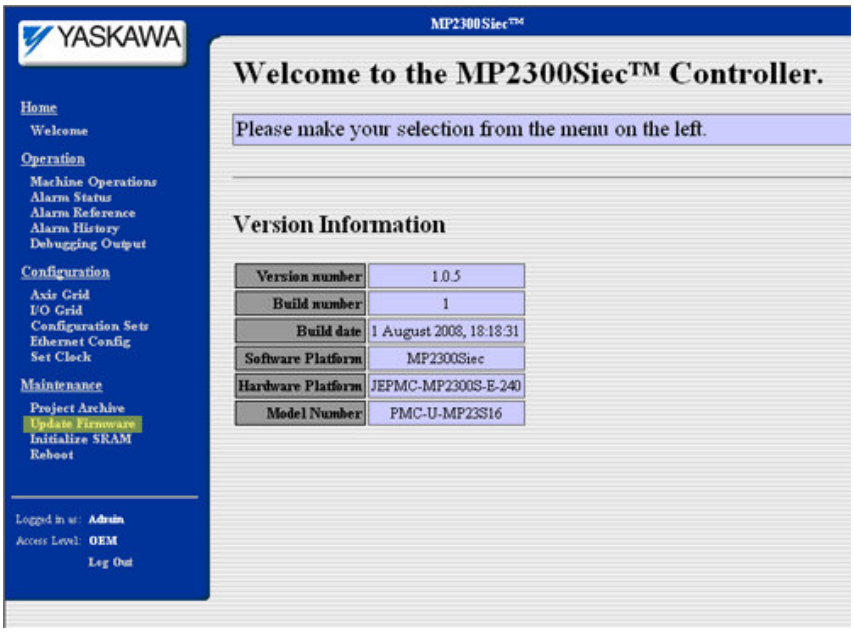
3. Login using the following Login name and password:

Controller	Login	Password
MP3200iec	Admin	MP3200
MP2310iec	Admin	MP2300S
MP2300Siec	Admin	MP2300S
MP2600iec	Admin	MP2600

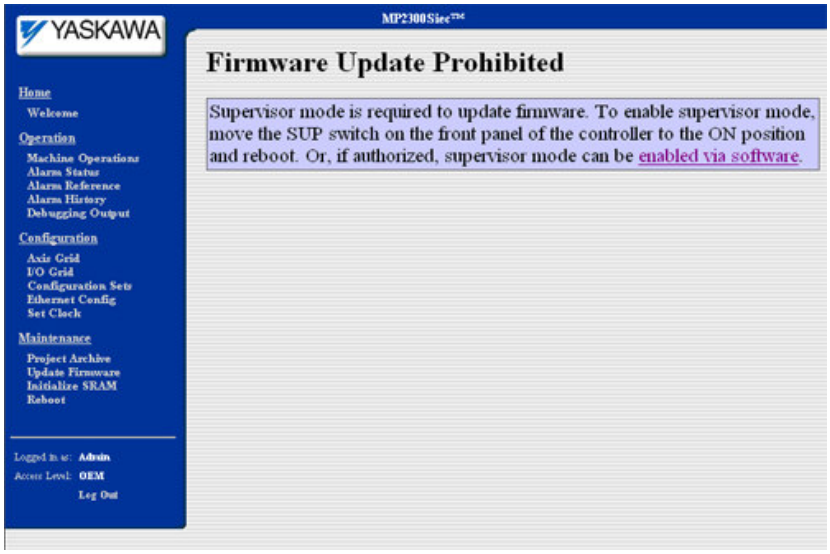


Note that the factory default Login and passwords may be changed by the user according to the information supplied in product note AN.MCD.09.069.

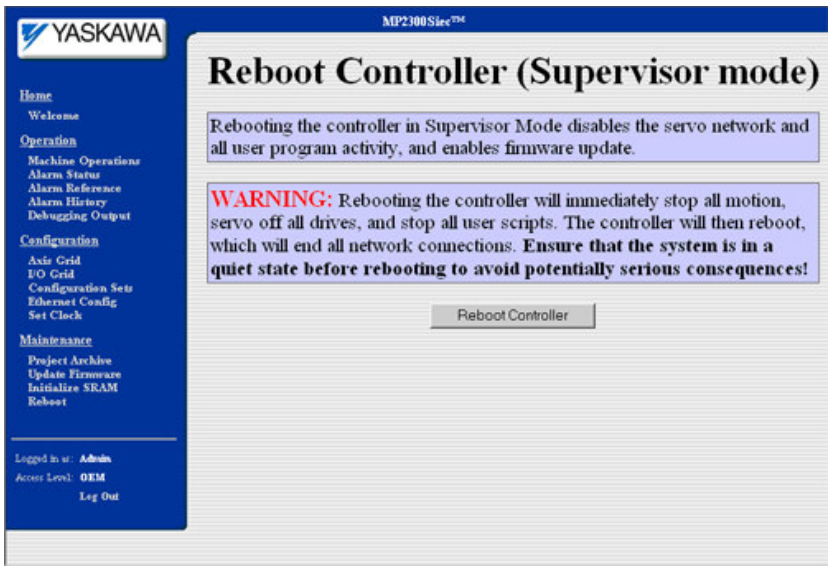
4. Select Update Firmware from the left menu:



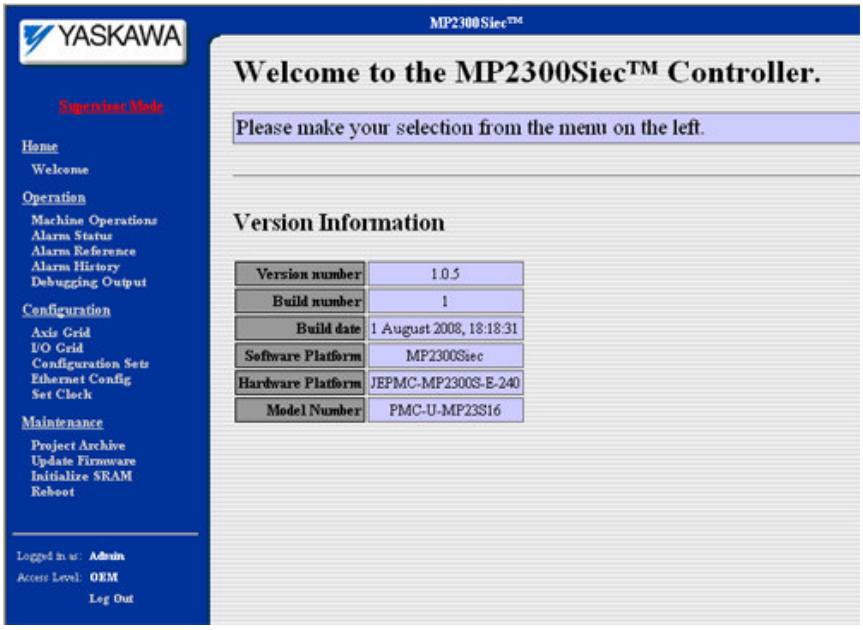
5. The firmware update screen will appear:



If the physical SUP switch was not enabled before step 1, the page will say the firmware update is prohibited. Click on the 'enabled via software' hyperlink in the text message area. Reboot the controller by clicking on the 'Reboot Controller' button on the update page:

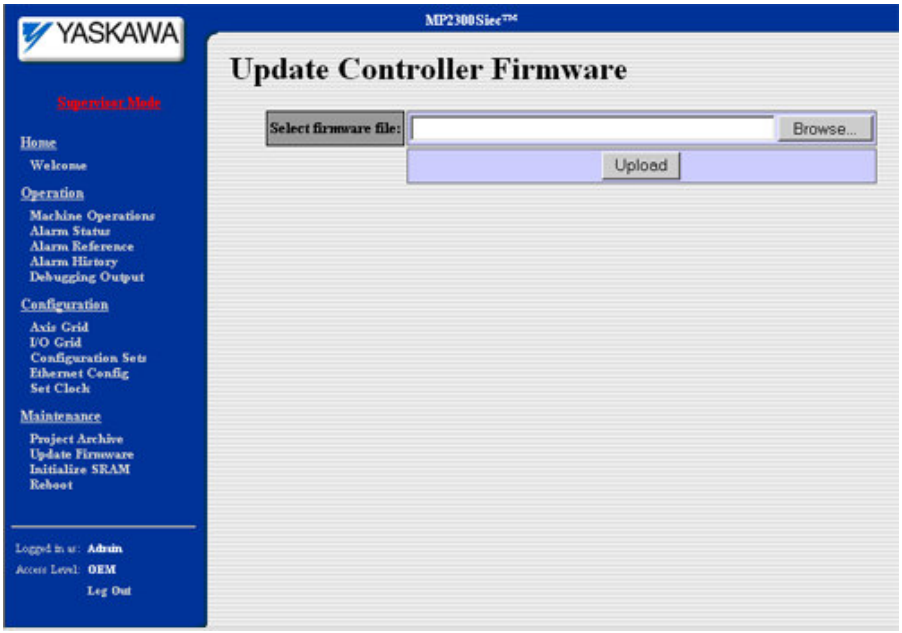


8. After the controller has finished rebooting, the following page will be displayed:



9. Click on the 'Update Firmware' link in the left menu.

10. Select a firmware.zip file that you wish to load. NOTE: DO NOT EXTRACT THE FILES FROM THE ZIP. THE CONTROLLER WILL EXTRACT THE FILE ITSELF.

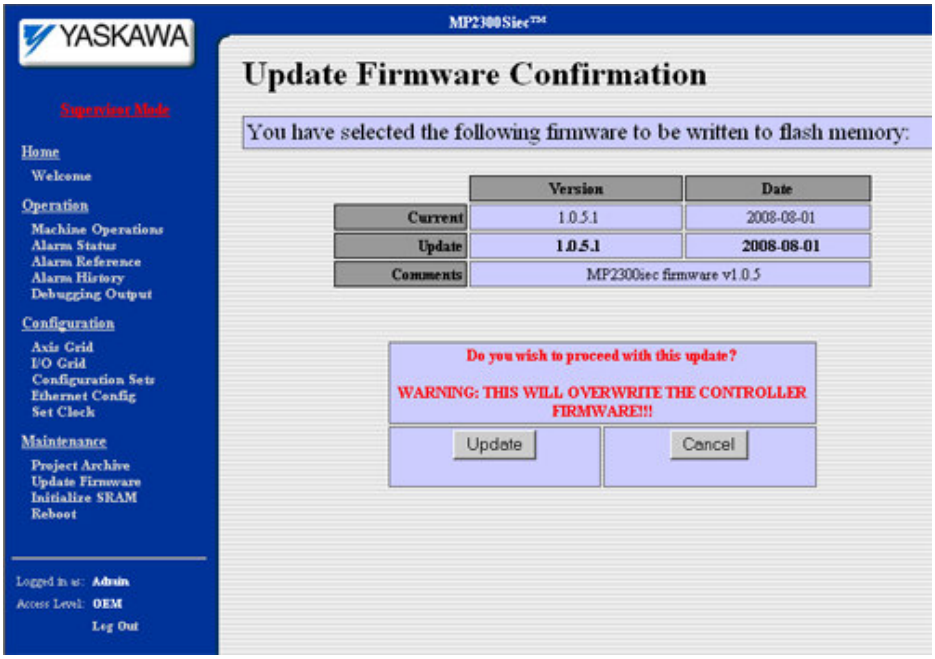


11. Click ‘Browse’ to locate the file.

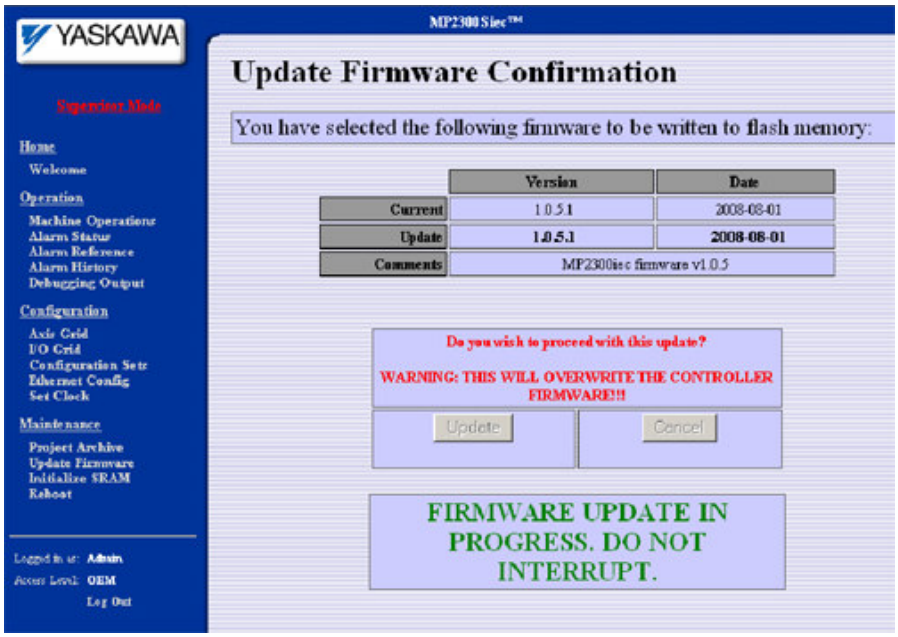
12. Click ‘Upload’ to upload the firmware file to the controller.

13. After the version has been verified, a message box will indicate the version currently in the controller, and the version about to be loaded.

14. Click on the ‘Update’ button to update the controller firmware.



15. Do not power cycle the controller or attempt to click on any of the menu bar links while the upgrade is taking place! Wait for the page to indicate that the firmware upgrade has completed.



16. Verify correct version loaded on the controller by clicking 'Welcome' (to refresh) in the left menu bar.

Refer to Product Note PN.MCD.08.083 on www.yaskawa.com for the complete instruction guide.

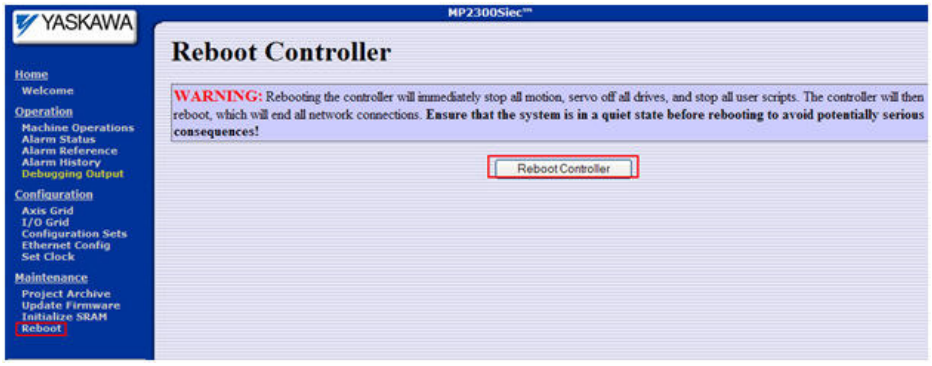
Initialize SRAM

Data that is reset when the SRAM is initialized:

1. Absolute Encoder offsets stored in the controller (by the MC_SetPosition function block.)
2. IEC Global variables marked as 'Retain' data.
3. Alarm history.

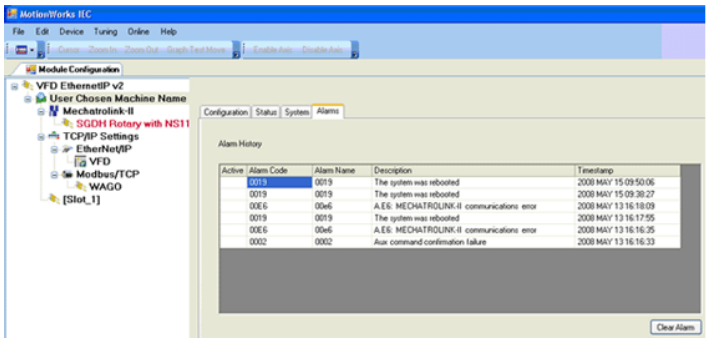
Reboot

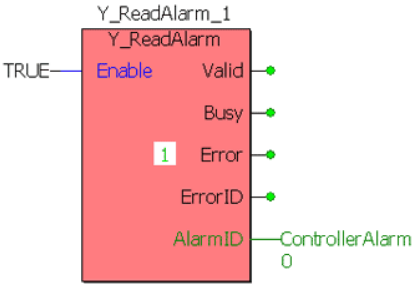
The controller can be rebooted from the web server. This function is identical to cycling power. Note that SGDV Servopacks are also 'soft rebooted' when the controller restarts. This will clear any alarms that require power cycling the drive.



Controller AlarmID List

The following is a list of alarm codes that are reported in the Hardware Configuration's Alarms tab or via the Y_ReadAlarm function block. These are non axis specific system alarms.





	Hex Code		Description
	ErrorClass	**AxisErrorID**	**ErrorClass+AxisErrorID output from MC_ReadAxisError**
	AlarmID		**AlarmID output from Y_ReadAlarm**
motionKernel	1201	0103	An alarm task queue was full when a new alarm was posted. This indicates that the task is being starved of execution time or that the system is generating many alarms simultaneously.
app	1401	0005	The script environment ran out of memory. This is a serious condition because it may prevent further errors from being handled correctly.
app	1401	0006	An error occurred while running the standard error handler for a general script error. This is a serious condition because it indicates the standard error handler is malfunctioning.
app	1401	0007	This error should never occur and is included only for completeness. It indicates that an unknown and potentially fatal problem has occurred within the script engine.
app	1401	000A	The script task failed to stop cleanly, which may result in unreleased system resources. Error recovery requires the controller be reset.
app	1401	000B	The command line task failed to stop cleanly, which may result in unreleased system resources. Error

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			recovery requires the controller be reset.
app	1403	0002	The task responsible for publishing events to a remote client failed to stop cleanly, which may result in unreleased system resources. Error recovery requires the controller be reset.
app	1403	0003	The task responsible for replying to remote clients failed to stop cleanly, which may result in unreleased system resources. Error recovery requires the controller be reset.
app	1403	0004	The task responsible starting and stopping connections to remote clients failed to stop cleanly, which may result in unreleased system resources. Error recovery requires the controller be reset.
app	1407	0001	The file system on which the configuration file directory resides could not be read and may be unmounted or corrupted. The system has booted in a minimal configuration mode, and most functionality is limited. If possible, the file system should be recovered or reformatted and new config files uploaded if applicable.
app	1407	0103	The watchdog timer expired.
app	1407	0108	A CPU exception occurred.
app	1407	0109	The firmware files on the controller do not match the expected checksums.
app	1407	010A	The manufacturing procedure failed. The controller probably could not fetch the current time from the network.
app	140A	0009	Network reset detected multiple Axes connected to the same servo network node.
app	140A	000A	Network reset detected multiple I/O connected to the same network node.
app	140A	0015	Controller memory was corrupted during network reset resulting in a lost logical Axis data structure.
app	140A	0016	Controller memory was corrupted during network reset resulting in a lost logical I/O data structure.
app	140A	0018	An Abort input specified in the configuration could not be found. The abort condition is considered permanently asserted. No motion is possible until the

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			I/O configuration can be matched to the abort inputs (restart required).
app	140A	0021	Too many events were posted from the system ISR. The motion scan and servo net loop have been shut down.
app	140B	0002	The controller ran out of free memory, possibly resulting in an unrecoverable failure. Please reboot the controller.
app	140B	0004	The largest free memory block is too small, possibly resulting in an unrecoverable failure. Please reboot the controller.
app	140C	1035	The manufacturing data on the controller is invalid. The controller needs to be returned to Yaskawa for reprogramming.
Mechatrolink	2301	0001	The drive returned an invalid watch dog code indicating a possible dropped communication packet.
Mechatrolink	2301	0002	The drive failed to return confirmation of last aux command within the default timeout period.
Mechatrolink	2301	0003	An unrecoverable error occurred during auto configuration. As a result, one or more drives are excluded from the servo network.
Mechatrolink	2301	0004	Overriding the auto configured axes parameters failed. As a result, one or more drives are excluded from the servo network.
Mechatrolink	2301	0005	Two or more nodes have the same ID. As a result, all servo network communication has been suspended.
Mechatrolink	2301	0006	The controller must be the root node on the servo network. All servo network communication has been suspended
Mechatrolink	2301	0007	The servo network communication device failed to initialize. Servo network communication is not possible.
Mechatrolink	2301	0008	An error occurred sending command to a node during initialization. The node may not support the configured communications rate. Communication with this node has been prohibited, but communication with other nodes may be possible.
Mechatrolink	2301	000E	The drive does not return response packet.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
Mechatrolink	2301	000F	Bus reset generation that controller is not demanding.
Mechatrolink	2301	0010	It receives response with the same channel at the same Iso cycle.
Mechatrolink	2301	0011	The ID in the response packet is not same to ID of AxisNode.
Mechatrolink	2301	0012	The data length in the response packet is not same to value of CSR register(SEND_DSP_DATA_LENGTH) of drive.
Mechatrolink	2301	0013	The packet type in the response packet is not same S-DSP.
Mechatrolink	2301	0014	Invalid cycle time has passed with configuration file 'servonet.xml'. As a result, all servo network communication has been suspended.
Mechatrolink	2301	0015	Node is not found on 1394 network.
Mechatrolink	2301	0016	Invalid node.
Mechatrolink	2301	0017	Error matching node IDs.
DPRAM	2309	0001	Invalid watch dog code from drive
DPRAM	2309	0002	Aux command confirmation failure
DPRAM	2309	0003	Auto configuration failed
DPRAM	2309	0004	Overriding auto configuration failed
DPRAM	2309	0005	Invalid cyclic check sum from drive
DPRAM	2309	0006	Invalid watch dog from drive
DPRAM	2309	0007	Control mode is not supported
DPRAM	2309	0008	Communication with a node failed during servo network startup
motionKernel	3103	0100	Controller SRAM battery is low
motionKernel	3103	0101	The file system failed the integral consistency check. **Remedy**: Power up the controller in supervisory mode using the SUP switch. Clear the alarm. Turn off the SUP switch. Power cycle the controller.
motionKernel	3201	0001	The motion kernel didn't request to enable axis. But, the axis is enabled.
motionKernel	3201	0002	The motion kernel didn't request to disable axis. But, the axis is disabled.
motionKernel	3201	0004	The encoder position stored in SRAM could not be

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			validated. The value has been reset.
motionKernel	3201	0005	Main bus power was disconnected while the axis was enabled. Main power must be restored and this alarm cleared before motion can continue.
motionKernel	3201	0101	Configuration error: multiple alarm tasks with duplicate priority.
motionKernel	3201	0102	Configuration error: Alarm task not configured. Using default priority and name.
motionKernel	3202	0001	Axis Coordinate System: The command position was outside the allowable range for the axis in the positive direction (positive overtravel). The axis may not be moved again until the alarm condition is cleared. After the alarm is cleared, it is permissible to execute a move which brings the axis back toward the allowed region, even though the axis is probably still outside the allowed region. Any move which pulls the axis further away from the allowed region will re-trigger the alarm.
motionKernel	3202	0002	Axis Coordinate System: The command position was outside the allowable range for the axis in the negative direction (negative overtravel). The axis may not be moved again until the alarm condition is cleared. After the alarm is cleared, it is permissible to execute a move which brings the axis back toward the allowed region, even though the axis is probably still outside the allowed region. Any move which pulls the axis further away from the allowed region will re-trigger the alarm.
motionKernel	3202	0003	Axis Coordinate System: The command speed was greater than the allowable range for the axis in the positive direction (overspeed). The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0004	Axis Coordinate System: The command speed was greater than the allowable range for the axis in the negative direction (overspeed). The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0005	Axis Coordinate System: The command acceleration was greater than the allowable range for the axis in the

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			positive direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0006	Axis Coordinate System: The command acceleration was greater than the allowable range for the axis in the negative direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0007	Axis Coordinate System: The command torque was greater than the allowable range for the axis in the positive direction (overtorque). The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0008	Axis Coordinate System: The command torque was greater than the allowable range for the axis in the negative direction (overtorque). The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0011	Joint Coordinate System: The command position was outside the allowable range for the axis in the positive direction (positive overtravel). The axis may not be moved again until the alarm condition is cleared. After the alarm is cleared, it is permissible to execute a move which brings the axis back toward the allowed region, even though the axis is probably still outside the allowed region. Any move which pulls the axis further away from the allowed region will re-trigger the alarm.
motionKernel	3202	0012	Joint Coordinate System: The command position was outside the allowable range for the axis in the negative direction (negative overtravel). The axis may not be moved again until the alarm condition is cleared. After the alarm is cleared, it is permissible to execute a move which brings the axis back toward the allowed region, even though the axis is probably still outside the allowed region. Any move which pulls the axis further away from the allowed region will re-trigger the alarm.
motionKernel	3202	0013	Joint Coordinate System: The command speed was greater than the allowable range for the axis in the positive direction (overspeed). The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0014	Joint Coordinate System: The command speed was

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			greater than the allowable range for the axis in the negative direction (overspeed). The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0015	Joint Coordinate System: The command acceleration was greater than the allowable range for the axis in the positive direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0016	Joint Coordinate System: The command acceleration was greater than the allowable range for the axis in the negative direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0017	Joint Coordinate System: The command torque was greater than the allowable range for the axis in the positive direction (overtorque). The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0018	Joint Coordinate System: The command torque was greater than the allowable range for the axis in the negative direction (overtorque). The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0021	World Coordinate System: The command position was outside the allowable range for the axis in the positive direction (positive overtravel). The axis may not be moved again until the alarm condition is cleared. After the alarm is cleared, it is permissible to execute a move which brings the axis back toward the allowed region, even though the axis is probably still outside the allowed region. Any move which pulls the axis further away from the allowed region will re-trigger the alarm.
motionKernel	3202	0022	World Coordinate System: The command position was outside the allowable range for the axis in the negative direction (negative overtravel). The axis may not be moved again until the alarm condition is cleared. After the alarm is cleared, it is permissible to execute a move which brings the axis back toward the allowed region, even though the axis is probably still outside the allowed region. Any move which pulls the axis further away from the allowed region will re-trigger the alarm.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
motionKernel	3202	0023	World Coordinate System: The command speed was greater than the allowable range for the axis in the positive direction (overspeed). The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0024	World Coordinate System: The command speed was greater than the allowable range for the axis in the negative direction (overspeed). The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0025	World Coordinate System: The command acceleration was greater than the allowable range for the axis in the positive direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0026	World Coordinate System: The command acceleration was greater than the allowable range for the axis in the negative direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0027	World Coordinate System: The command torque was greater than the allowable range for the axis in the positive direction (overtorque). The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0028	World Coordinate System: The command torque was greater than the allowable range for the axis in the negative direction (overtorque). The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0031	The move specified would exceed the software position limits in the positive direction and was rejected before being started. The group may be moved again immediately if desired.
motionKernel	3202	0032	The move specified would exceed the software position limits in the negative direction and was rejected before being started. The group may be moved again immediately if desired.
motionKernel	3202	0033	The move specified would exceed the software speed limits in the positive direction and was rejected before being started. The group may be moved again immediately if desired.
motionKernel	3202	0034	The move specified would exceed the software speed limits in the negative direction and was rejected before

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			being started. The group may be moved again immediately if desired.
motionKernel	3202	0035	The move specified would exceed the software acceleration limits in the positive direction and was rejected before being started. The group may be moved again immediately if desired.
motionKernel	3202	0036	The move specified would exceed the software acceleration limits in the negative direction and was rejected before being started. The group may be moved again immediately if desired.
motionKernel	3202	0037	The move specified would exceed the software torque limits in the positive direction and was rejected before being started. The group may be moved again immediately if desired.
motionKernel	3202	0038	The move specified would exceed the software torque limits in the negative direction and was rejected before being started. The group may be moved again immediately if desired.
motionKernel	3202	0039	The predictive soft limit encountered a segment that doesn't support the predicted stopping point.
motionKernel	3202	0041	Cam and Contour tables must have a header indicating the number of rows and columns and a feed forward velocity flag. Comma separated data values following the header.
motionKernel	3202	0042	In CamTables, the first (master) column must be either increasing or decreasing.
motionKernel	3202	0043	In ContourTables, the first (time) column must start at zero and be increasing.
motionKernel	3202	0044	The master position was outside the range of the CamTable, which automatically stopped the cam motion.
motionKernel	3202	0045	One or more slave axes could not attain the target position and velocity within the user specified time limit for the Cam or Gear motion.
motionKernel	3202	0046	One or more slave axes could not attain the target position and velocity within the user specified distance limit for the Cam or Gear motion.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
motionKernel	3202	0051	Axis enable failed. This problem is usually a result of communication problems with the servo drive.
motionKernel	3202	0052	Runtime computation detected an invalid motion parameter. This alarm ID can occur if a discrete move has to be completed but the commanded deceleration for that move is not sufficient. For example if a MC_MoveAbsolute aborts another move and the axis has to stop at a position that will come up in a couple of scans, but the deceleration input on the MC_MoveAbsolute is not high enough to make the desired profile, this alarm will occur.
motionKernel	3202	0061	The axis Positive Overtravel (P-OT) limit has been exceeded. Motion is prevented in the positive direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0062	The axis Negative Overtravel (N-OT) limit has been exceeded. Motion is prevented in the negative direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	3202	0100	The inverse kinematics computation detected a world position that can not be reached.
motionKernel	3202	0101	The inverse kinematics computation detected that the elbow 'handedness' (orientation) does not match the configuration. The 'handedness' must be fixed by commanding the individual axes or manually moving the robot.
motionKernel	3202	0102	The robot XY position intruded into the configured dead zone area near the origin.
Mechatrolink	3301	0009	Some motor properties, such as encoder resolution, maximum speed, and maximum torque, could not be determined for the attached motor. The serial encoder may be malfunctioning, incorrectly programmed, or unplugged.
Mechatrolink	3301	000B	Setting of Pn002, digits 3 and 4, disables torque limit and/or velocity limit in velocity and/or torque control modes. Set Pn002 = xx11 to initialize. Saving in the Hardware Configuration will automatically set Pn002.
Mechatrolink	3301	000D	The servo network does not support this motion control

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			mode.
Mechatrolink	3301	0018	The command position specified an instantaneous jump too large relative to the current position. Sigma-5 amplifiers give an A.94b warning and ignore subsequent position commands for any absolute position reference greater than 2,097,152 encoder pulses (2 revolutions of a 20-bit encoder). The controller watches for deviation between command position and actual motor position greater than 1,966,080 encoder pulses and issues an alarm. This is at 1.875 revolutions of a 20-bit motor little bit of margin. Sigma-II/III drives have a lower maximum following error limit of 1,048,576 encoder pulses. The position error limit on the Servopack (Pn520) should not be set greater than 1.875 rev = 1,966,080.
Mechatrolink	3301	0019	Setting of Pn002 digit 4 specifies torque feed-forward, but the SERVOPACK model does not support torque FF in position mode.
Mechatrolink	3302	00E4	The setting of the MECHATROLINK-II transmission cycle is out of the allowable range.
Mechatrolink	3304	0000	The base code for io alarms. The io's alarm value is bitwise OR'd in with this base value.
DPRAM	3309	0009	An error occurred sending command to a servo
DPRAM	3309	000A	The drive has an alarm
DPRAM	3309	000B	The data buffer for reading drive parameters via the messaging interface was too small
DPRAM	3309	1000	Error code prefix for data link errors
DPRAM	3309	100F	Servo check sum error for data link
DPRAM	3309	1010	Invalid function code for data link
DPRAM	3309	1040	Option card computed an invalid check sum
DPRAM	3309	1041	Invalid data size from the option card
DPRAM	3309	2000	Error code prefix for message errors
DPRAM	3309	2001	Unsupported message function code
DPRAM	3309	20A0	Controller option card detected bad CRC
DPRAM	3309	3000	Error code prefix for data link errors
Mechatrolink	3312	0000	The base code for inverter alarms. The inverter's alarm

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			value is bitwise OR'd in with this base value.
Mechatrolink	3312	0001	reserved
Mechatrolink	3312	0002	reserved
Mechatrolink	3312	0003	reserved
Mechatrolink	3312	0004	reserved
Mechatrolink	3312	0005	reserved
Mechatrolink	3312	0006	reserved
Mechatrolink	3312	0007	reserved
Mechatrolink	3312	0008	reserved
Mechatrolink	3312	0009	reserved
Mechatrolink	3312	000A	reserved
Mechatrolink	3312	000B	reserved
Mechatrolink	3312	000C	reserved
Mechatrolink	3312	000D	reserved
Mechatrolink	3312	000E	reserved
Mechatrolink	3312	000F	reserved
Mechatrolink	3312	0010	reserved
Mechatrolink	3312	0011	reserved
Mechatrolink	3312	0012	reserved
Mechatrolink	3312	0013	reserved
Mechatrolink	3312	0014	reserved
Mechatrolink	3312	0015	reserved
Mechatrolink	3312	0016	reserved
Mechatrolink	3312	0018	reserved
Mechatrolink	3312	0019	reserved
Mechatrolink	3312	001A	reserved
Mechatrolink	3312	001B	reserved
Mechatrolink	3312	001C	reserved
Mechatrolink	3312	001D	reserved
Mechatrolink	3312	001E	reserved
Mechatrolink	3312	001F	reserved
Mechatrolink	3312	0020	reserved
Mechatrolink	3312	0021	reserved

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
Mechatrolink	3312	0025	reserved
Mechatrolink	3312	0026	reserved
Mechatrolink	3312	0027	reserved
Mechatrolink	3312	0028	reserved
Mechatrolink	3312	0029	reserved
Mechatrolink	3312	002A	reserved
Mechatrolink	3312	002B	reserved
Mechatrolink	3312	002C	reserved
Mechatrolink	3312	002D	reserved
Mechatrolink	3312	002E	reserved
Mechatrolink	3312	002F	reserved
Mechatrolink	3312	0031	reserved
Mechatrolink	3312	0083	reserved
Mechatrolink	3312	0084	reserved
Mechatrolink	3312	0085	reserved
Mechatrolink	3312	0086	reserved
Mechatrolink	3312	0087	reserved
Mechatrolink	3312	0088	reserved
Mechatrolink	3312	0089	reserved
Mechatrolink	3312	008A	reserved
Mechatrolink	3312	008B	reserved
Mechatrolink	3312	0091	reserved
Mechatrolink	3312	0092	reserved
Mechatrolink	3312	0093	reserved
Mechatrolink	3312	0094	reserved
Mechatrolink	3312	00E6	reserved
Mechatrolink	3312	00EC	Power reset required.
Mechatrolink	3312	00ED	(Access not possible 10 consecutive times). Power reset required.
Mechatrolink	3312	00EE	(1s elapsed). Power reset required.
app	3401	0001	The user script encountered an alarm, suspending its operation.
app	3401	0002	Script syntax errors are detected before the script is actually executed, during the pre-compile phase. The

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			syntax must be corrected before the script can be run successfully.
app	3401	0003	Script runtime errors can be caused by a variety of incorrect script routines. The most common error is an attempt to use a 'nil' object where it should not be used.
app	3401	0004	The system could not find the file specified.
app	3401	0011	A data value argument provided to the API function was out of the expected range.
app	3401	0012	An argument provided to the API function was not the expected type.
app	3401	0013	An object argument provided to the API function was not the expected object type.
app	3401	0014	A scalar value was provided where a vector was expected, or a vector value was provided where a scalar was expected.
app	3401	0015	The script attempted to write to a read-only variable.
app	3401	0016	Use of that API function is not permitted with the current conditions and/or arguments.
app	3401	0017	The number of data values provided did not match the expected number of axes.
app	3401	0018	CamTable must have a header indicating the number of rows and columns and a feed forward velocity flag. Comma separated data values follows the header. The first (master) column must be either increasing or decreasing.
app	3401	0019	ContourTables must have a header indicating the number of rows and columns and a feed forward velocity flag. Comma separated data values follow the header. In ContourTables, the first (time) column must start at zero and be increasing.
app	3401	001A	It is prohibited to start a torque (or velocity) move when any moves other than torque moves (or velocity moves) are currently in progress or queued.
app	3401	00ED	'LastMove' events should be detected when a move completes normally or is aborted. However, the controller detected a situation in which the move

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			finished but the event did not occur. Please submit an SCR.
communication	3403	0200	Invalid EtherNet/IP I/O configuration. Common causes of invalid configuration include duplicate t2o/o2t assembly instances or invalid client connection parameters.
communication	3403	0202	EtherNet/IP remote server unreachable. There is no route to the EtherNet/IP server. Common causes include: invalid remote server address, invalid gateway, invalid subnet mask, or the Ethernet network is not correctly configured.
communication	3403	0203	EtherNet/IP remote server unreachable. There is no route to the EtherNet/IP server. Common causes include: invalid remote server address, invalid gateway, invalid subnet mask, or the Ethernet network is not correctly configured.
communication	3403	0204	EtherNet/IP network unreachable. Unable to reach the network for the EtherNet/IP server. Common causes include: invalid remote server address, invalid gateway, invalid subnet mask, or the Ethernet network is not correctly configured.
communication	3403	0205	EtherNet/IP connection refused. Remote server rejected connection attempt. The remote server may not be listening for connections or there may be a firewall preventing the connection.
communication	3403	0206	Too many EtherNet/IP connections. The Ethernet/IP client ran out of connection slot resources. Reduce the number of concurrent client connections.
communication	3403	0302	Error connecting to the Modbus TCP slave. Unable to connect to the Modbus TCP slave. Common causes include: invalid Modbus TCP slave address, invalid gateway, invalid subnet mask, or the Ethernet network is not correctly configured.
communication	3403	0303	Modbus TCP slave unreachable. There is no route to the Modbus TCP slave. Common causes include: invalid Modbus TCP slave address, invalid gateway, invalid subnet mask, or the Ethernet network is not correctly configured.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
communication	3403	0304	Modbus TCP network unreachable. Unable to reach the network for the Modbus TCP slave. Common causes include: invalid Modbus TCP slave address, invalid gateway, invalid subnet mask, or the Ethernet network is not correctly configured.
communication	3403	0305	Modbus TCP slave connection refused. Modbus TCP slave rejected connection attempt. The Modbus TCP slave may not be listening for connections or there may be a firewall preventing the connection.
communication	3403	0306	
app	3406	0001	A web server login user was assigned to a group which did not exist. The system is unaffected, but that user will have limited (default) access.
app	3406	0002	The default login group for the web server was assigned to a group which did not exist. Access control has been disabled, because a minimal amount of access is required in order to log in. The configuration file should be fixed before continuing.
app	3406	0003	The web server configuration specified access control should be enabled, but did not specify at least one path to control access to. Access control has been disabled. The configuration file should be fixed before continuing.
app	3407	0002	The base directory for configuration files was missing and has been created automatically. The system has booted in a minimal configuration mode, and most functionality is limited. Please upload a new complete configuration file set.
app	3407	0003	A required default configuration file was missing. A minimal configuration for the corresponding component has been loaded, and some functionality may be limited.
app	3407	0004	A required default configuration file was incorrectly formatted. A minimal configuration for the corresponding component has been loaded, and some functionality may be disabled.
app	3407	0005	A configuration file specified by the user configuration file set was incorrectly formatted. The corresponding default configuration file is being used instead.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
app	3407	0006	The file describing which configuration set to use was corrupted. The default configuration set is being used.
app	3407	0007	An error occurred while writing a config file. The file system may be full or damaged.
app	3407	0101	The configured RAM disk on the controller was unable to be created.
app	3407	0102	Detected an unsupported option card inserted in the controller.
app	3407	0104	Data in the controller SRAM did not match the expected value. It should be treated as corrupted until it is re-initialized.
app	3407	0106	The SRAM battery backup power failed. SRAM data should be treated as corrupted until it is re-initialized.
app	3407	0107	The controller's time-of-day clock detected a voltage decrease in the backup battery. The current time and date is likely to be incorrect. This alarm can be cleared, but will recur when the controller is powered ON until the time and day is reset and the battery is replaced.
app	3407	0204	Unable to set configured network default gateway
app	3409	0001	The servo network axis node for the axis specified in the configuration file was not found.
app	3409	0002	Axis enable failed. This problem is usually a result of communication problems with the servo drive. It may occur after a drive was disconnected from the network. In this case, use Y_ResetMechatrolink to establish communication with the drives once again.
app	3409	0003	Axis group motion activation failed. Some axes in the group are currently under control of another group, or motion has been blocked by the user.
app	3409	0004	The motion segment could not be added to the motion queue because it is already queued.
app	3409	0005	Moves are prohibited when any of the group's axes are disabled, have an alarm, or are in violation of their soft limits.
app	340A	0001	The source for the logical input was not found, the configured input will not be available.
app	340A	0002	The source for the logical output was not found, the

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			configured output will not be available.
app	340A	0003	Two or more axis in the configuration file had the same axis ID.
app	340A	0004	The servo network axis node for the axis specified in the configuration file was not found.
app	340A	0005	The axis group specified in the configuration file could not be created because either one or more of its axes are invalid or the group name is already being used.
app	340A	0006	The type of AtTargetAgent specified in the configuration file is unknown. This is because AtTargetAgent could not be created.
app	340A	0007	The number of constraints for axis group soft limit must be the same as the number of axes in the axis group.
app	340A	0008	The axis group doesn't have the configured frame.
app	340A	000B	A continuous-wrap range for an axis causes its position to automatically wrap around between two user-specified numbers. Generally these numbers evaluate to full revolutions of the encoder but other ranges are permitted. However, all ranges specified in user units must map exactly to an integral number of encoder pulses. This alarm indicates that the mapping from user units to encoder ticks was inexact. Use more precise numbers to describe the range or choose a different range that evaluates to an integral number of encoder pulses. When this alarm occurs at startup or servo-net reset, it indicates that the axis has not been connected to an axis node and cannot be servoed on. Otherwise, this alarm indicates that the specified continuous-wrap range was not put into effect.
app	340A	000D	Two or more logical outputs specified in the I/O configuration file use the same physical bit. This can cause writes to not correctly generate value-change events on logical outputs for the shared bits. The configuration file should be fixed.
app	340A	000E	One or more of the data parameters in the axis configuration file were out-of-range or otherwise incorrectly specified for the axis. The axis was not

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			created and is not available.
app	340A	0010	After servo network reset, the Axis failed to reconnect to the servo network. The drive might have been removed from the network, the node ID of the drive might have changed or there might be a communication problem.
app	340A	0012	After servo network reset, the network I/O failed to reconnect to the servo network. The network I/O module might have been removed from the network, the node ID of the network I/O module might have changed or there might be a network communication problem.
app	340A	0013	After servo network reset, a new axis node was discovered. This axis node is not associated with any existing axes and will not be available. To make this node available, update the configuration and power cycle the controller.
app	340A	0014	After servo network reset, a new I/O node was discovered. This I/O node is not associated with any existing I/O and will not be available. To make this node available, update the configuration and power cycle the controller.
app	340A	0017	One or more of the axis data or configuration parameters were inconsistent or incompatible with the axis node specified. The axis was created but was not connected to the servo node.
app	340A	001B	Two or more LogicalInput have the same ID. The configuration file should be fixed.
app	340A	001C	Two or more LogicalOutput have the same ID. The configuration file should be fixed.
app	340A	001D	Two or more AnalogInput have the same ID. The configuration file should be fixed.
app	340A	001E	Two or more AnalogOutput have the same ID. The configuration file should be fixed.
app	340A	001F	Analog I/O configuration is missing the 'hardwareConfig' element, and configuration could not be resolved by the physical hardware. The configuration file should be fixed by adding this

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			element to the analog I/O element.
app	340A	0020	One or more axes failed to respond to a servo-off command during a system I/O initiated abort. This is normally the result of communication problems with the drive, which also causes an automatic servo-off.
app	340A	0022	Reset of a servo node failed.
app	340A	0023	The axis position may not be valid because the persistent axis data was corrupted. SRAM should be reinitialized and the axis should be homed.
app	340C	0000	All PLCopen error codes are in the range from 0x0000 to 0x0fff.
app	340C	0001	Time limit exceeded.
app	340C	0002	Distance limit exceeded.
app	340C	0003	Torque limit exceeded.
app	340C	0100	Modbus TCP I/O Driver Error on Server because of invalid address range
app	340C	0101	MBTCP Client I/O driver, MBTCP Connection config is missing input member
app	340C	0102	I/O memory area is not aligned to the correct byte to accommodate reading and writing.
app	340C	0103	Watchdog Error
app	340C	0104	Reserved
app	340C	0106	Reserved
app	340C	0107	Reserved
app	340C	0108	Reserved
app	340C	0109	Reserved
app	340C	010A	Not enough memory on PLC for POU during insertion. Project size must be reduced.
app	340C	010B	Internal PLC Error in memory management. This error can occur if an older project was loaded on the controller which was compiled to use lees of the controllers total memory space. By using the "Resource" Dialog box, perform "Delete On target," for the bootproject, and then download the application code again.
app	340C	010C	Internal PLC Error: POU invalid

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
app	340C	010D	Internal PLC Error: Unknown POU type
app	340C	010E	Cannot insert a POU because there is no project.
app	340C	010F	Internal PLC Error: Cannot insert a POU because it does not belong to the project.
app	340C	0110	Internal PLC Error: Cannot insert a POU.
app	340C	0111	Internal PLC Error: Invalid POU type
app	340C	0112	Internal PLC Error: Memory reorganization not possible; PLC stopped.
app	340C	0113	Internal PLC Error: SPG defined more than once.
app	340C	0114	Internal PLC Error: Memory error for initialized data of POU.
app	340C	0115	Internal PLC Error: Retain CRC failed. Possible reasons: (1) actual project does not have any retain data, (2) actual project is 'old style' without retain CRC (3) PLC isn't in STOP mode
app	340C	0116	Internal PLC Error: FB defined more than once.
app	340C	0117	Internal PLC Error: Not all POU sent.
app	340C	0118	Internal PLC Error: No program memory defined.
app	340C	0119	Internal PLC Error: Invalid FB number.
app	340C	011A	Internal PLC Error: Invalid PG number.
app	340C	011B	Internal PLC Error: Invalid SPG number.
app	340C	011C	POU uses more than 80 percent of POU memory.
app	340C	011D	Project uses more than 80 percent of program memory.
app	340C	011E	Internal PLC Error: Invalid function or function block.
app	340C	011F	Internal PLC Error: Invalid firmware function or function block.
app	340C	0120	Internal PLC Error: Invalid program.
app	340C	0121	Internal PLC Error: Invalid change of mode.
app	340C	0122	Internal PLC Error: Unknown system mode! PLC stopped!
app	340C	0123	Stack overflow. Increase stack size.
app	340C	0124	System error in module. Check debugging output via controller's web interface.
app	340C	0125	System error in module. Check debugging output via

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			controller's web interface.
app	340C	0126	Internal PLC Error: Error during indirect variable access.
app	340C	0127	PLC CPU overload.
app	340C	0128	Internal PLC Error: Breakpoint unexpected.
app	340C	0129	Internal PLC Error: Error in data configuration.
app	340C	012A	Internal PLC Error: Error in retain data configuration.
app	340C	012B	Internal PLC Error: Floating point error.
app	340C	012C	Internal PLC Error: Fatal error.
app	340C	012D	Output string is too short.
app	340C	012E	Input string is too short.
app	340C	012F	Invalid input parameter 'p' or 'l' (position or length).
app	340C	0130	String is identical to the output string.
app	340C	0131	Invalid string comparison.
app	340C	0132	Invalid data type for string conversion.
app	340C	0133	Error in format string.
app	340C	0134	Error during string conversion.
app	340C	0135	Error in I/O configuration.
app	340C	0136	Initializing I/O driver failed.
app	340C	0137	Board not instantiated.
app	340C	0138	Board number not allowed.
app	340C	0139	Input Group doesn't fit.
app	340C	013A	Output Group doesn't fit.
app	340C	013B	Board not found.
app	340C	013C	Error reading inputs.
app	340C	013D	Error writing outputs.
app	340C	013E	Error creating I/O semaphore.
app	340C	013F	Invalid memory size.
app	340C	0140	Invalid I/O memory address.
app	340C	0141	Internal PLC Error: PG defined more than once.
app	340C	0142	POU exceeds 64K module size during insertion. POU size must be reduced.
app	340C	0143	Internal PLC Error: Error in task configuration.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
app	340C	0143	Unknown I/O Driver.
app	340C	0200	Common causes of invalid configuration include duplicate t2o/o2t assembly instances or invalid client connection parameters.
app	340C	0202	Unable to connect to the EtherNet/IP remote server. Common causes include: invalid remote server address, invalid gateway, invalid subnet mask, or the Ethernet network is not correctly configured.
app	340C	0203	There is no route to the EtherNet/IP server. Common causes include: invalid remote server address, invalid gateway, invalid subnet mask, or the Ethernet network is not correctly configured.
app	340C	0204	Unable to reach the network for the EtherNet/IP server. Common causes include: invalid remote server address, invalid gateway, invalid subnet mask, or the Ethernet network is not correctly configured.
app	340C	0205	Remote server rejected connection attempt. The remote server may not be listening for connections or there may be a firewall preventing the connection.
app	340C	0206	The Ethernet/IP client ran out of connection slot resources. Reduce the number of concurrent client connections.
app	340C	0302	Unable to connect to the Modbus TCP slave. Common causes include: invalid Modbus TCP slave address, invalid gateway, invalid subnet mask, or the Ethernet network is not correctly configured.
app	340C	0303	There is no route to the Modbus TCP slave. Common causes include: invalid Modbus TCP slave address, invalid gateway, invalid subnet mask, or the Ethernet network is not correctly configured.
app	340C	0304	Unable to reach the network for the Modbus TCP slave. Common causes include: invalid Modbus TCP slave address, invalid gateway, invalid subnet mask, or the Ethernet network is not correctly configured.
app	340C	0305	Modbus TCP slave rejected connection attempt. The Modbus TCP slave may not be listening for connections or there may be a firewall preventing the connection.
app	340C	0306	The Modbus TCP master ran out of connection slot

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			resources. Reduce the number of concurrent slave connections.
app	340C	1020	The controller battery voltage has dropped, indicating it has failed or is about to fail. While the controller is powered on, the battery should be replaced as soon as possible or a prolonged power-down state will cause various static data to be lost.
app	340C	1028	The driver parameter specified in the axis configuration caused an exception
app	340C	1029	The driver parameter did not match the axis configuration
app	340C	1030	The configured axis count exceeded the allowable limit.
app	340C	1031	The axis count exceeded the allowable limit due to an auto-detected axis.
app	340C	1033	Using an incompatible version of the PLCopenPlus firmware function block library may result in controller instability. Consequently, the PLC application will not be allowed to run. Please change either the controller's firmware or the firmware function block library.
app	340C	1110	All motion error codes are in the range from 0x1111 to 0x111f.
app	340C	1111	The move could not be buffered because the motion queue for that axis is full.
app	340C	1112	The move could not be started because motion is prohibited.
app	340C	1113	The servo drive failed to enable or disable.
app	340C	1114	Drive parameter read/write did not complete.
app	340C	1115	Drive parameter read/write failed
app	340C	1116	Torque move prohibited while non-torque moves queued or in progress.
app	340C	1117	Y_CamOut called while not camming.
app	340C	1118	The master slave relationship can not be modified because the master axis has not been set yet.
app	340C	1119	Y_CamFileSelect can not open a second cam table while the first cam table is still being opened.
app	340C	111A	The function block can not command an external axis.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
app	340C	111B	The homing sequence is already in progress.
app	340C	111C	MC_SetPosition can not be called while the axis is moving.
app	340C	111D	Motion aborted due to axis alarm.
app	340C	111E	MC_SetPosition can not set the position to be outside the configured wrap range.
app	340C	111F	Can not transition to homing state; must be in StandStill state first.
app	340C	1120	Clear alarms is already in progress.
app	340C	1121	Axis reset is already in progress.
app	340C	1122	Mechatrolink reset is already in progress.
app	340C	1123	Y_CamStructSelect cannot transfer a second cam structure while the first cam structure is being transferred.
app	340C	1124	Y_ReadCamTable cannot be read a second cam structure while the first cam structure is being read.
app	340C	1125	Y_WriteCamTable cannot write a second cam structure while the first cam structure is being written.
app	340C	1126	MC_SetPosition cannot be called while either the master or slave axis is camming.
app	340C	1127	The function block can not be used with a virtual axis.
app	340C	1128	The function block can not be used with an inverter axis.
app	340C	1129	Y_VerifyParmeters and Y_WriteParameters can not be called a second time while the first one is in progress.
app	340C	1210	All error codes for structures are in the range from 0x1211 to 0x121f.
app	340C	1211	Axis ID does not correspond to an axis.
app	340C	1212	The master slave relationship is not defined.
app	340C	1213	The input reference does not correspond to a real input
app	340C	1214	The output reference does not correspond to a real output.
app	340C	1215	The input/output number does not correspond to a real input or output bit.
app	340C	1216	Trigger reference is not valid.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
app	340C	1217	The cam switch structure is not valid.
app	340C	1218	The track structure is not valid.
app	340C	1219	Table size results in misaligned data.
app	340C	121A	Buffer size results in misaligned data.
app	340C	121B	Table type is not supported.
app	340C	121C	Invalid start index.
app	340C	121D	Invalid end index.
app	340C	1220	All error codes for invalid enumeration values are in the range from 0x1221 to 0x122f.
app	340C	1221	'BufferMode' does not correspond to a valid enumeration value.
app	340C	1222	'Direction' does not correspond to a valid enumeration value.
app	340C	1223	'StartMode' does not correspond to a valid enumeration value.
app	340C	1224	'ShiftMode' does not correspond to a valid enumeration value.
app	340C	1225	'OffsetMode' does not correspond to a valid enumeration value.
app	340C	1226	'Mode' does not correspond to a valid enumeration value.
app	340C	1227	'SynchMode' does not correspond to a valid enumeration value.
app	340C	1228	'Parameter' does not correspond to a valid enumeration value.
app	340C	1229	'AdjustMode' does not correspond to a valid enumeration value.
app	340C	122A	'RampIn' does not correspond to a valid enumeration value.
app	340C	122B	'ControlMode' does not correspond to a valid enumeration value.
app	340C	1230	All error codes for range errors are from 0x1221 to 0x122f.
app	340C	1231	Distance parameter is less than zero.
app	340C	1232	Velocity parameter is less than or equal to zero.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
app	340C	1233	Acceleration is less than or equal to zero.
app	340C	1234	Deceleration is less than or equal to zero.
app	340C	1235	Torque is less than or equal to zero.
app	340C	1236	Time is less than or equal to zero
app	340C	1237	Specified time was less than zero.
app	340C	1238	Specified scale was less than or equal to zero.
app	340C	1239	Velocity is negative.
app	340C	123A	Denominator is zero.
app	340C	123B	Jerk is less than or equal to zero.
app	340C	123C	TorqueRamp is less than or equal to zero.
app	340C	123D	Engage position is outside the table domain.
app	340C	123E	Negative engage width.
app	340C	123F	Disengage position is outside the table domain.
app	340C	1240	Negative disengage width.
app	340C	1241	StartPosition is outside of master's range.
app	340C	1242	EndPosition is outside of master's range.
app	340C	1310	All error codes for invalid input data range from 0x1211 to 0x121f.
app	340C	1311	The specified Pn does not exist.
app	340C	1312	The mask does not correspond to valid tracks.
app	340C	1313	The profile must start with relative time equal to zero, and the time must be increasing.
app	340C	1314	The specified cam file does not exist.
app	340C	1315	Invalid header for the cam file. Cam tables must have a header indicating the number of rows, number of columns and a feed forward velocity flag
app	340C	1316	The first (master) column must be either increasing or decreasing.
app	340C	1317	Cam table reference does not refer to a valid cam table.
app	340C	1318	The engage phase exceeded the time limit. Slave axis could not attain the target position and velocity within the user specified time limit.
app	340C	1319	The engage phase exceeded the distance limit. Slave axis could not attain the target position and velocity

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			within the user specified master distance.
app	340C	131A	Invalid width input. Width is an enumeration type with the following allowable values 'WIDTH_8'=0, 'WIDTH_16'=1, and 'WIDTH_32'=2.
app	340C	131B	The slave axis can not be the same as the master axis.
app	340C	131C	Default drive parameter info is not available for this parameter.
app	340C	131D	Invalid external axis.
app	340C	131E	Invalid virtual axis.
app	340C	131F	File extension is not recognized or missing.
app	340C	1320	Could not find the axis parameter file.
app	340C	2110	All log error codes are in the range from 0x2111 to 0x211f.
app	340C	2111	Adding log items or setting up log is not possible because the data log is already set up.
app	340C	2112	Starting or stopping logging is not possible because the data log is not set up.
app	340C	2113	Invalid handle for user log item.
app	340C	2114	Data log can not be created because too many data logs are in use.
app	340C	2115	Invalid handle for data log.
app	340C	2116	A user log item can only support eight inputs for each type.
app	340C	2117	Saving the log failed.
app	340C	B114	Failed to send clear alarms command.
app	340C	B115	Failed to reset Mechatrolink.
app	340C	B116	Mechatrolink reset is prohibited while axes are moving.
app	340C	B117	Failed to initialize absolute encoder.
app	340C	E110	All error codes for ProConOS errors range from 0xE111 to 0xE11f.
app	340C	E111	Instance object is NULL.
app	340C	E112	The instance data is NULL.
app	340C	E113	The structure pointer check sum is invalid.
app	340C	E114	The structure size does not match.
app	340C	EDED	This function block was implemented in a later

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			firmware version. If you would like to use this function block, then the controller must be updated.
app	340C	F110	All error codes for kernel errors range from 0xF111 to 0xF11f.
app	340C	F111	An internal assertion in the motion kernel failed indicating the controller is not in a stable state. This error should be reported to Yaskawa Electric America.
user	3501	0000	A user script task posted an alarm directly.
motionKernel	4202	0001	The command position will soon reach the allowable range for the axis in the positive direction (positive overtravel). The axis may not be moved again until the alarm condition is cleared. After the alarm is cleared, it is permissible to execute a move which brings the axis back toward the allowed region, even though the axis is probably still outside the allowed region. Any move which pulls the axis further away from the allowed region will re-trigger the alarm.
motionKernel	4202	0002	The command position will soon reach the allowable range for the axis in the negative direction (negative overtravel). The axis may not be moved again until the alarm condition is cleared. After the alarm is cleared, it is permissible to execute a move which brings the axis back toward the allowed region, even though the axis is probably still outside the allowed region. Any move which pulls the axis further away from the allowed region will re-trigger the alarm.
motionKernel	4202	0003	The command speed will soon reach the allowable range for the axis in the positive direction (overspeed). The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0004	The command speed will soon reach the allowable range for the axis in the negative direction (overspeed). The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0005	The command acceleration will soon reach the allowable range for the axis in the positive direction. The axis may not be moved again until the alarm condition is cleared.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
motionKernel	4202	0006	The command acceleration will soon reach the allowable range for the axis in the negative direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0007	The command torque will soon reach the allowable range for the axis in the positive direction (overtorque). The axis may not be moved again until the alarm condition is cleared.
Memory			
motionKernel	4202	0008	The command torque will soon reach the allowable range for the axis in the negative direction (overtorque). The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0011	The command position will soon reach the allowable range for the axis in the positive direction (positive overtravel). The axis may not be moved again until the alarm condition is cleared. After the alarm is cleared, it is permissible to execute a move which brings the axis back toward the allowed region, even though the axis is probably still outside the allowed region. Any move which pulls the axis further away from the allowed region will re-trigger the alarm.
motionKernel	4202	0012	The command position will soon reach the allowable range for the axis in the negative direction (negative overtravel). The axis may not be moved again until the alarm condition is cleared. After the alarm is cleared, it is permissible to execute a move which brings the axis back toward the allowed region, even though the axis is probably still outside the allowed region. Any move which pulls the axis further away from the allowed region will re-trigger the alarm.
motionKernel	4202	0013	The command speed will soon reach the allowable range for the axis in the positive direction (overspeed). The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0014	The command speed will soon reach the allowable range for the axis in the negative direction

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			(overspeed). The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0015	The command acceleration will soon reach the allowable range for the axis in the positive direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0016	The command acceleration will soon reach the allowable range for the axis in the negative direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0017	The command torque will soon reach the allowable range for the axis in the positive direction (overtorque). The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0018	The command torque will soon reach the allowable range for the axis in the negative direction (overtorque). The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0021	The command position will soon reach the allowable range for the axis in the positive direction (positive overtravel). The axis may not be moved again until the alarm condition is cleared. After the alarm is cleared, it is permissible to execute a move which brings the axis back toward the allowed region, even though the axis is probably still outside the allowed region. Any move which pulls the axis further away from the allowed region will re-trigger the alarm.
motionKernel	4202	0022	The command position will soon reach the allowable range for the axis in the negative direction (negative overtravel). The axis may not be moved again until the alarm condition is cleared. After the alarm is cleared, it is permissible to execute a move which brings the axis back toward the allowed region, even though the axis is probably still outside the allowed region. Any move which pulls the axis further away from the allowed region will re-trigger the alarm.
motionKernel	4202	0023	The command speed will soon reach the allowable range for the axis in the positive direction (overspeed). The axis may not be moved again until the alarm

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			condition is cleared.
motionKernel	4202	0024	The command speed will soon reach the allowable range for the axis in the negative direction (overspeed). The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0025	The command acceleration will soon reach the allowable range for the axis in the positive direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0026	The command acceleration will soon reach the allowable range for the axis in the negative direction. The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0027	The command torque will soon reach the allowable range for the axis in the positive direction (overtorque). The axis may not be moved again until the alarm condition is cleared.
motionKernel	4202	0028	The command torque will soon reach the allowable range for the axis in the negative direction (overtorque). The axis may not be moved again until the alarm condition is cleared.
Mechatrolink	4301	000A	The SERVOPACK model type was unable to be determined. This can indicate that some parameters may be incorrect.
Mechatrolink	4301	000C	The controller was unable to send the drive command because servo network resources were allocated to motion. Brake on, brake off, absolute encoder initialization and alarm clear can only be sent when not moving.
Mechatrolink	4301	001C	The Mechatrolink.xml file specified duplicate configuration structures for a node. The first match was used, subsequent matches were ignored.
Mechatrolink	4301	001D	The Mechatrolink.xml file specified duplicate default configuration structures for a node type. The first default structure was used, subsequent structures were ignored.
Mechatrolink	4301	001E	A node was detected on the mechatrolink network, but it is not supported by the software.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
Mechatrolink	4301	001F	The Mechatrolink comm board inverter control reference/run control is not enabled. Change the settings in parameters b1-01 and b1-02 to '3' to select PCB reference/run source.
Mechatrolink	4301	0020	The drive returned an invalid watch dog code indicating a possible dropped communication packet.
Mechatrolink	4302	0000	The base code for Sigma-II drive warnings. The drive's warning value is bitwise OR'd in with this base value.
Mechatrolink	4302	0091	This warning occurs before the overload alarms (A.710 or A.720) occur. If the warning is ignored and operation continues, an overload alarm may occur.
Mechatrolink	4302	0092	This warning occurs before the regenerative overload alarm (A.32) occurs. If the warning is ignored and operation continues, a regenerative overload alarm may occur.
Mechatrolink	4302	0093	This warning occurs when the absolute encoder battery voltage is lowered. Continuing the operation in this status may cause an alarm.
Mechatrolink	4302	0094	A value outside the setting range was set using MECHATROLINK-II communications.
Mechatrolink	4302	0095	A command not supported in the product specifications was sent, OR the command reception conditions were not met.
Mechatrolink	4302	0096	A communications error occurred (once).
Mechatrolink	4303	0000	The base code for Sigma-III drive warnings. The drive's warning value is bitwise OR'd in with this base value.
Mechatrolink	4303	0900	Position error pulse exceeded the parameter settings (Pn520 x Pn51E/100).
Mechatrolink	4303	0901	When the servo turned ON, the position error pulses exceeded the parameter setting (Pn526 x Pn528/100).
Mechatrolink	4303	0910	This warning occurs before the overload alarms (A.710 or A.720) occur. If the warning is ignored and operation continues, an overload alarm may occur.
Mechatrolink	4303	0911	Abnormal vibration at the motor speed was detected. The detection level is the same as A.520. Set whether to output an alarm or warning by "Vibration Detection Switch" of Pn310.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
Mechatrolink	4303	0920	This warning occurs before the regenerative overload alarm (A.320) occurs. If the warning is ignored and operation continues, a regenerative overload alarm may occur.
Mechatrolink	4303	0930	This warning occurs when the absolute encoder battery voltage is lowered. Continuing the operation in this status may cause an alarm.
Mechatrolink	4303	0941	The change of the parameters can be validated only after turning the power ON from OFF.
Mechatrolink	4303	094A	Incorrect command parameter number was set.
Mechatrolink	4303	094B	Command input data is out of range.
Mechatrolink	4303	094C	Calculation error was detected.
Mechatrolink	4303	094D	Data size does not match.
Mechatrolink	4303	095A	Command was sent though command sending condition was not satisfied.
Mechatrolink	4303	095B	Unsupported command was sent.
Mechatrolink	4303	095C	Command condition is not satisfied for parameter settings.
Mechatrolink	4303	095D	Command, especially latch command, interferes.
Mechatrolink	4303	095E	Subcommand and main command interfere.
Mechatrolink	4303	0960	Communications error occurred during MECHATROLINK communications.
Mechatrolink	4304	0000	The base code for io warnings. The io's warning value is bitwise OR'd in with this base value.
DPRAM	4309	1000	Error code prefix for data link errors
DPRAM	4309	1011	Invalid register
DPRAM	4309	1012	Value exceeded data limit
DPRAM	4309	1013	Data math error
DPRAM	4309	1014	Register number and data size do not agree
DPRAM	4309	1015	Invalid data size
DPRAM	4309	1030	Servo and option card accessed data link channel at the same time
DPRAM	4309	10FF	Unknown data link error
DPRAM	4309	2000	Error code prefix for message errors
DPRAM	4309	2002	Invalid register

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
DPRAM	4309	2003	Message size and data quantity do no match
DPRAM	4309	2030	Invalid register
DPRAM	4309	2031	Register access not allowed
DPRAM	4309	2032	Setting value is out of range
DPRAM	4309	2033	Messaging accessed only part of a register group or spanned register groups
DPRAM	4309	2034	Message command could not be processed because pre-conditions have not been met
DPRAM	4309	2035	Command processing is not possible due to conflict
DPRAM	4309	20A1	Controller option card received an empty message response
Mechatrolink	4312	0000	The base code for inverter warnings. The inverter's warning value is bitwise OR'd in with this base value.
Mechatrolink	4312	0001	Reserved
Mechatrolink	4312	0002	Reserved
Mechatrolink	4312	0003	Reserved
Mechatrolink	4312	0004	Reserved
Mechatrolink	4312	0005	Reserved
Mechatrolink	4312	0006	Reserved
Mechatrolink	4312	0007	Reserved
Mechatrolink	4312	0008	Reserved
Mechatrolink	4312	0009	Reserved
Mechatrolink	4312	000A	Reserved
Mechatrolink	4312	000B	Reserved
Mechatrolink	4312	000C	Reserved
Mechatrolink	4312	000D	Reserved
Mechatrolink	4312	000E	Reserved
Mechatrolink	4312	0010	Reserved
Mechatrolink	4312	0011	Reserved
Mechatrolink	4312	0012	Reserved
Mechatrolink	4312	0013	Reserved
Mechatrolink	4312	0014	Reserved
Mechatrolink	4312	0017	Reserved
Mechatrolink	4312	0018	Reserved

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
Mechatrolink	4312	001A	Reserved
Mechatrolink	4312	001B	Reserved
Mechatrolink	4312	001C	Reserved
Mechatrolink	4312	001D	Reserved
Mechatrolink	4312	001E	Reserved
Mechatrolink	4312	001F	Reserved
Mechatrolink	4312	0022	Reserved
Mechatrolink	4312	0023	Reserved
Mechatrolink	4312	0024	Reserved
Mechatrolink	4312	0025	Reserved
Mechatrolink	4312	0026	Reserved
Mechatrolink	4312	0094	Reserved
Mechatrolink	4312	0095	Reserved
Mechatrolink	4312	0096	Reserved
Mechatrolink	4312	00E5	Reserved
app	4401	0008	Each call to groupAxes() must be matched by a corresponding call to ungroupAxes(). If a script exits without such a matching call (thus leaving an 'orphaned' group behind), this warning is issued. Clearing the warning also ungroups the orphaned group.
app	4401	0009	The debug stack trace was longer than expected. It may be clipped.
app	4403	0001	The event queue for the remote client was full, and an event was dropped. This is generally caused either by exceeding the network bandwidth or exceeding the general system processing power (starving the connection). When an event is dropped in this manner, the connection is terminated.
app	4403	0005	An RMI connection was attempted by an external client and rejected due to the concurrent connection limit.
app	4407	0001	The configuration file directory is read-only or resides on a read-only file system. Attempts to update the configuration or create directories will fail.
app	4407	0002	An attempt was made to write to a read-only configuration file. The write failed.

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
app	4407	0105	There was an indication that the SRAM battery backup power may have failed temporarily. SRAM data may have been compromised.
app	4408	0001	The alarm history was configured to use NVRAM storage, but either the available NVRAM was not sufficient to contain the configured buffer size, or the configured buffer size was not large enough to contain the configured number of records. The alarm history will contain fewer records than configured.
app	4408	0002	The alarm history was configured to use NVRAM storage and the data was found to be corrupted. The alarm history has been lost. NOTE: this alarm also occurs if the configured size of the alarm history has been changed.
app	440A	000C	The position and torque scales specified in the configuration file have different signs. As a result, a positive acceleration results in a negative torque, and position limits are opposite in sign as the torque limits.
app	440A	000F	The axis was temporarily disconnected from the servo network during reset. During this time, the feedback data is not valid and the axis cannot be moved.
app	440A	0011	The network I/O was temporarily disconnected from the servo network during reset. During this time, any network I/O state change will be unobservable to the controller.
app	440A	0019	The system was rebooted by the user.
app	440A	001A	The system failed to shut down gracefully during a reboot, although the reboot did occur. This does not necessarily indicate that the software is damaged.
app	440B	0001	The controller is running out of memory. Memory should be freed as soon as possible. Try closing connections to the controller or stopping scripts.
app	440B	0003	The largest free memory block is approaching the critical level. Memory should be freed as soon as possible. Try closing connections to the controller or stopping scripts.
app	440C	0105	Reserved
app	440C	1032	The configuration file version is not compatible with the

	Hex Code		Description
	ErrorClass	AxisErrorID	ErrorClass+AxisErrorID output from MC_ReadAxisError
	AlarmID		AlarmID output from Y_ReadAlarm
			fimware version. Please use the configuration tool to update the configuration files to match the the firmware version.
app	440C	1034	Some function blocks are not supported by the controller firmware. If these function blocks are used in the PLC application, then their ErrorID will always equal 60909. If these function blocks are needed, then please upgrade the controller's firmware.
app	4501	0000	A user script task posted a warning directly.

Controller Memory

Physical Memory	MP2600iec	MP2300Siec	MP2310iec	MP3200iec	Note
Size of FLASH	8 MB	8 MB	8 MB	40 MB	
Size of SRAM (Battery backed memory)	0.5 MB	0.5 MB	2 MB	8 MB	
Size of SDRAM	32 MB	32 MB	32 MB	128 MB	
FLASH Allocation:					
Firmware	4 MB	4 MB	4 MB	8 MB *	* Separate flash device from user flash
System Files	0.5 MB	0.5 MB	0.5 MB	None *	* Stored w/ firmware image
DOS compatible flash file system to store user data files, compiled IEC application, and IEC application source code (if desired)	3.5 MB	3.5 MB	3.5 MB	32 MB	
SRAM Allocation: (Battery backed memory)					
System	34 KB	34 KB	34 KB	34 KB	
Modbus	34 KB	34 KB	34 KB	34 KB	
Axis Data	56 KB	60 KB	60 KB	60 KB	
Alarm History	32 KB	32 KB	32 KB	256 KB	
User Retained Data (Global Variables)	352 KB	352 KB	951 KB	6 MB	
NOTE: Divide User Retained Data by 2 to allow 2 copies at run time to support the 'Download Changes' feature.					
SDRAM Allocation:					
Firmware - system memory - cam tables - other data	13 MB	13 MB	13 MB	32 MB	
Running cam tables (CamTableIDs)	7.5 MB	7.5 MB	7.5 MB	20 MB	
Memory available to the IEC application during run (code & data	3.5 MB	3.5 MB	3.5 MB	52 MB	
RamDisk for system use	4 MB	4 MB	4 MB	24 MB	
Note: The can select between two memory allocations to favor the 'Running Cam Tables' or the 'Memory available to the IEC application' via a toolbar button on the Configuration toolbar. The 'Memory available to the IEC application' can be increased to 6.5MB, which reduces the 'Memory available for Running cam tables' to 4.5 MB					