EasyMotion User's Manual

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Cito Systems

Chapter 1.

Introduction.
Welcome to EasyMotion. This complete motion system setup program provides you with all the tools you need to test hardware connections, view system status, tune control filter gains, input machine parameters and execute motion.

Those new to motion control systems will appreciate EasyMotion's easy-to-use Windows based design, and experienced users will find all the motion power they need. Each tool is run in a separate view screen allowing simultaneous viewing of the systems from different angles. Many visible and audible warning messages enhance the user interface features.

This chapter will introduce you to EasyMotion's many features and give you an overview of how they work together.

How to Use This User's Guide
This user guide has three parts: the first chapter gives you an overview of EasyMotion's features; the next chapter shows you how to install EasyMotion; the last chapter serves as a brief tutorial.

Overview of EasyMotion Features
The following describes key features of EasyMotion.

Motion Scope
Every mechanical system requires an individual set of control filter gains. The control filter (PID, PIDff or others) works in a closed loop with the feedback signal. In order to perform the task of smooth motion and precise positioning, the filter gains have to be properly adjusted according to the system characteristics. The system tuning can be done with the step response method. Motion Scope generates a step input signal and the system output is displayed on the computer screen. The response curve can be stored in a file and later displayed off-line.

With Motion Scope you can:
- ♦ view four different signals of up to four axes
- ♦ measure system actual position, position error, actual velocity and velocity error signals
- ♦ read signals displayed in real time
- ♦ change the number of samples per interval
- ♦ change time base
- ♦ change channel sensitivity
- ♦ start measurements on trigger signals
- ♦ store data in a file
- ♦ view and analyze data off-line

Controller Status Views
Every motion system is quite complex and has to satisfy a number of conditions in order to run. The system status can be observed in a Controller Status view. It provides a constant display of each axis internal state.

CNC Display
Some applications require viewing system axes position in large format. The axes position can be displayed in metric, imperial or encoder count units. Large fonts allow this data to be seen from a far distance.

Chapter 2.

This chapter will help you quickly install EasyMotion. In addition it lists what you need to check before you begin the installation.

Preparing to Install EasyMotion
Before installing EasyMotion to your system, please do the following:
- ♦ Check that your system has required the software and hardware
- ♦ Check that your controller board is properly installed
- ♦ Make backup copies of the program disks

Checking Your System: Hardware and Software Requirements
The following lists the hardware and software you need to use EasyMotion.
- ♦ A ‘486 or Pentium-based computer
- ♦ A motion controller board
- ♦ 8 Mbytes of RAM
- ♦ Windows 95/98/Me or NT/2000/XP
- ♦ A hard disk with minimum of 4 Mbytes of free disk space

Backing Up Your Program Disk
Before installing EasyMotion, make a backup copy of your program disks. We recommend write-protecting your original disks to help prevent accidental erasing or overwriting.

Installing EasyMotion
To install EasyMotion:
- Insert distribution CD into CD ROM drive
- The CD has the autorun feature, so it automatically proceeds with the setup process. If by some reason the autorun chooses not to run, from the Windows Explorer run setup.exe in the CD folder.
- After a few moments, the Install dialog box will appear.
- Follow the instructions that appear on your screen.
- The installation requires your computer to be rebooted for the system to install the drivers.
- Now, it is a good moment to insert your motion controller card into your computer. **While doing so, make sure that the power is off.**

Installing the drivers.
Install the motion controller card into your computer. **Make sure, that the power is off, while inserting the card into a slots.**
- Power up the computer.
- Windows Plug-and-Play features recognizes a new hardware component in the system and through a series of dialogs prompts the driver installation.

- When a dialog prompts for an inf file location, check both CD and specify location as a letter of your CD ROM and the Drivers folder on the CD. For example: E:\drivers.
- Proceed with the driver installation process
- Install the EasyMotion package, if it has not yet been installed.

Chapter 3.

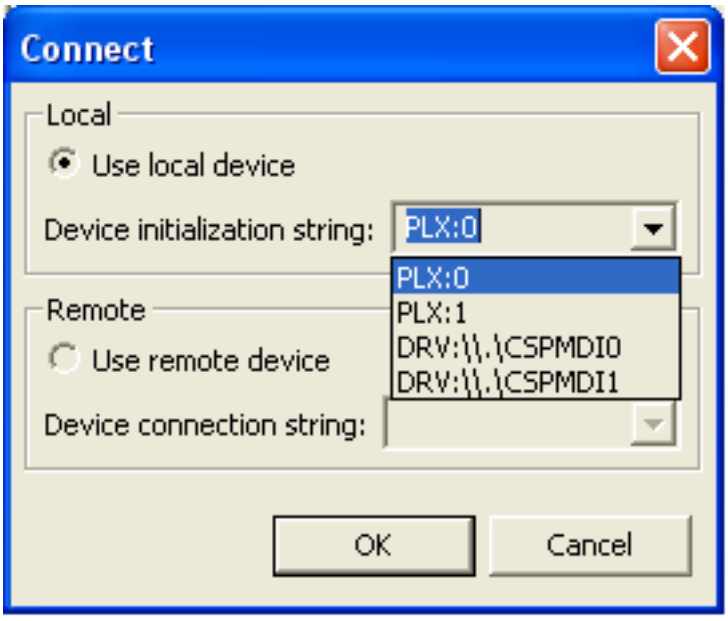
This chapter serves as a brief tutorial designed to help you quickly get up and running with EasyMotion. It covers basic tasks of the system parameters, such as tuning the servo filter and jogging and homing axes, and using various utilities to test the control system.

Since EasyMotion is a Windows based application some menus common to all the applications are not discussed in this manual. It is assumed that the user is familiar with editing functions, view tools and arranging windows in the Windows environment.

1.Initializing the application

When EasyMotion is launched for the very first time is not fully configured, yet. It is up to the user to make a choice of a card from the Connect dialog. From File | Connect command got to the Connect dialog. For systems, that have a motion controller card installed in a local computer bus, make a choice of the appropriate device. PCI cards have device initialization string starting with a prefix PLX:, while ISA cards' device initialization string starts with string DRV:\\. The proper device are preset in the Device initialization string list. For the first card install chose the number 0, for the second one the number 1. Similar way the ISA cards are connected.
For systems the work over the network, use Remote group and name the device connection string appropriately as the network ID requires.

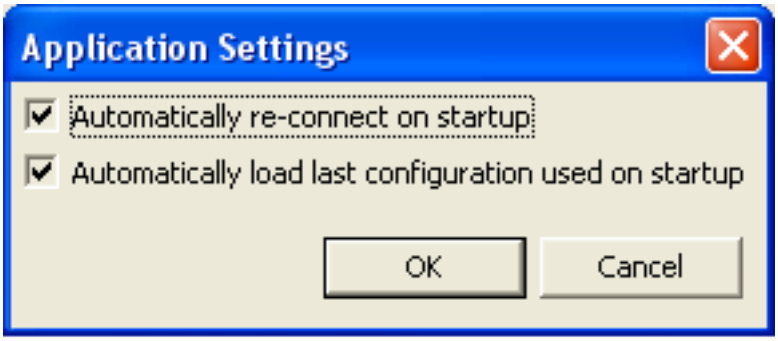
When the application needs to be disconnected from the card use File | Disconnect command.



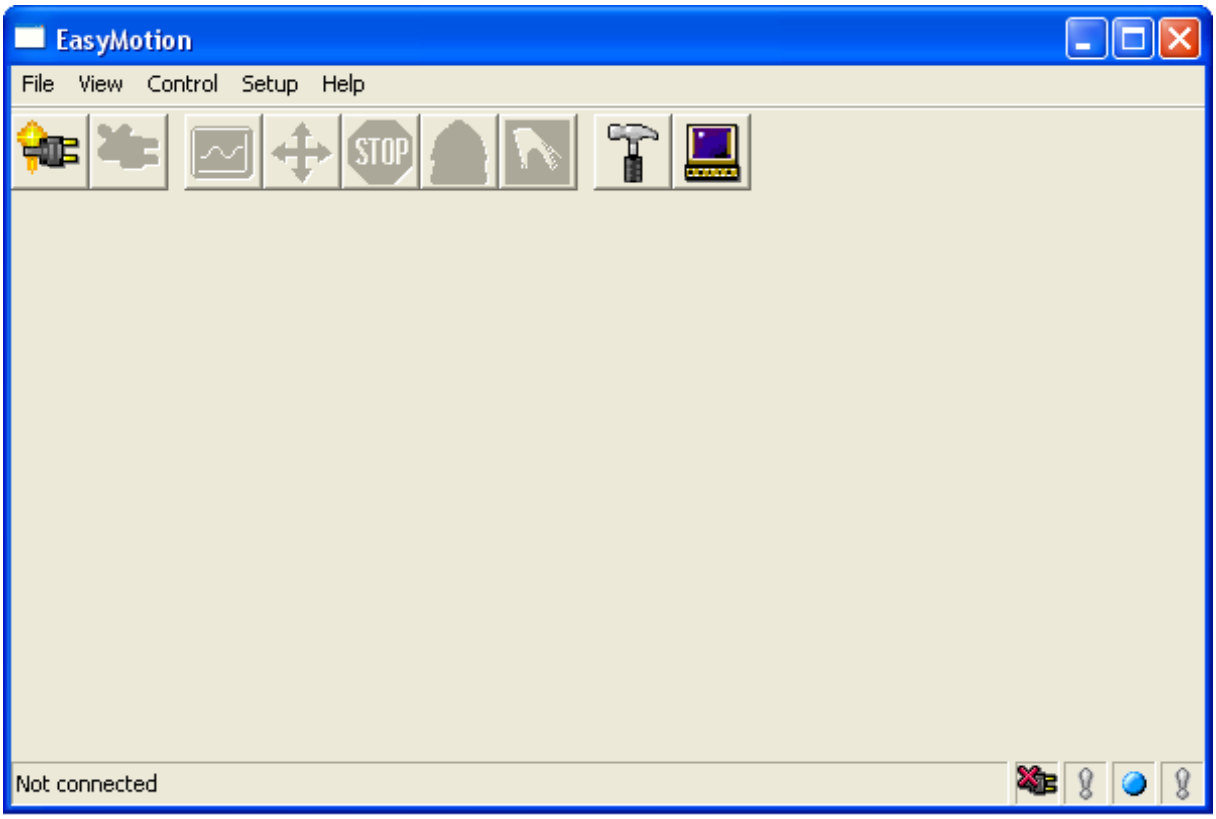
Once the card becomes connected a parameter initialization file can be loaded. Use File | Load Configuration command to invoke file explorer. From the file list chose the file that contains the card's parameters. It is advisable to load the easymotion.ini file from the \bin

folder. This file contains initial default parameters. The card setup can be stored by using File | Save configuration command.

In order to avoid connecting and initialization file loading each and every time the application is launched, appropriate setting can be checked in the Application Settings dialog. Use File | Settings command to enter that dialog.

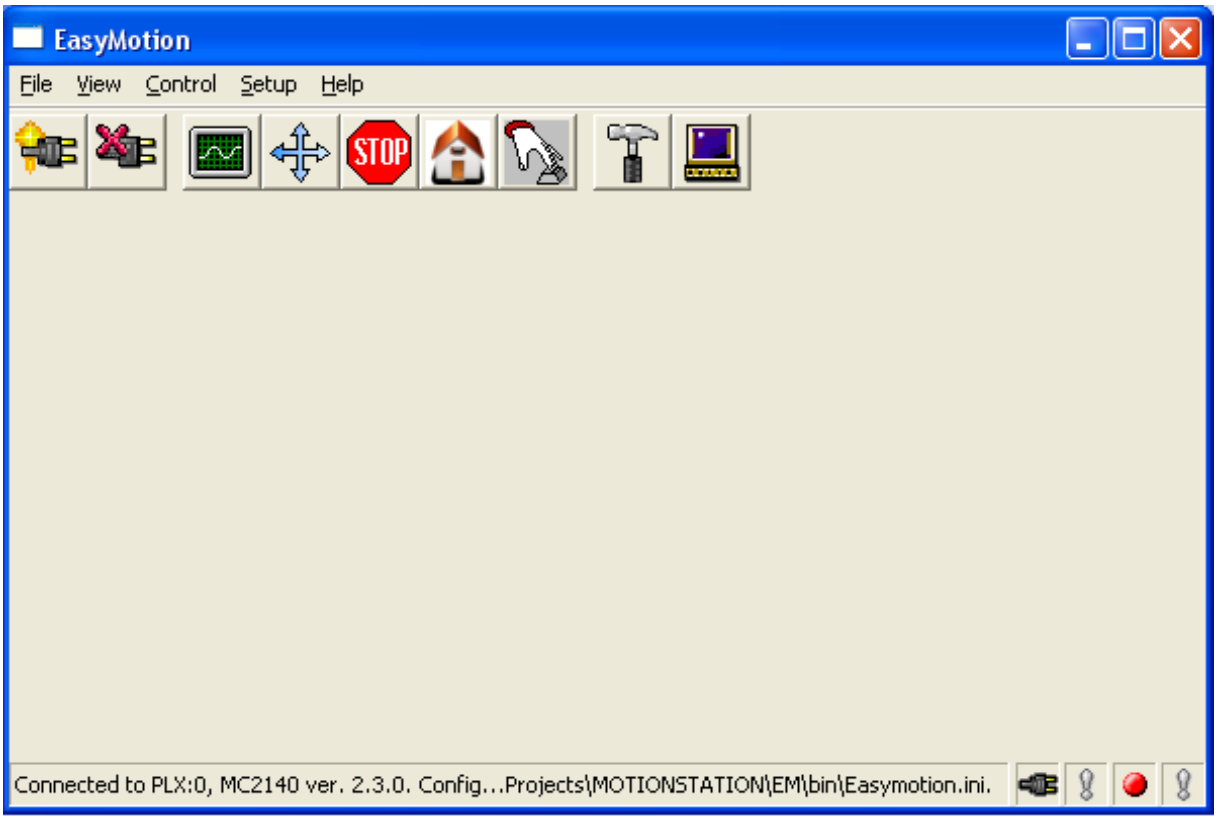


After making the very first launch, when the application has not been initialized a set of greyed out tool icons appear on the main screen. Once the application becomes connected the tool icons change their state into the active one.



2.Toolbar controls

There is a set of icons on the toolbar providing shortcuts to various menu items. Each of these icons has a tool tip informing about performed tasks. Some of them may be grayed out when the tool is not used by a specific controller configuration.



Toolbar icons description

1. Connect – connects the application to the controller board. This step is necessary to communicate with the board
2. Disconnect – disconnect application from the controller board
3. MotionScope – a graphical tool helping in the system parameters tuning and its performance visualization
4. Jog – a tool for axes jogging
5. Stop – stops instantaneously axis motion
6. Home – performs homing procedure
7. Event Status Reset – resets the event status register to clear off all status conditions to the default setting
8. Device parameters – sets all the card parameters
9. Console – a interface tool for entering individual commands and functions

Status bar icons description

The status field indicates whether the application is connected to a card and shows a path to a loaded initialization file. The icons in the far right lower corner indicate respectively:

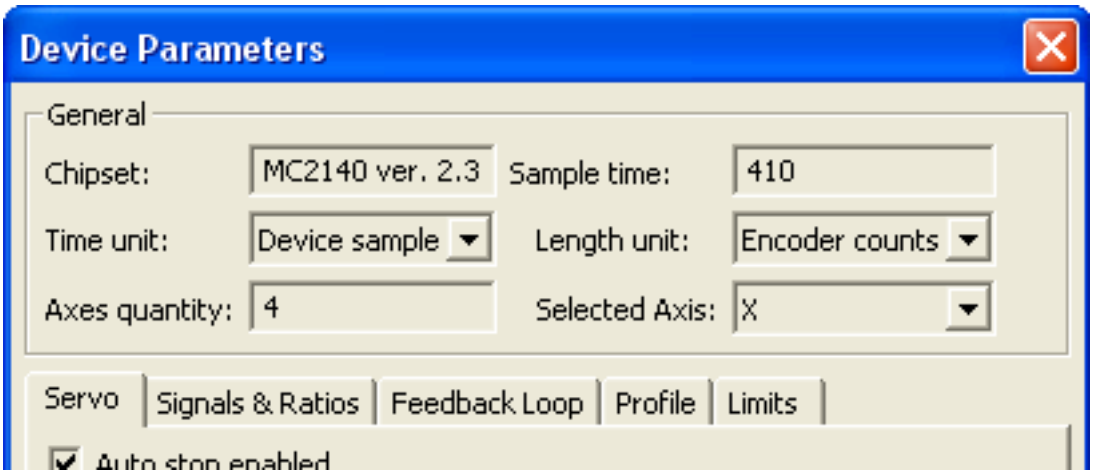
1. Connection plug, shows whether the application is connected to a card
2. Exclamation mark, when highlighted red, indicates that a motion error has occurred
3. Dot, when red, the servo is on, when blue, the servo is off
4. Exclamation mark, when highlighted red, indicates that the soft limits are off, while being enabled, due to a change of the breakpoint condition

3. Initializing Parameters

After the control board installation, it is necessary to set the system parameters. This way proper control output signals can be generated and a mechanical system characteristic defined.

Choose Setup | Parameters command. It displays a set of tabs in which you can set motion board parameters. The parameters can act on a currently selected axis (axis parameters) or on all axes at once (general parameters).

Device Parameters dialog tabs:

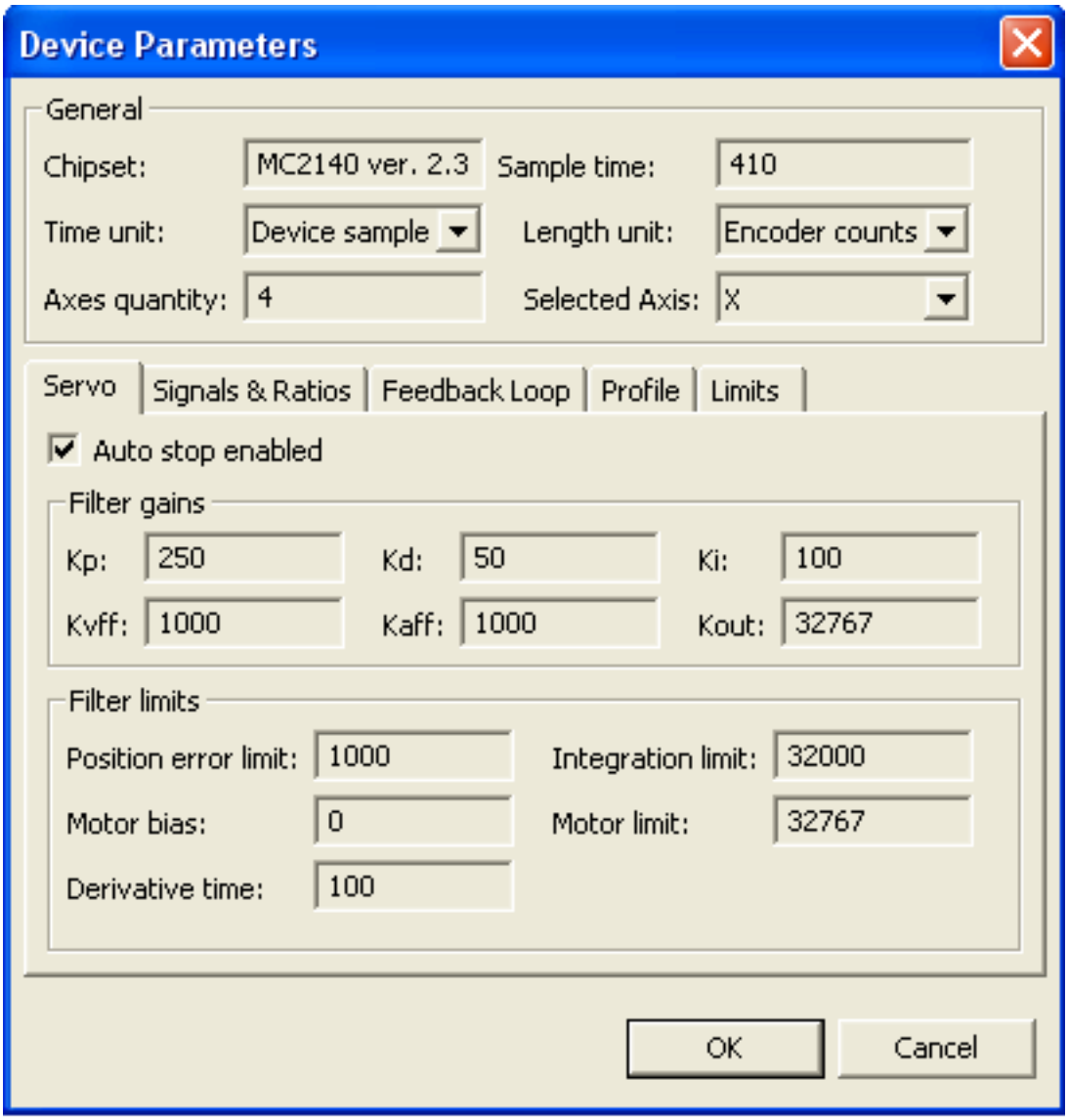


General group controls description:
Chipset – a version of motion processor used
Time unit – selects time units of the motion control system. They can be device samples, seconds, milliseconds and minutes. Device sample is chipset dependent and its value is displayed in "Sample time" field.
Axes quantity - program detects automatically number of all available axes, however, the user can lower the number to 2 or 1, if needed.
Sample time – expressed in microseconds, set the cycle time for the chipset. It can be set as a multiples of axes enabled and intervals of 102 μsec for MC2100 series and 154 μsec for MC2300 and MC2400 series.
Sample time - sets the cycle time for the motion processor. This is the time between servo loop updates and trajectory calculations. The value is expressed in microseconds.
Only certain values are allowed as follows:
Brushed servo motors (MC2100 series) - multiples of 102 and at least 102 μsec per enabled axis
Brushless servo motors (MC2300 series) - multiples of 154 and at least 154 μsec per enabled axis
Microstepper motors (MC2400 series) - multiples of 154 and at least 154 μsec per enabled axis
Stepper motors (MC2500 series) - it does not apply.

It affects the cycle time for all axes.

Length unit – selects length units of the mechanical system. They can be encoder counts, motor steps, millimeters, centimeters, meters and inches.
Selected axis – selects an axis for which the settings need to be made.

Servo tab:



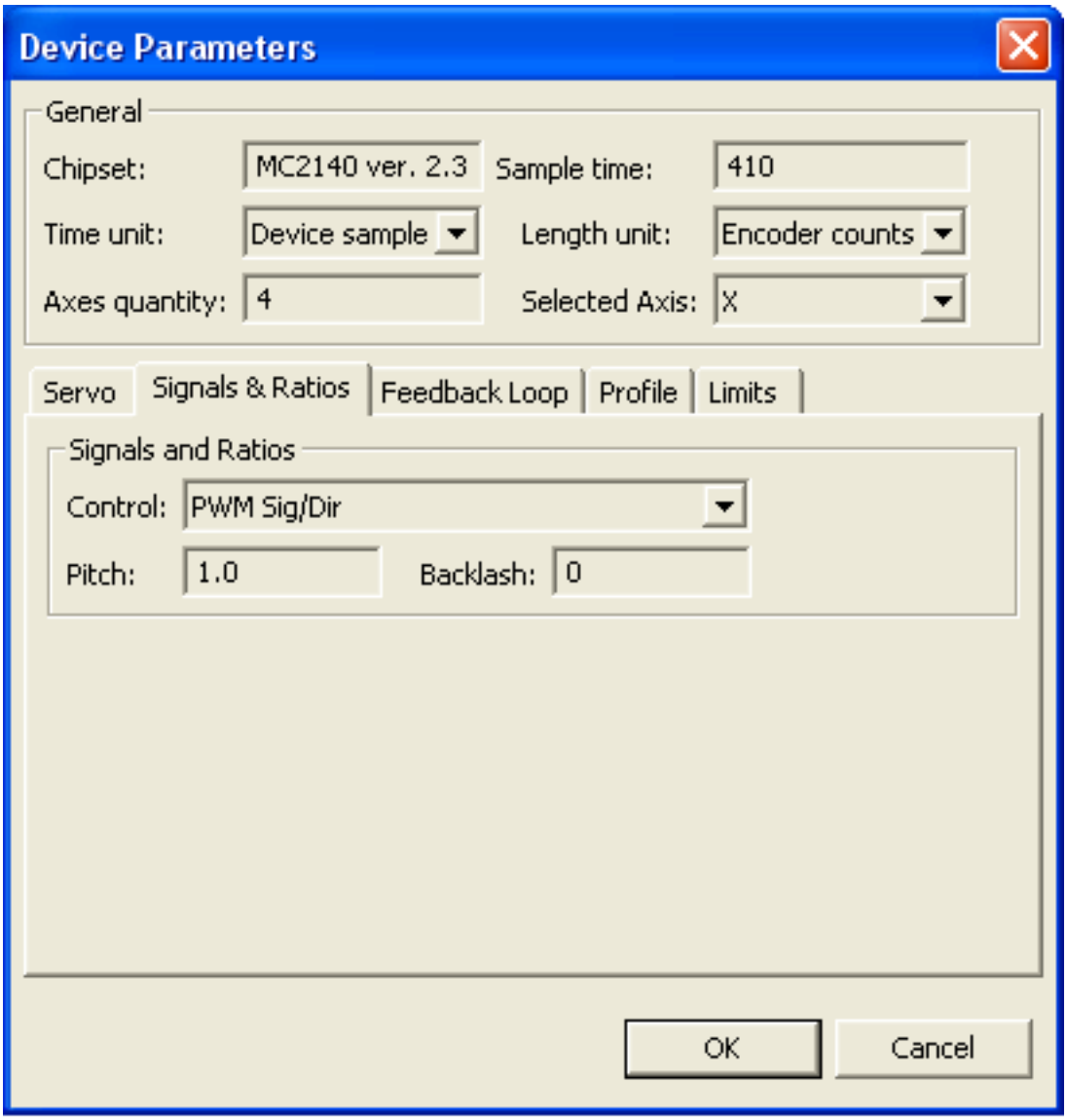
Servo tab controls description:
Auto stop enabled – when checked (enabled), the axis goes into open-loop mode when a motion error occurs. When unchecked (disabled), the axis is not affected by a motion error.

Filter gains group:
Kp - sets the proportional gain of the digital servo filter
Kd - sets the derivative gain of the digital servo filter
Ki – sets the integral gain of the digital servo filter
Kv - sets velocity coefficient of the PID fileter
Kvff - sets the velocity feedforward gain of the digital servo filter
Kaff - sets the acceleration feedforward gain of the digital servo filter
Kout - sets the output scale factor of the digital servo filter

Filter limits group:
Pos. Error limit - set position (following) error value
Integration limit - set limit for the integration
Motor bias – sets the bias voltage of the digital servo filter

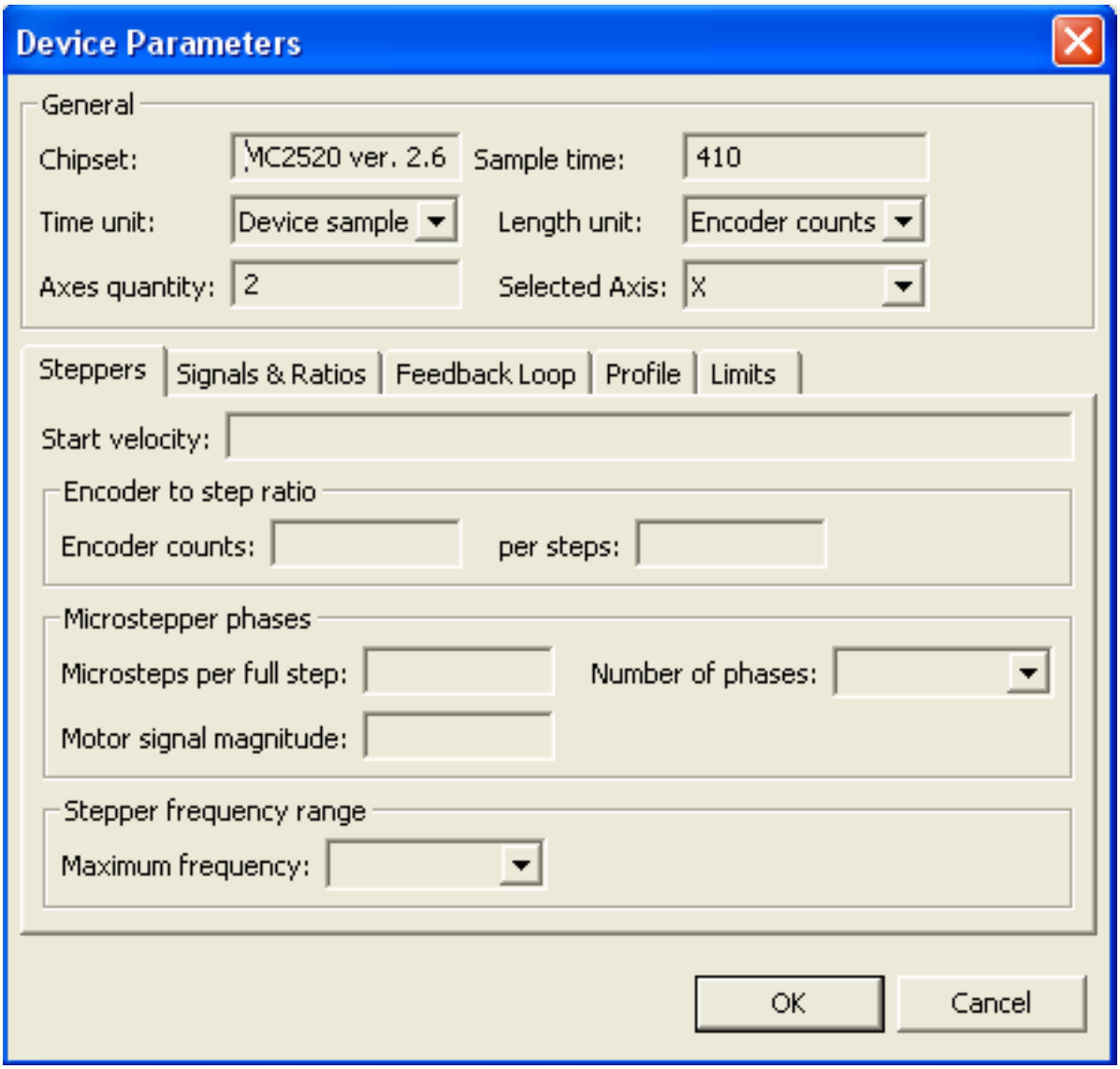
Motor limit – sets the maximum value for the motor output command allowed by the digital servo filter
Derivative time - sets the sampling time, in number of servo cycles, for the servo filter to use in calculating the derivative term

Signals and Ratios tab:



Signals and Ratios tab controls description:
Control – sets the output signal type to Analog, PWM Signal/Direction or PWM 50/50 depending on the hardware option.
Pitch (gear) - defines pitch of the axis lead screw or gear ratio of the gearbox used on the mechanical axis (expressed in threads per linear unit).
Backlash - sets mechanical backlash of the selected axis in encoder counts.

Steppers tab:



Steppers tab controls description:
Start Velocity - loads the starting velocity buffer register for the specified axis. Scaling example: To load a starting velocity value of 1.750 counts/cycle multiply by 65,536 (giving 114,688). It has no effect when the controller is in S-curve profile mode.

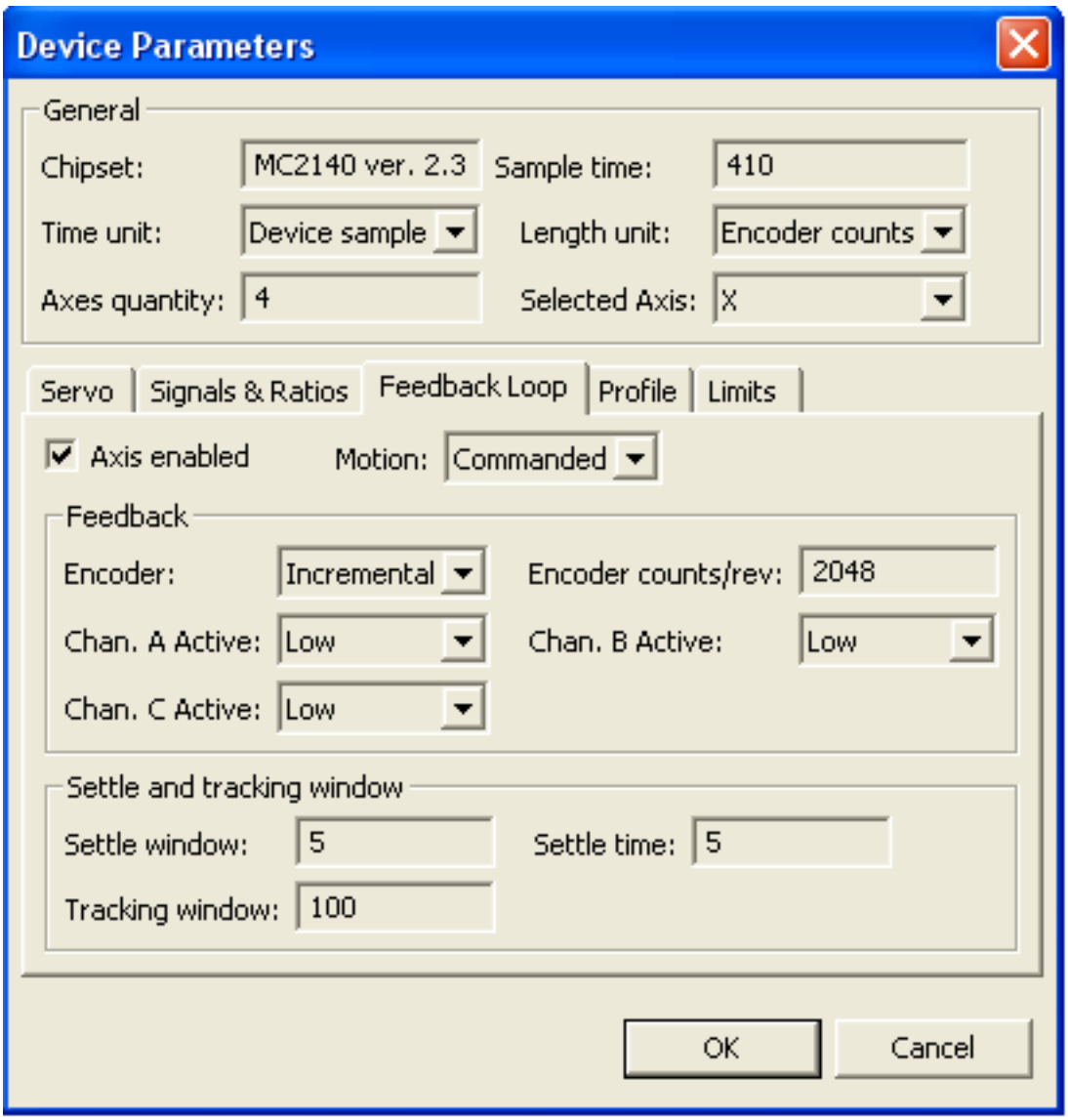
Encoder to step ratio group: ***(microstepper motors, only)***
It sets the ratio between the number of encoder counts and the number of output steps per motor rotation used by the motion processor to convert encoder counts into steps/microsteps.
Encoder counts - the number of encoder counts per full rotation of the motor.
per step - is the number of steps/microsteps output by the motion processor per full rotation of the motor.
Since this command sets a ratio, the parameters do not have to be for a full rotation as long as they correctly represent the encoder count to step ratio.

Microstepper phases group: ***(microstepper motors, only)***
Microsteps per full step – sets the number of microsteps per electrical cycle (4 times the desired number of microsteps). So for example, to set 64 microsteps per full step, the value

256 should be used. The maximum number of microsteps that can be generated per full step is 256, giving a maximum parameter for this command of 1024.
Number of phases - establishes the number of commutation phases - 1, 2 or 3, for the specified axis.
In PWM Sign/Magnitude output mode, the number of phases can be set to 1 or 2.
In PWM 5050 output mode, the number of phases can be set to 1,2 or 3.
Motor signal magnitude - loads the motor-command buffer register of the specified axis. It sets microstepping motor torque. This allows turning it down when the motor is idle, reducing power consumption and heat generation.
Scaling example:
If it is desired that a motor command value of 13.7 % of full scale be output to the motor than this register should be loaded with a value of 13.7 *32,768/100 = 4,489.

Stepper frequency group: ***(stepper motors, only)***
Maximum frequency - sets the maximum pulse rate frequency in kHz units for the specified axis.

Feedback loop tab:



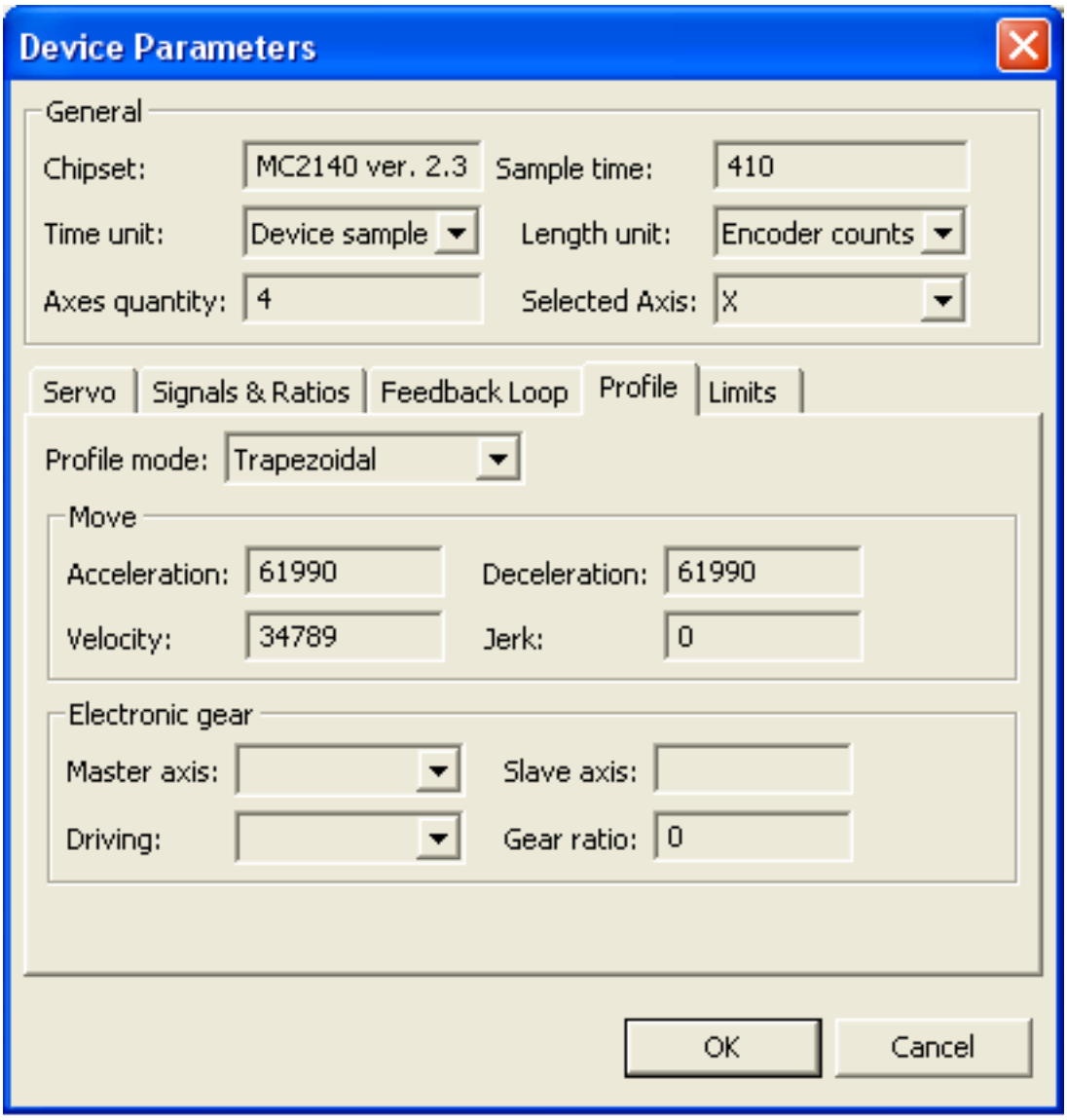
Feedback loop tab controls description:
Axis enable – enables or disables the selected axis for motion.

Motion complete - establishes the source for the comparison, which determines the motion-complete status for the specified axis. When set to commanded mode the motion is considered complete when the profile velocity reaches zero and no further motion will occur without an additional host command. This mode is unaffected by the actual encoder location. When set to actual mode the motion complete bit will be set when the above condition is true and the actual encoder position has been within the Settle Window value for the number of servo loops specified by the *Settle Time* value. The settle "timer" is started at zero at the end of the trajectory profile motion so at a minimum a delay of *Settle Time* cycles will occur after the trajectory profile motion is complete.

Feedback group:
Encoder type - sets the type of feedback (an incremental quadrature encoder or a parallel-word encoder) for the specified axis. When incremental quadrature is selected the controller expects A and B quadrature signals to be input at the I/O chip. When parallel-word is selected the chipset expects user-defined external circuitry connected to the controller external bus to load a 16-bit word containing the current position value for each axis. External feedback devices with less than 16 bits may be used but the unused bits must be sign extended or 'zeroed'.
Encoder counts/rev – sets the number of quadrature counts per full revolution of the encoder.
CH. A, B, C (encoder channels A, B and Index) - establish the sense of the encoder signals connected to the controller's specified axis. The signals can be active LOW or HIGH. Inverting the encoder A, B, or Index may prevent the index capture mechanism from operating correctly.

Settle and Tracking Window group:
Settle window - sets the position range within which the specified axis must remain for the duration specified by *Settle Time* before the axis-settled indicator (in the activity status register) is set.
Tracking window - sets boundaries for the actual position of the specified axis. If the axis crosses the window boundary in either direction, the Tracking indicator (bit 2 of the activity Status register) is set to 0. When the axis returns to within the window, the tracking indicator is set to 1.
Settle time - sets the time, in number of cycles, that the specified axis must remain within the settle window before the axis-settled indicator (in the Activity status register) is set.

Motion profile tab:



Motion profile tab controls description:
Profile mode - sets the profile mode, selecting Trapezoidal, Velocity Contouring, S-curve or Electronic gear for the specified axis.

Move group:
Acceleration - loads the maximum acceleration buffer register for the specified axis.
This command is used with the Trapezoidal, Velocity Contouring, and S-curve profiling modes. Acceleration may not be issued while an axis is in motion with the S-curve profile. Acceleration command is not valid in Electronic Gearing profile mode.
Deceleration - loads the maximum deceleration buffer register for the specified axis.
This command sets the magnitude of the deceleration register, which always has a negative sign. This command is used with the Trapezoidal, S-curve, and Velocity contouring profile modes. If deceleration is set to zero, then the value specified for acceleration will automatically be used to set the magnitude of deceleration.
Velocity - loads the Maximum Velocity buffer register for the specified axis. Velocity may not be issued while an axis is in motion with the S-curve profile. Velocity command is not valid in Electronic Gearing profile mode. The velocity must not be < 0 except in the Velocity-Contouring profile mode.

Jerk - loads the jerk register in the parameter buffer for the specified axis. This command is used only with the S-curve profile mode. It is not used with the trapezoidal, velocity contouring, or electronic gear profile modes.

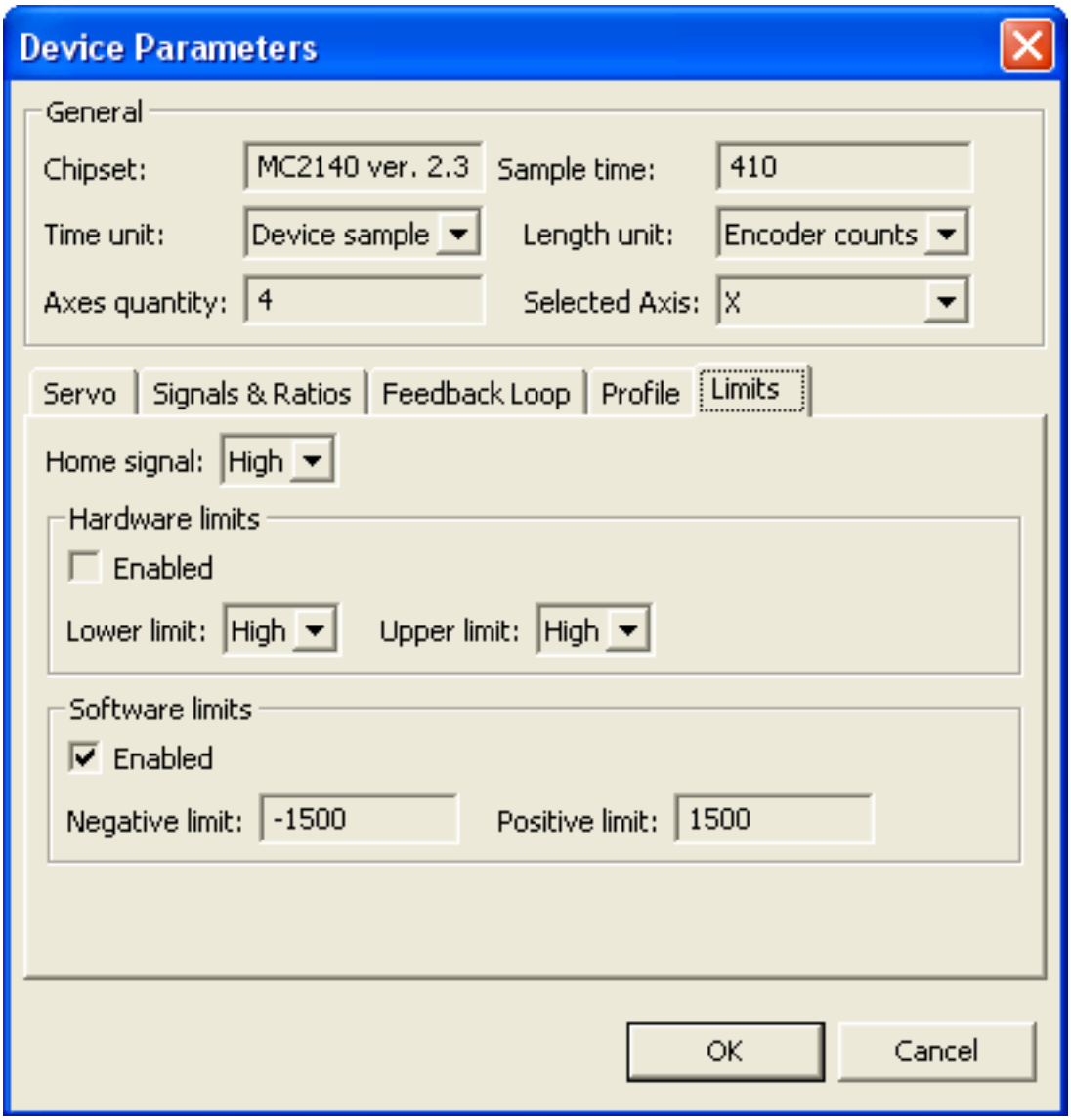
Electronic gear group:
Sets the ratio between the master and slave axes for the electronic gearing profile for the current axis. Positive ratios cause the slave to move in the same direction as the master, negative ratios in the opposite direction. The specified ratio has a unity scaling of 65,536.

Scaling examples:

ratio value	resultant ratio
-32,768	.5 negative slave counts for each positive master count
1,000,000	15.259 positive slave counts for each positive master count
123	.0018 positive slave counts for each positive master count

Master axis - establishes the master axis for the electronic-gearing profile. It determines what axis will drive the slave axis.
Slave axis - establishes the slave axis for the electronic-gearing profile.
Driving source - sets the source, Actual or Commanded, of the master axis position data to be used. The source determines whether the master axis' commanded position as determined by the trajectory generator will be used to drive the slave axis, or whether the master axis' encoder position will be used to drive the slave.
Gear ratio – displays scaled gear ratio.

Overtravel limits tab:



Overtravel limits tab controls description:
Home signal – sets the controller home signal input to be active LOW or HIGH for the specified axis.

Hardware limits group:
Enabled – enables hardware limit inputs. When limits are activated by a moving axis they cause the axis to stop.
Lower limit - sets the negative hardware travel limit switch to be active LOW or HIGH for the specified axis.
Upper limit - sets the positive hardware travel limit switch to be active LOW or HIGH for the specified axis.

Software limits group:
Enabled – enables software limits. When the software limits are reached by a moving axis they cause the axis to stop.
Negative limit - sets a value of the negative software limit for the specified axis.
Positive limit - sets a value of the positive software limit for the specified axis.

4. Motion tools

EasyMotion contains several software tools that largely help and simplify installation of a motion control system. The tools are accessible through View commands. Click on the tool you want to utilize and a new view with the tool features will appear on the computer screen.

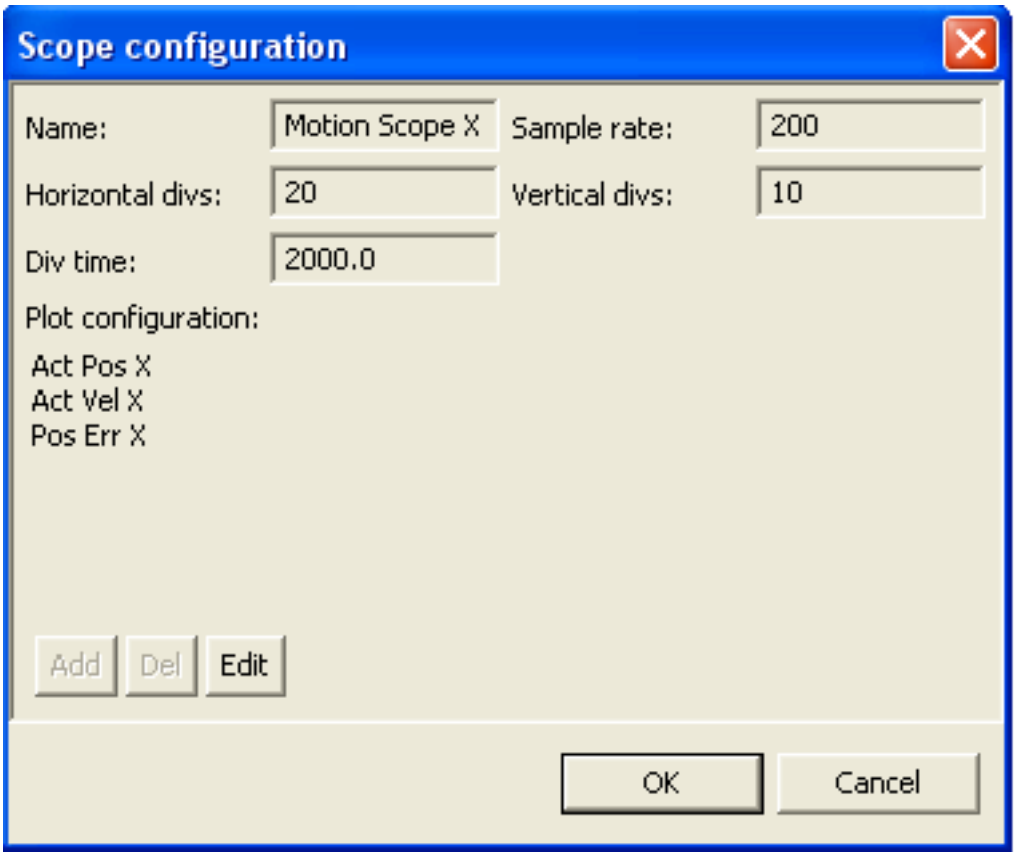
4.1. Motion Scope

Motion Scope is a great tool to graphically view output signals from feedback devices. The scope allows viewing in real time on continuous basis 3 different signals (actual position, position error and actual velocity) of up to 4 axes of motion. The feedback data can be acquired into a file starting on different trigger signals and stopped after a predefined time has elapsed or a number of data points gathered.

Generating input signals allows viewing the system response. With this feature the user can tune gains of the control filter for precise and smooth motion. Closed or open loop methods can be used alternatively. In the closed loop method select a control filter type and speed profile you want to tune your axis with. Then play with the gains to obtain the desired graph shape: little or no overshoot and quick settling time.

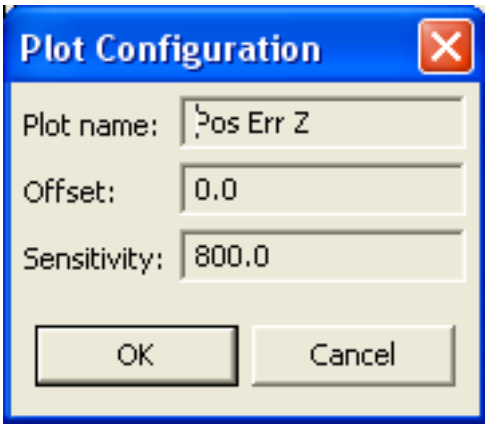
Choose View | Motion Scope command to activate a scope view from the list. To use the scope double click on the desired scope view. It activates the Scope configuration dialog box that provides controls and settings for the scope. Use Edit button in the Scope configuration dialog to alter plot settings.

Scope configuration dialog:



Scope configuration dialog description:
Name - input axis name for which the settings need to be made.
Sample rate - sets the number of data points per division.
Horizontal divs – sets the number of horizontal grid lines
Vertical divs – sets the number of vertical grid lines
Dive time - sets the scope time base per division.
Plot configuration – lists plots that are displayed at that scope view. Highlighting a listing element allows to use function buttons to alter the listing.
Add –allows adding a new data value to be displayed on the scope view.
Del – allows deleting a data value from the scope view
Edit - enters into the Plot configuration dialog

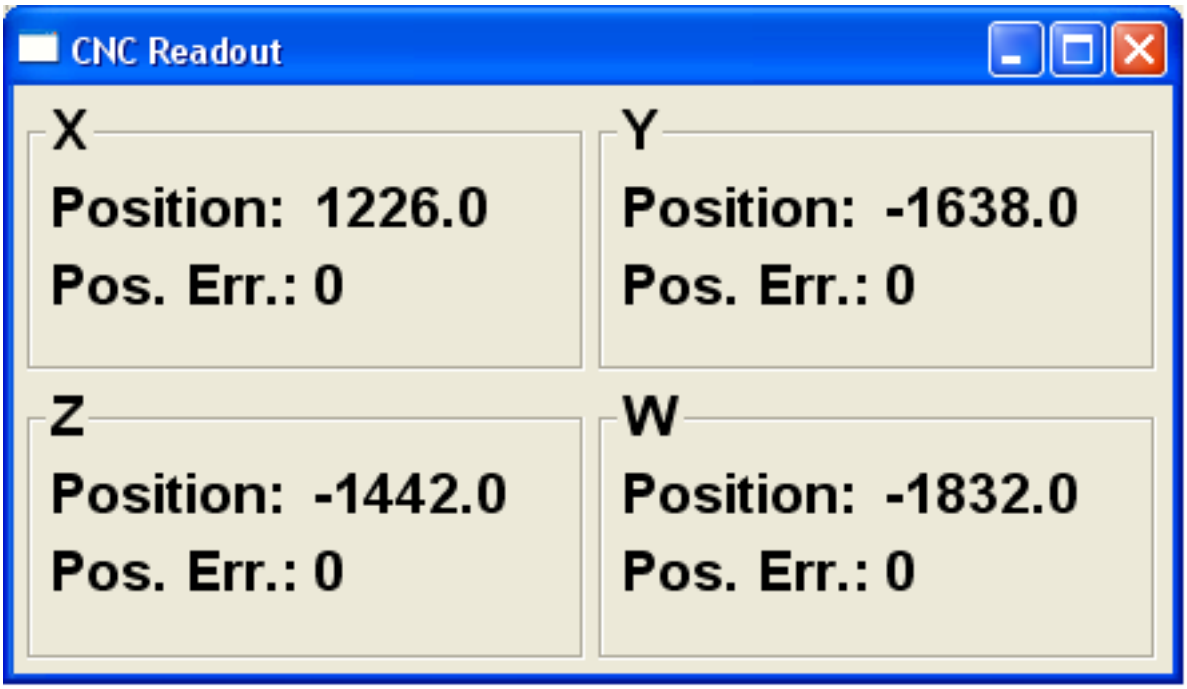
Plot configuration dialog:



Plot configuration dialog description:
Plot name – allows naming the plot's Y axis
Offset – adjusts graph position on the scope view.
Sensitivity – defines the signal gain on the scope view.

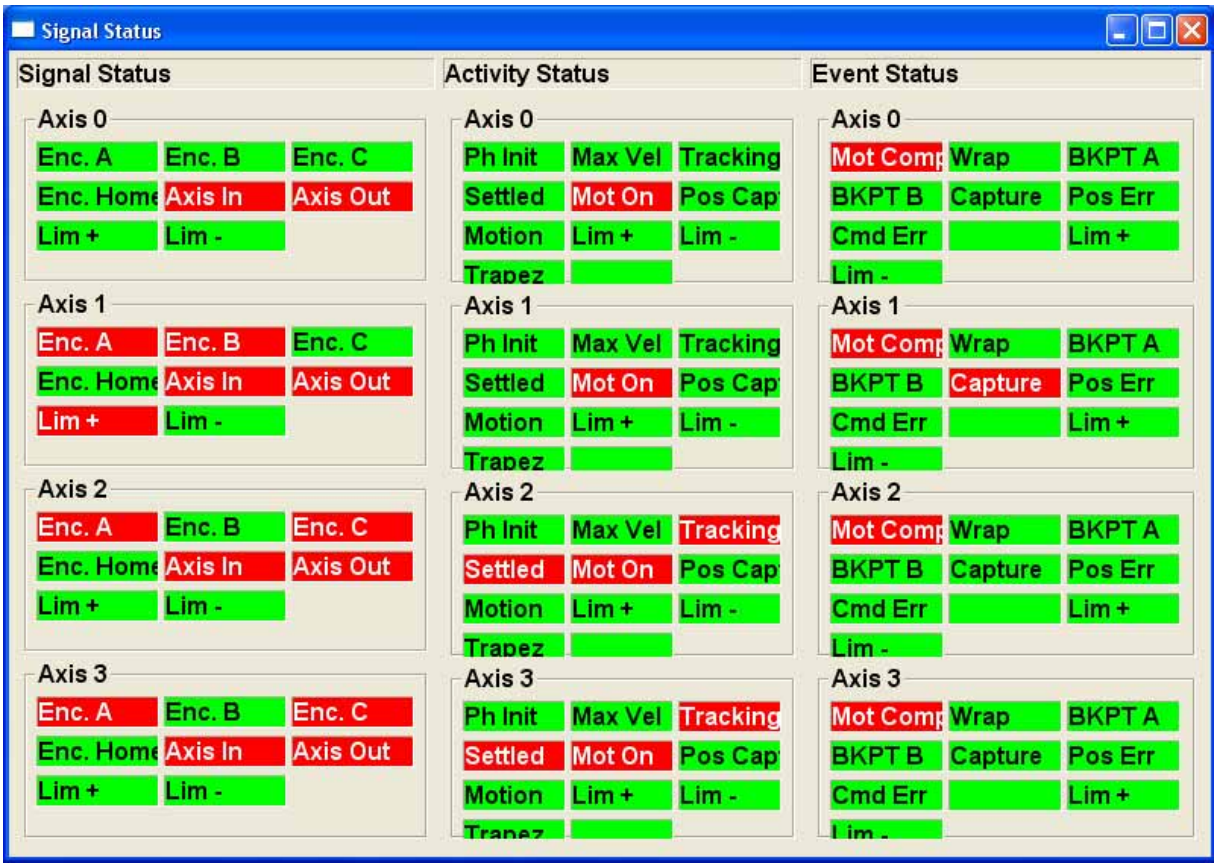
4.2. CNC readout

Choose View | CNC readout command to activate the digital readout view from the list. This command activates a view where actual position and position error of each axis are displayed in large fonts. The view can be resized to be visible from further distance.



4.3. Controller Status

Choose View | Signal status command to activate a status view from the list. It activates a view window that shows status information of the control card updated in real-time.



Signal Status View – displays the contents of the signal status register for the specified axis. The signal status register contains the current value of various hardware signals connected to each axis of the controller. The value read is combined with the signal sense register (Signal Sense command) and then returned to the user. For each bit in the Signal Sense register that is set to 1 the corresponding bit in the Signal Status command will be inverted, so that a low signal will be read as 1 and a high signal will be read as 0. Conversely, for each bit in the Signal Sense register that set to 0 the corresponding bit in the Signal Status command is not inverted, so that a low signal will be read as 0 and a high signal will be read as 1. All of the bits in the Signal Status command are inputs except for AxisOut. The value read for this bit is equal to the current value output by the axis out mechanism.

Activity Status View - displays activity status register for the specified axis. Each of the bits in this register continuously indicates the state of the motion processor without any action on the part of the host. There is no direct way to set or clear the state of these bits, since they are controlled by the processor.

Status Signal	**Description**
Phasing initialized	Set when phasing initialized (*brushless motors only)*
Max. Velocity	Set when the trajectory is at maximum velocity. This bit is determined by the trajectory generator, not the actual encoder position.
Tracking	Set to when the axis is within the tracking window.
Profile	Displays the current trajectory profile mode: trapezoidal, velocity contouring, S-curve or electronic gear.
Axis	Set when the axis is settled

Motor	Set when the motor mode is On, or Off.
Position	Set when a value has been captured by the high speed position capture hardware but has not yet been read
In Motion	Set when the trajectory generator is executing a profile on the axis.
Positive limit	Set when the positive limit switch is active
Negative limit	Set when the negative limit switch is active
S-curve phase	Only used during S-curve profile mode. Contains value of 0 when the profile is at rest. Contains phase number 1-7 when profile is in motion.

Event Status View – displays the event signals for the specified axis. All of the bits in this status word are set by the chipset and cleared by the host.

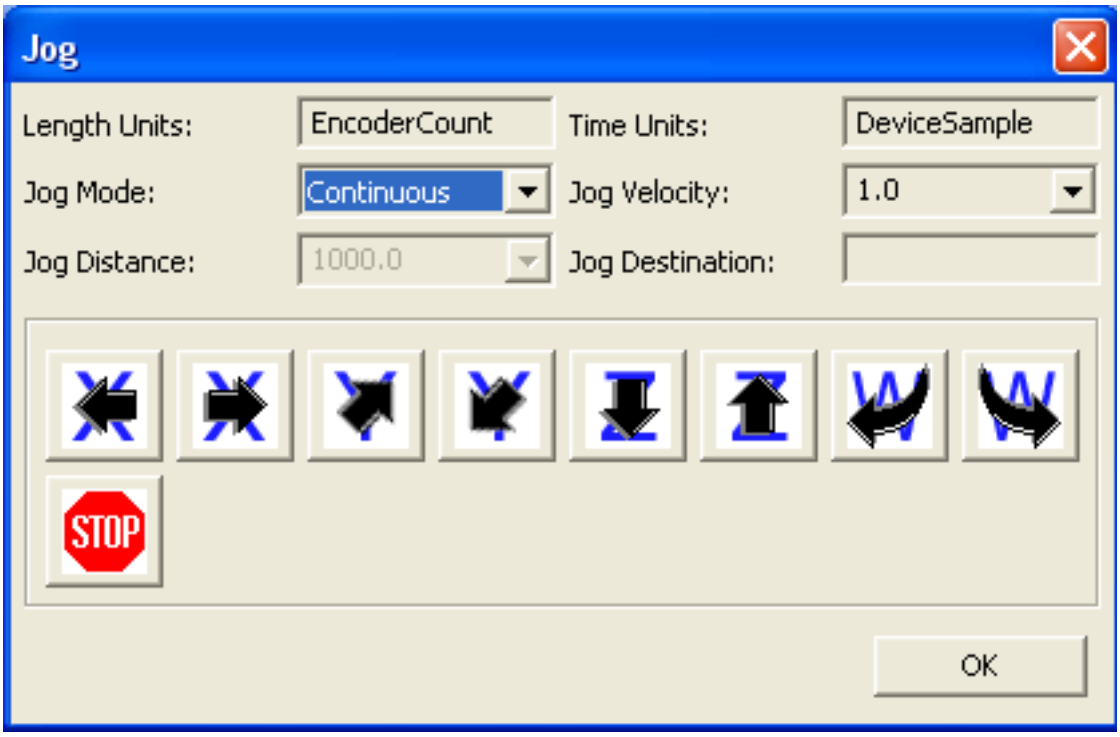
Status Signal	**Description**
Motion	Set when motion is completed. Motion Complete Mode command determines if this signal is based on the trajectory generator position or the encoder position.
Wrap-around	Set when the actual (encoder) position wraps from maximum allowed position to minimum or vice versa.
Breakpoint A	Set to when a breakpoint A is triggered.
Capture	Set when a position capture occurs.
Position	Set when a motion error occurs.
Positive limit	Set when the axis enters a positive limit switch condition.
Negative limit	Set when the axis enters a negative limit switch condition.
Command error	Set when an instruction error occurs.
Breakpoint B	Set to when a breakpoint B is triggered.

5. Jogging Axes

After successful installation of the control board and proper tuning of the filter gains the system is ready to perform motion. Axes jogging can be executed in the negative or positive direction using screen's soft buttons. Clicking the mouse's left button over the jogging switch starts desired motion. In continuous mode an axis runs as long as the button is pressed. In incremental mode every jog step requires separate key pressing. Jogging can be executed any time, except when a program is running.

Choose Control | Jog command to displays a dialog box in which you can set jogging parameters.

Jog dialog:



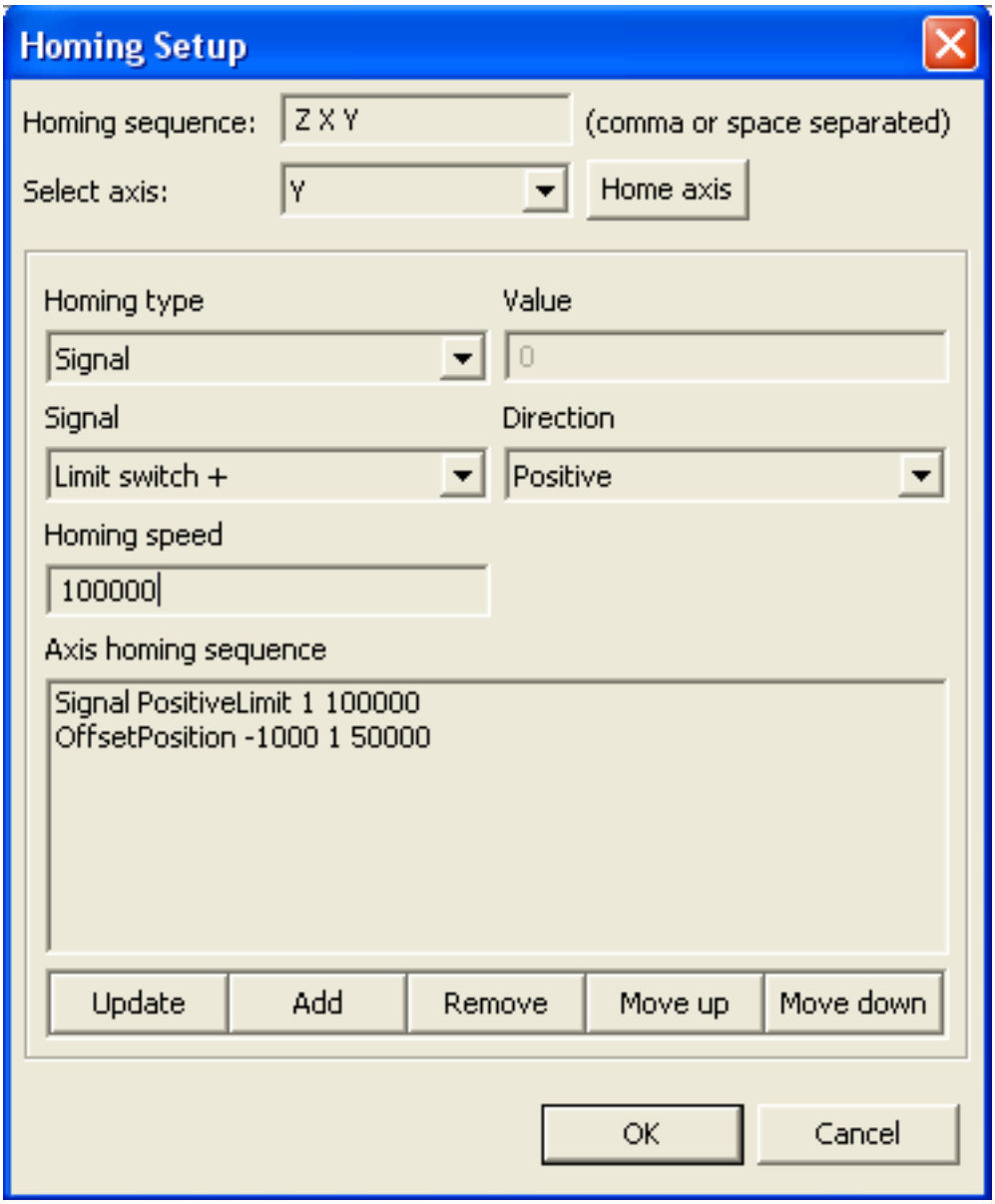
Jog dialog controls description:
Length units – specifies length units in which axis jogging will be preformed.
Time units – specifies time units in which axis jogging will be preformed.
Jog mode – this lists allows choosing different modes of jogging – incremental, continuous and absolute.
Jog velocity - defines jogging velocity.
Jog distance – when the incremental mode is set, this lists becomes active and provides selection of jogging intervals expressed in units set in the Length units field.
Jog destination – when the absolute mode is set, this field is used to define destination point to which an axis will be moved.
Jogging buttons – define specific direction of motion of an axis in the CNC way. Thus first set of two arrows moves the X axis (axis 0 in the control card standard) respectively in the negative and positive direction, then axes Y, Z and W follow.
STOP button – is used to instantaneously stop the axis motion.

6. Homing Axes

Typically homing is performed either to a dedicated home switch or to one of the travel limit switches. Depending on a mechanical device's configuration, axes move to home position either into negative or positive direction. After the switch is triggered (coarse home position), an axis moves off in the opposite direction to the encoder index pulse (fine home position). If needed, additional position offset can be defined.

Choose Setup | Homing Setup command to define homing procedure in a dialog box.

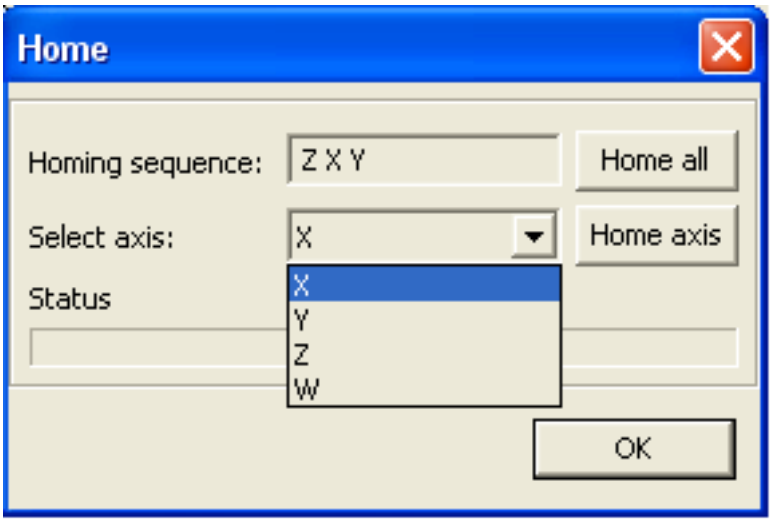
Homing setup:



Homing Setup dialog controls description:
Homing sequence - defines a sequence, in which the axes should be safely homed. The axis names should be separated by a comma or a space.
Select axis - define a separate homing process for every axis from this list
Home axis button – pressing the button starts homing process for this axis. It allows to quickly verify the homing procedures performance.
Homing type – lists Signal and Position as the homing destination trigger signals.
Value – when the Position is chosen as the destination signal, this field value indicates, what position the axis should be driven to.
Signal – a hardwired signals to the control cards can be used as homing trigger. The axis can be driven to the negative, positive or home switch.
Direction – indicates, whether the axis should run to the trigger signal in the negative or positive direction. In case of the Position as a trigger signal, direction is irrelevant, since the position value already defines it.
Homing speed – defines homing velocity, which the axis should be driven with to its trigger signal.

Axis homing sequence – this display field shows sequence and move parameters of the homing procedure stages for this axis.
Update – an edit button to update changes made to the homing parameters for the highlighted homing step.
Add – an edit button to add a new homing step to the sequence.
Remove – an edit button to remove the highlighted homing step from the sequence.
Move Up – an edit button to move the highlighted field up along the homing sequence.
Move Down - an edit button to move the highlighted field down along the homing sequence.

Home dialog:

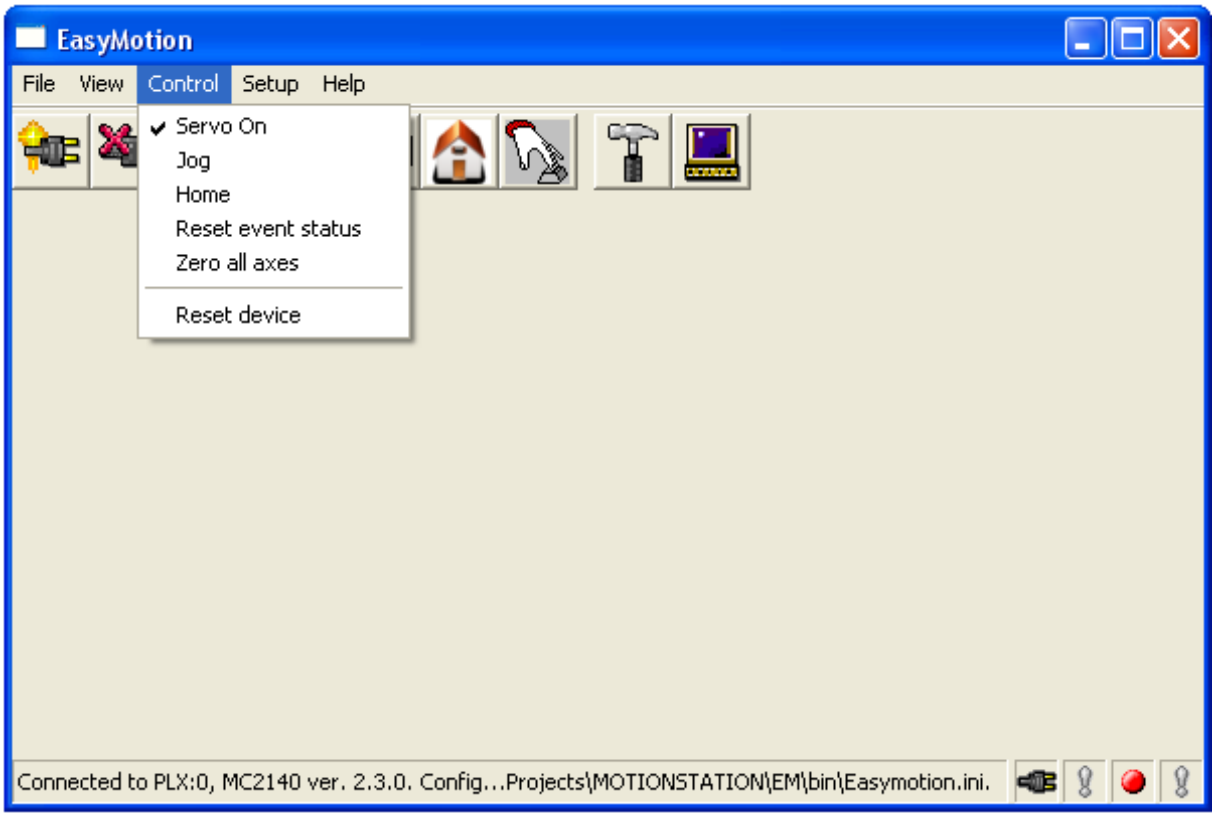


To actually execute the homing process, choose Control | Home command. Before starting a program or the soft limits to take an effect, the homing procedure has to be performed. The homing can be performed any number of times.

Home dialog controls description:
Homing sequence - shows the sequence, in which the axes can be safely homed.
Home all – starts the homing process of all the axes.
Select axis – lists axes that can be homed individually.
Home axis – starts the homing process of the selected axis.
Status – field displaying the current status of the homing process.

7. Control utilities

There are a few utility procedures that can be useful while working with the motion control system.



7.1. Servo On *(servo cards, only)*

Choose Control | Servo On to close the servo feedback loop. The servo should be switched to the On mode after the servo filter parameters are properly chosen in the tuning process. If unchecked, the system is set to the open loop mode and certain procedures, as jogging and homing, cannot be performed.

7.2. Reset event status

Choose Control | Reset event status to clear all the status register bits.

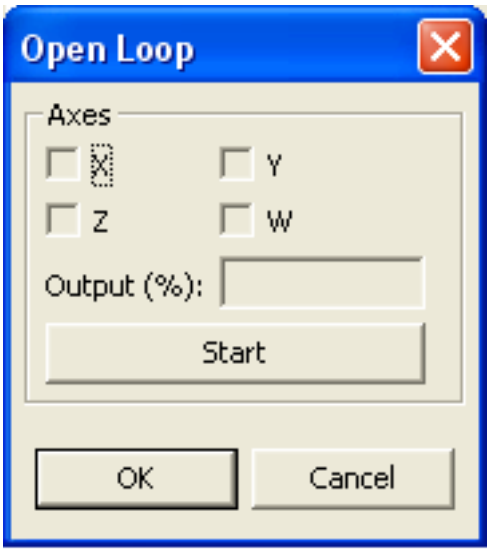
7.3. Zero all axes

Choose Control | Zero all axes to set to zero the actual position of all the axes of motion.

7.4. Reset device

Choose Control | Reset device to execute command that resets the motion control board. The default values are loaded to the board.

8. Open Loop mode *(servo cards, only)*



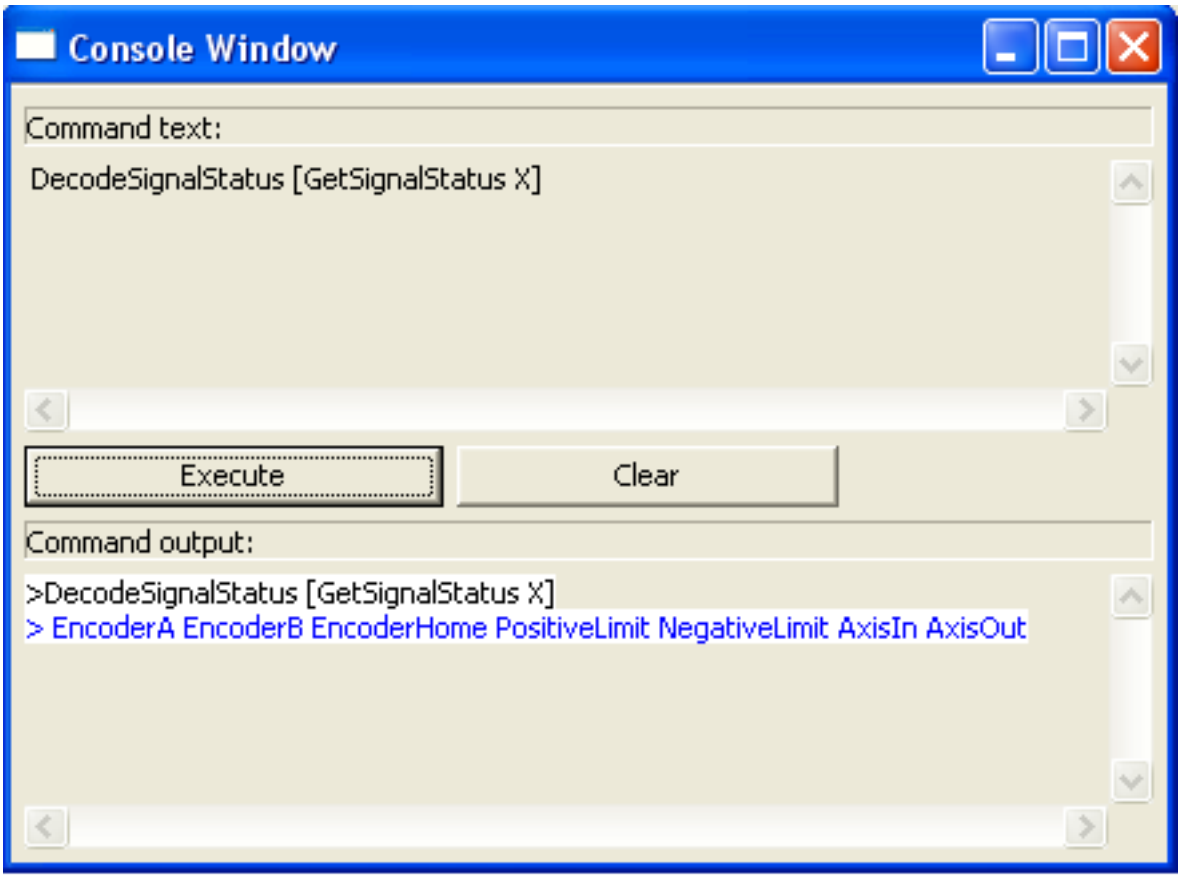
There are some situations when it is not desired to run axes in the closed loop feedback. It can take place when the user needs to check a servo amplifier, or a controller board is misbehaving in the closed loop and the problem separation is needed, or an axis has to be moved only to test the encoder readout. For this purpose axes can be run in the open loop mode.

Choose Setup | Open Loop command to display a dialog box in which you can perform axes open loop motion.

Open Loop dialog controls description:
Axes group - check axes to be in the open loop.
Output (%) – in this field a value from a range of 0 – 100% can be specify to output a motor signal value proportional to this output value. A minus sign in the front of the value indicated a negative value of the motor signal. For example, when the card operates in the analog output mode in the range of +/ 10V, 50% output value causes 5V output signal to a servo amplifier.
Start – commands the card to output the value set in the Output field. If a motor is connected to the card, actual motion can occur. It is strongly recommended to use this procedure with extreme caution. While the appropriate precautions are undertaken it becomes a powerful tool to check drives or motor condition.

9. Console.

Choose Setup | Console command to display a dialog box in which you can enter the PMD chipset and the CyberMotion sets of commands. This way direct communication with the controller board can be tested and the results of low-level commands examined.


Console Window
Command text:
DecodeSignalStatus [GetSignalStatus X]
Execute
Clear
Command output:
>DecodeSignalStatus [GetSignalStatus X]
> EncoderA EncoderB EncoderHome PositiveLimit NegativeLimit AxisIn AxisOut