



# ServoStudio

## Reference Manual

# stepIM

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**Software Version: 1.41**

**Firmware Version: 0.0.2.79**





## Revision History

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1.0	Mar. 2016	Initial release.

Firmware Version	Software (GUI) Version
0.0.2.79	1.41.1.13

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# **1 Introduction**

## **1.1 ServoStudio Overview**

ServoStudio is a graphical user interface (GUI) supplied with the stepIM to enable setup, configuration and tuning of the servo drive. It also allows you to set certain parameters for the stepIM motor and the particular application in which the stepIM is used.

## **1.2 Manual Format**

This manual describes the screens, menus and functions in ServoStudio.

For detailed instructions on commissioning the stepIM, refer to the stepIM User Manual.

## 2 Software Setup

### 2.1 Computer Requirements

For proper graphic display of ServoStudio, the following is required.

- Screen resolution 1280x800 (recommended).  
Minimal resolution is 1024x768.
- Windows 7 **Display** settings must set to **Smaller – 100% (Default)**.

### 2.2 Software Installation

1. Download ServoStudio software from the Servotronix website or contact Technical Support.
2. Install ServoStudio software on the host computer.
3. When installation is complete, start ServoStudio from the Windows Start menu or the shortcut on your desktop.

### 2.3 Drive Selection

When ServoStudio is first activated after installation, it may prompt you to select the drive you are using.



**Figure 2-1. Drive Selection**

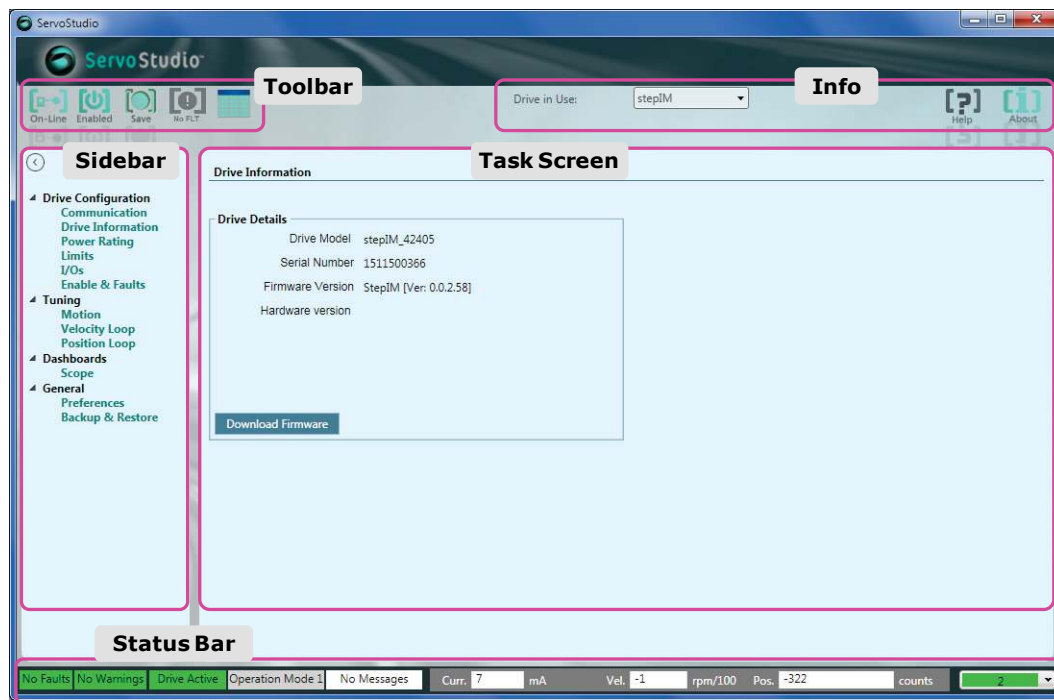
After installation, the selected drive can be changed through the **Drive in Use** option at the top of screen.





## 3 Software Interface Elements






### 3.1 ServoStudio Screen Components

The ServoStudio software window has five main function areas:



**Figure 3-1. ServoStudio Software for stepIM**

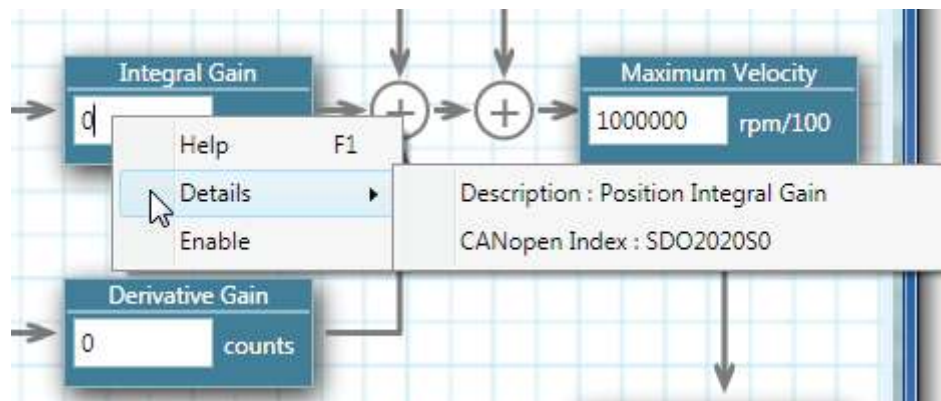
	<b>Toolbar</b>	Contains quick access buttons for frequently used functions.
	Offline   Online	<p>Toggles ServoStudio communication with the drive off and on, and indicates the state of the connection.</p> <ul style="list-style-type: none"> <li>■ <b>Offline</b> mode: ServoStudio does not attempt to communicate with the drive.</li> <li>■ <b>Online</b> mode: ServoStudio continually communicates with the drive to read parameters and status.</li> </ul> <p><b>Note:</b> It is recommended to switch to Offline mode before physically disconnecting the drive or powering off the drive.</p>
	Enable   Disable	Enables and disables the stepIM, and indicates the state of the stepIM.

	Save	Saves the parameter values currently in the drive RAM to the drive's non-volatile memory. These values will be loaded to drive RAM at power-up. Use <b>Save</b> after configuring parameters to keep values in non-volatile memory.
	No Fault   Clear Fault	Indicates whether a fault exists. When lit, click to send a clear faults command to the drive.
	CANopen Objects Table	Opens a screen that allows you to access and modify the values of the CAN objects. Refer to <i>CANopen Objects Table</i> .
	<b>Info</b>	
	Drive in Use	Shows the drive detected (online), or the drive defined for offline use.
	Help	Online help for ServoStudio software. Also includes help for drive hardware and VarCom. In addition, use <b>F1</b> or the right-click shortcut menu to activate Help for the currently selected field.
	About	Software version information.
	<b>Sidebar</b>	Contains a navigation menu to the various ServoStudio screens. The sidebar can be hidden or displayed using the Arrow button.
	<b>Task Screen</b>	Displays various interactive screens for viewing, setting and testing parameters and drive configurations. These screens are described in detail in other sections throughout this manual.
	<b>Status Bar</b>	Displays the status of the drive.
	Faults	This segment of the status bar is <b>green</b> as long as no faults exist; it is <b>red</b> whenever a fault exists. Hovering the mouse over <b>Faults</b> displays the fault/s. Click <b>Faults</b> to open the Enable & Faults screen. Right-click to clear faults.
	Warnings	This segment of the status bar is <b>green</b> as long as no warnings exist; it is <b>yellow</b> whenever a warning exists. Click <b>Warnings</b> to open the Enable & Faults screen. Right-click to clear fault/s.

Drive Active   Drive Inactive	This segment of the status bar is <b>green</b> when the drive is enabled (active); it is <b>red</b> when the drive is disabled (inactive). Click to open the Enable & Faults screen. Right-click <b>Drive Active</b> to disable drive.
Operation Mode	This segment is <b>gray</b> . It indicates the currently defined operation mode. Right-click to select and change the operation mode.
Messages	Notifications from ServoStudio that do not require immediate attention. They are saved and displayed upon request; you can continue normal work without viewing them. Click <b>New Messages</b> to see the message text. You can scroll through and delete messages in the dialog box. Right-click <b>New Messages</b> on the status bar to delete all messages in the log.
Current	Motor current. Shows the equivalent motor current. <a href="#">Object 6078h</a>
Velocity	Motor velocity. Shows the velocity of the motor according to the primary feedback. <a href="#">Object 606Ch</a>
Position	Motor position. Shows the actual motor position according to the primary feedback. <a href="#">Object 6064h</a>
Offline   Online	When ServoStudio has established communication with a drive, this segment is <b>green</b> , and displays the address and name of the drive. When ServoStudio has not established communication with a drive, this segment is <b>red</b> and displays <b>Offline</b> .

## 3.2 Help

Right-click on any field, button or menu item in ServoStudio to open a Help shortcut menu. The shortcut menu provides access to the most common functions associated with the selected element, depending on context.



**Figure 3-2. Right-Click Help Shortcuts**

<b>Help</b>	<b>F1.</b> Activates online help for the currently selected screen element.
<b>Enable   Kill</b>	Toggles the Enable/Disable state of the drive.
<b>Clear Faults</b>	Displayed when faults exist. Sends a clear faults command to the drive.
<b>Details</b>	<b>Description.</b> A brief description of the parameter. <b>CANopen Index.</b> The comparable CANopen object.

### 3.3 Parameters



**Disable the stepIM before manipulating motor and feedback parameters.**

Many parameters can be modified while the stepIM is enabled.

Exercise caution, however, as motor behavior will change.

If a parameter cannot be modified while the stepIM is enabled, ServoStudio will prompt you to disable the stepIM.

#### 3.3.1 Data Entry

Throughout ServoStudio, you will work with fields containing configurable (read/write) drive parameters.

Whenever you begin entering a parameter value, the field turns blue.

After entering or modifying a value, press the **Enter** key to send the value to the drive RAM.

- If the value entered is valid, the field reverts to white.
- If the value entered is invalid, the last valid value is displayed.

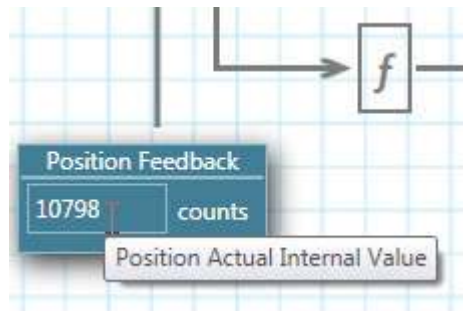
Gray fields are read-only; the displayed values cannot be modified.

In ServoStudio, drive parameters may be saved to the drive's non-volatile memory at any time by clicking the **Save** button on the toolbar.

### 3.3.2 Schematics

ServoStudio uses schematic diagrams in many of the configuration and tuning screens to help you visualize and correctly set values for required parameters.

Hover over a parameter field to view its description and CANopen object name.



**Figure 3-3. Schematic Tooltip**

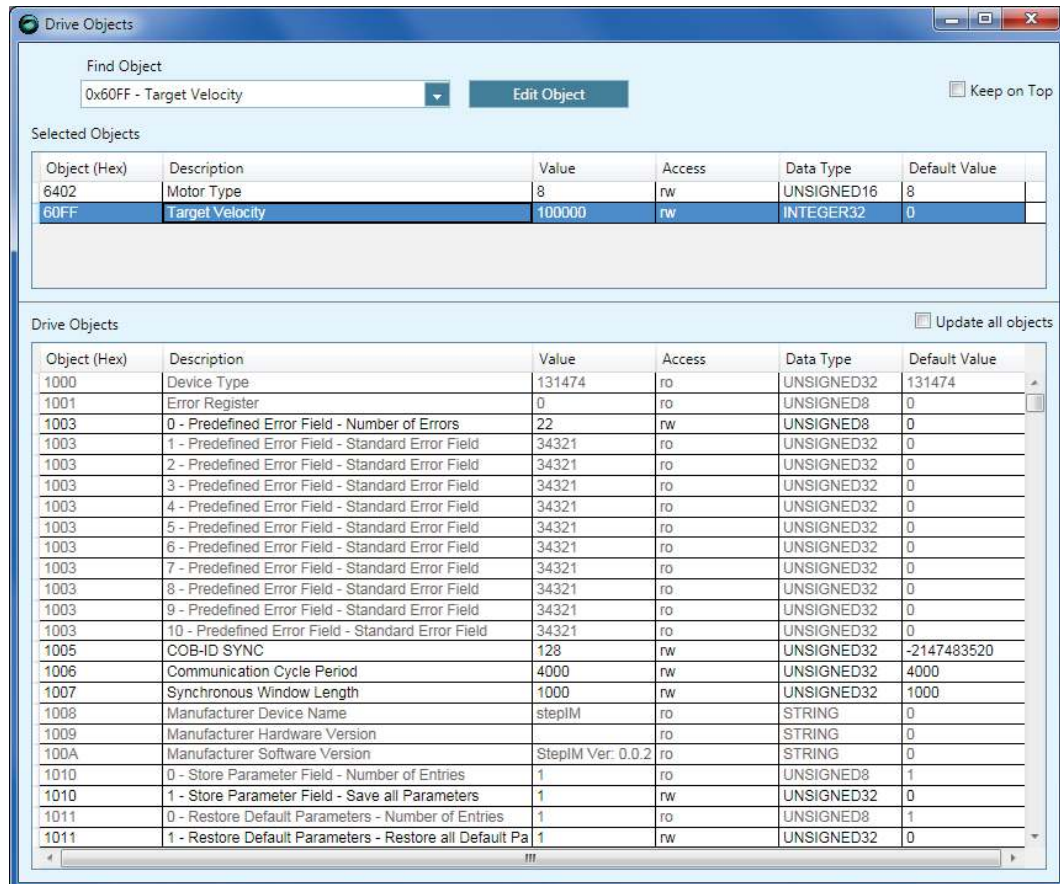
Some of the fields in these screens are read-only. Their values are entered automatically according to the motor defined in the Motor screen and/or settings defined elsewhere in the software.

Other fields in these schematic screens are configurable (read/write).

After entering or modifying a value, press **Enter** to send the value to the drive RAM.

## 4 CANopen Objects Table

The CANopen Objects Table allows you to access and modify the values of the CAN objects.



**Figure 4-1. CANopen Objects Table**

The table is a floating screen. It remains open and accessible even when other task screens are in use.

**Note:** The Objects Table screen closes automatically if the active drive is switched to another drive.

To access an object, start typing in the **Find Object** field. As you begin typing an object number or name, a list of possible matches appear.

Click on the object you want to modify and click **Edit Object**. The object is copied to the **Selected Objects** table.

Click on the object's **Value** field to modify the value. An object in gray (text/cell) is read only and cannot be manipulated.

Right-click on the **Selected Objects** table allows you to delete a row, or the entire table.

You can also scroll through the entire list of **Drive Objects** and manipulate values directly within that table.

## 5 Communication

The drive and host computer communicate over a CANopen network. A Kvaser USB-CAN interface is typically used to connect the stepIM to the computer to enable communication with ServoStudio software.

The ServoStudio **Communication** screen is used to establish communication between the computer and the stepIM.

Multiple stepIM units can be accessed through the same instance of ServoStudio provided they are all on the same CANopen network.

To select a drive, click on the drive's node ID in either the Communication screen or in the **Switch to Drive** menu in the status bar.

**Figure 5-1. ServoStudio – Communication Screen**

Bit Rate	The stepIM is factory-defined with default setting of CAN bit rate 1000 kps.
<b>Connect</b>	The software attempts to connect to drive/s defined by the search.
<b>Go Offline</b>	To use ServoStudio without connecting to the drive, click <b>Go Offline</b> .
Address	The software attempts to detect a drive at the specified address. The factory default address for all drives is 101.
Start Address End Address Connect Address Range	The software attempts to detect all drives within the address range defined by Start Address and End Address. The address range is limited from 1 to 127.

**IDs to Connect**

Displays the node IDs of all drives detected.

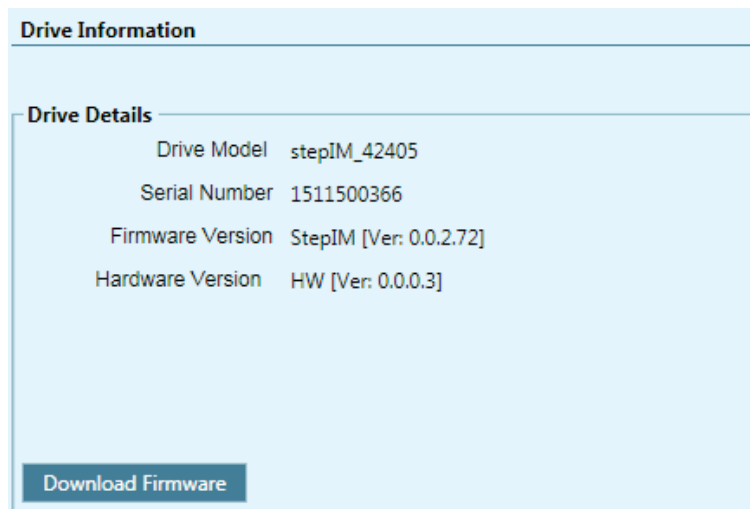
The green node ID indicates the drive with which ServoStudio is currently communicating. To communicate with a different drive, click on that drive's node ID.



## 6 Drive Information

The **Drive Information** screen displays basic information about the drive, such as current rating, hardware version and firmware version. It is important to provide this information to Technical Support when asking for assistance.

The **Drive Information** screen also provides access to the Firmware Download utility.



**Figure 6-1. ServoStudio – Drive Information Screen (sensAR)**

<b>Drive Details</b>	Hardware-defined. Read only. Shows the drive model and serial number, and version numbers of the firmware and hardware.
<b>Download Firmware</b>	Activates the installation procedure for new versions of drive firmware. Refer to the drive user manual for firmware upgrade instructions.

## 7 Power Rating

The **Power Rating** screen displays the continuous and peak current ratings of the stepIM, and allows you to set the bus over- and under-voltage parameters.

**Figure 7-1. ServoStudio – Power Rating Screen – Main**

<b>Current Rating</b>		
Motor Rated Current	The continuous current of the stepIM. This value is obtained from the motor datasheet/electronic nameplate. It can be manipulated up a predefined factory setting.	<a href="#">Object 6075h</a>
Peak Current	The peak rated current of the stepIM. It can be manipulated up a predefined factory setting.	<a href="#">Object 2036h</a>
<b>Temperature</b>		
Control Board	The temperature of the drive electronics board, in Celsius degrees. Read only.	<a href="#">Object 2044h</a>
<b>Bus Voltage Limits</b>		
Over-Voltage Threshold	Shows the level for detection of bus over-voltage. Range: 11500 to 52000	<a href="#">Object 20A1h</a>
DC Link Circuit Voltage	Defined in hardware. Read only.	<a href="#">Object 6079h</a>
Under-Voltage Threshold	Defines the level for detection of bus under-voltage condition. Range: 12600 to 52000	<a href="#">Object 20CFh</a>

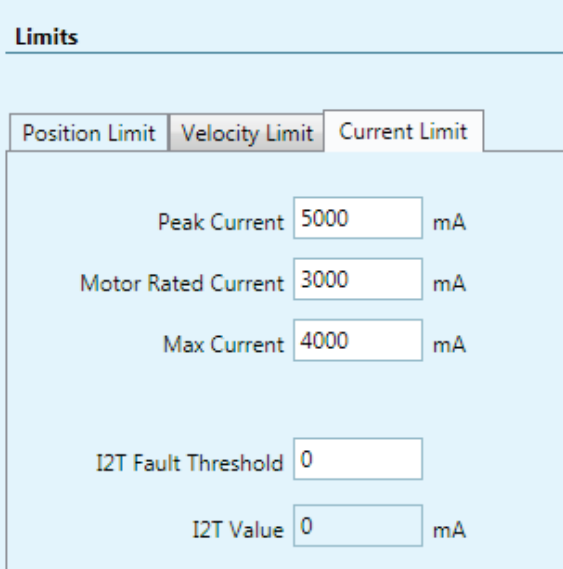
## 8 Limits

The **Limits** screen has three tabs:

- Current Limit
- Velocity Limit
- Position Limit

### 8.1 Current Limit

The **Current Limit** screen contains a diagram that shows how the maximum current for the system is determined, and enables you to set the current limit for your application.



The screenshot shows the 'Limits' screen with the 'Current Limit' tab selected. The settings are as follows:

Parameter	Value	Unit
Peak Current	5000	mA
Motor Rated Current	3000	mA
Max Current	4000	mA
I2T Fault Threshold	0	
I2T Value	0	mA

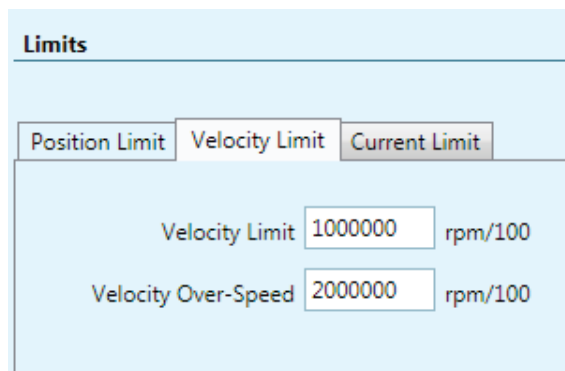
**Figure 8-1. ServoStudio – Current Limit Screen**

Peak Current	The peak rated current of the stepIM. It can be manipulated according to factory-defined limits.	<a href="#">Object 2036h</a>
Motor Rated Current	The continuous current of the stepIM. This value is obtained from the motor datasheet/electronic nameplate. It can be manipulated according to factory-defined limits.	<a href="#">Object 6075h</a>
Maximum Current	The maximum current for generating torque in the motor.	<a href="#">Object 6073h</a>

I2T Threshold	The threshold value for the I2T integrator. A fault condition occurs when the I2T value exceeds the threshold value. When set to 0, the I2T threshold function is disabled.	<a href="#">Object 2034h</a>
I2T Value	The I2T integrator represents the energy delivered to the motor over the maximum allowed continuous energy; it is calculated as follows: $I2T = \int (I_{cont} - I)^2 dt$	<a href="#">Object 2033h</a>

## 8.2 Velocity Limit

The **Velocity Limit** screen contains a diagram that shows how the maximum velocity for the system is determined, and enables you to set the velocity limit for your system accordingly.



**Figure 8-2. ServoStudio – Velocity Limit Screen**

Velocity Limit	The maximum velocity of the stepIM.	<a href="#">Object 20EEh</a>
Velocity Over-Speed	The velocity value that triggers the over-speed protection fault.	<a href="#">Object 2F0Ah</a>

## 8.3 Position Limit

The **Position Limit** screen contains elements that indicate the status of limit switches, and define if and how software position switches are used as motion limit switches.

**Figure 8-3. ServoStudio – Position Limit Screen**

<b>Position Error</b>		
Following Error Window	The maximum position error allowed without producing a fault; in counts.	<a href="#">Object 6065h</a>
Position Window	The error tolerance for declaring an "in position" state.	<a href="#">Object 6067h</a>
<b>Hardware Position Limits Error</b>	The inputs that indicate whether position limits have been reached in the positive and negative direction.	
<b>Software Position Limits</b>		
Software Position Limit Mode	Enables and disables the use of software position limits. 0 = Software position limits disabled. 1 = Software position limits enabled.	<a href="#">Object 20ACh</a>
Maximum   Minimum Software Position Limit	The maximum and minimum values, in counts, for the software position limits.	<a href="#">Object 607Dh sub-index 2</a> <a href="#">Object 607Dh sub-index 1</a>

## 9 Inputs/Outputs

The **I/Os** screen enables you to configure functionality and polarity of the digital I/Os, and to monitor the state of all digital I/Os. It also allows you to set the analog input offset and to monitor the analog input.

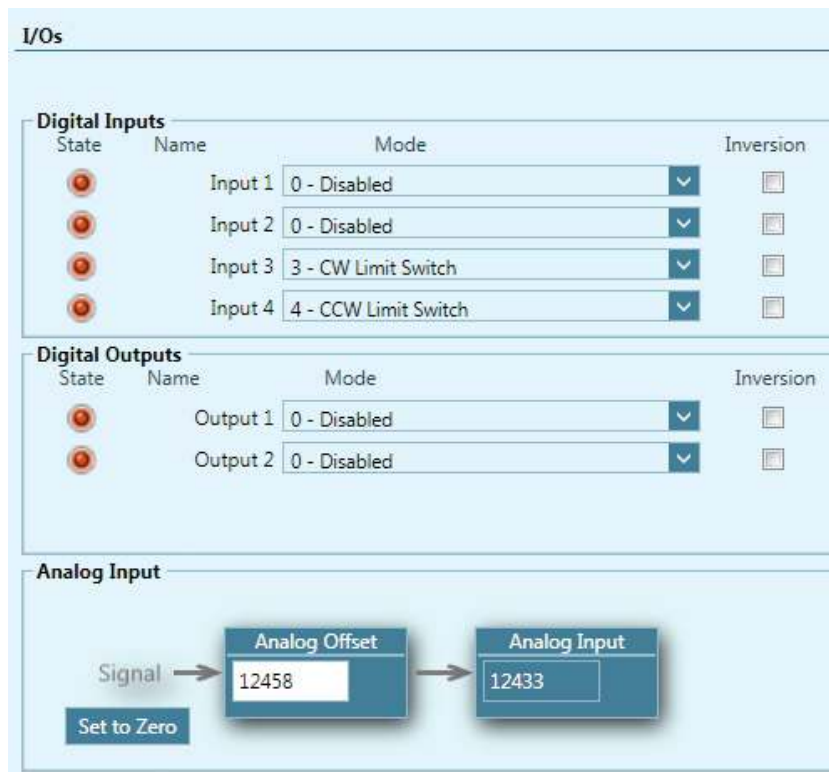


Figure 9-1. ServoStudio –I/Os Screen

### 9.1 Digital Inputs

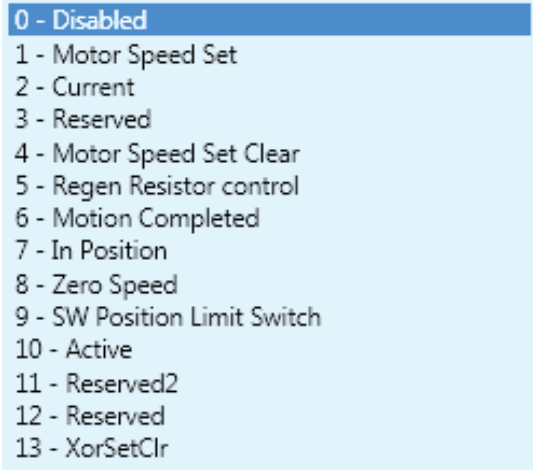
The **Digital Inputs** pane in the **I/Os** screen allows you to configure functionality and polarity of the digital inputs, and to monitor the state of the digital inputs.

<b>State</b>	A graphic element that toggles between green and red to reflect the on or off state of the actual input.
<b>Name</b>	Identifies the specific input.
<b>Mode</b>	Defines the functionality of the digital input. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <ul style="list-style-type: none"> <li>0 - Disabled</li> <li>1 - General</li> <li>2 - Homing</li> <li>3 - CW Limit Switch</li> <li>4 - CCW Limit Switch</li> <li>5 - Remote Enable</li> <li>6 - Start motion command for profiled position operation mode</li> </ul> </div>

<b>Inversion</b>	Inverts the polarity of a digital input. Select the option to invert the polarity. As a result of inversion, the LED graphic in the software immediately changes color.
------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------

## 9.2 Digital Outputs

The **Digital Outputs** pane in the **I/Os** screen allows you to configure functionality and polarity of the digital outputs, and to monitor the state of the digital outputs.

<b>State</b>	A graphic element that toggles between green and red to reflect the on or off state of the actual output.
<b>Name</b>	Identifies the specific output.
<b>Mode</b>	<p>Defines the condition that will activate a specified digital output.</p>  <ul style="list-style-type: none"> <li>0 - Disabled</li> <li>1 - Motor Speed Set</li> <li>2 - Current</li> <li>3 - Reserved</li> <li>4 - Motor Speed Set Clear</li> <li>5 - Regen Resistor control</li> <li>6 - Motion Completed</li> <li>7 - In Position</li> <li>8 - Zero Speed</li> <li>9 - SW Position Limit Switch</li> <li>10 - Active</li> <li>11 - Reserved2</li> <li>12 - Reserved</li> <li>13 - XorSetClr</li> </ul>

## 9.3 Analog Input

The **Analog Input 1** pane in the **I/Os** screen allows you to set the analog input properties and to monitor the input state.

<b>Analog Offset</b>	The DC voltage offset on the analog input.	<a href="#">Object 20F6h</a>
<b>Analog Input</b>	The voltage at the analog input. Read only.	<a href="#">Object 20F2h</a>
<b>Set to Zero</b>	Causes the value of the analog input signal to become 0 by modifying the analog offset value.	

# 10 Enable | Faults

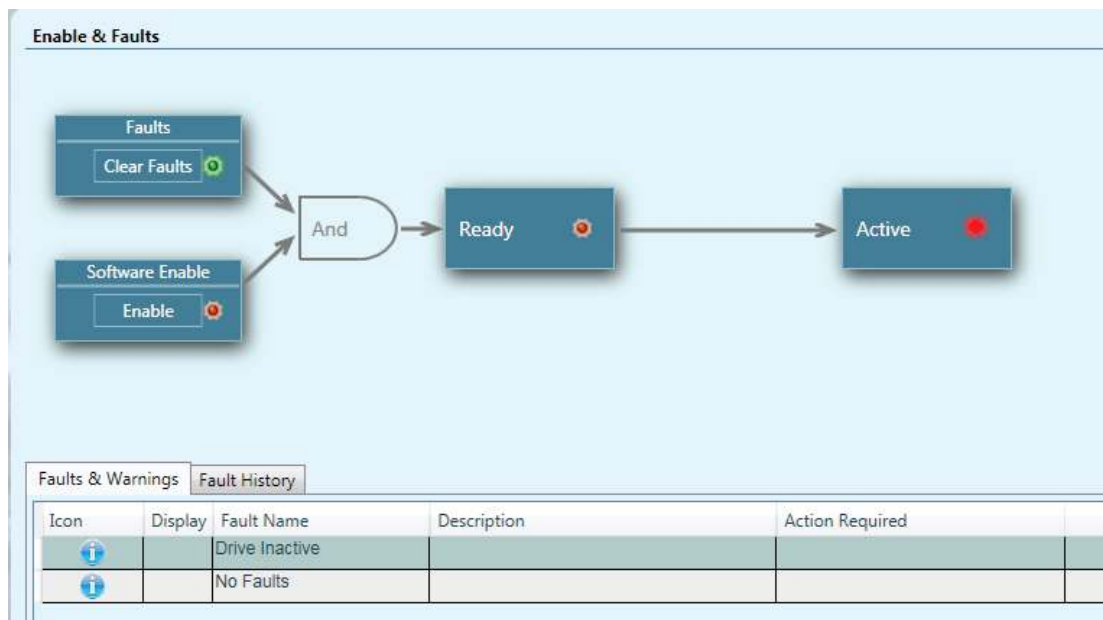
## 10.1 Drive Enable



**Caution:** Enabling the drive might cause the motor to move.

The **Enable & Faults** screen graphically shows the conditions required for the drive to be enabled. It allows you to clear faults and to activate the Software Enable switch.

As long as any light in the diagram is red, the drive remains disabled. When all lights are green, the drive is enabled.





**Figure 10-1. ServoStudio – Enable & Faults Screen**



## 10.2 Faults

The **Faults** panel displays a list of all faults and warnings currently in effect, and a list of faults that have occurred in the present working session.

Faults & Warnings		Fault History		
Icon	Display	Fault Name	Description	Action Required
		Drive Inactive		
		Position error	The difference between the position command and the actual position is greater than the value that is set in maximum position error (object 6065h)	Check the parameter values in the control loops. Check the demanded velocity (object 6081h), acceleration (object 6083h) and deceleration (object 6084h). Increase the value of the position error maximum (object 6065h) if needed.

**Figure 10-2. ServoStudio – Fault History**

<b>Icon</b>	A graphic image that indicates the type of fault: Warning, Fault, Fatal Fault.
<b>Display</b>	<i>Not in use</i>
<b>Fault Name</b>	The system name of the fault.
<b>Description</b>	Describes the status or fault indicated by the code.
<b>Action Required</b>	Describes the recommended steps for correcting the fault.

### Faults & Warnings

The **Faults and Warnings** tab displays a list of all faults and warnings currently in effect.

- Displays a list of **warnings**.
- Displays a list of **faults** that are preventing the drive from being enabled.

Warnings remain displayed until cleared by **Clear Faults** button, provided the condition that caused the warning has been removed.

After a fault condition is removed, the fault remains latched until cleared by any of the following methods:

- **Clear Faults** button
- **Software Enable** button

Once all faults are cleared, the drive is ready for activation.

### Fault History

The **Fault History** tab displays a list of faults that have occurred since the fault buffer was last cleared.

The drive stores a log of the 40 most recent faults.

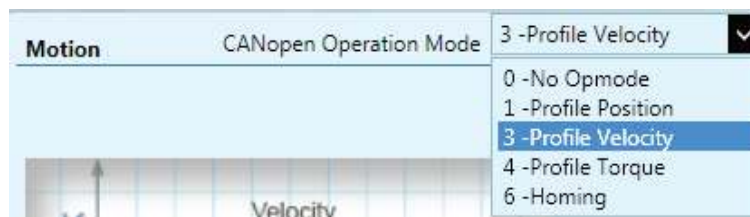
The Clear Faults History button is displayed only when the log contains a fault.

# 11 Motion – Operating Modes

The **Motion** screen allows you to select the operation mode and define motion settings. The schematic diagram and data displayed in the Motion screen varies according to the selected operation mode.

Using the Motion screen, you can execute motion and view the actual values of current, velocity and position.

ServoStudio displays the list of standard (CiA 402) CAN operation modes.

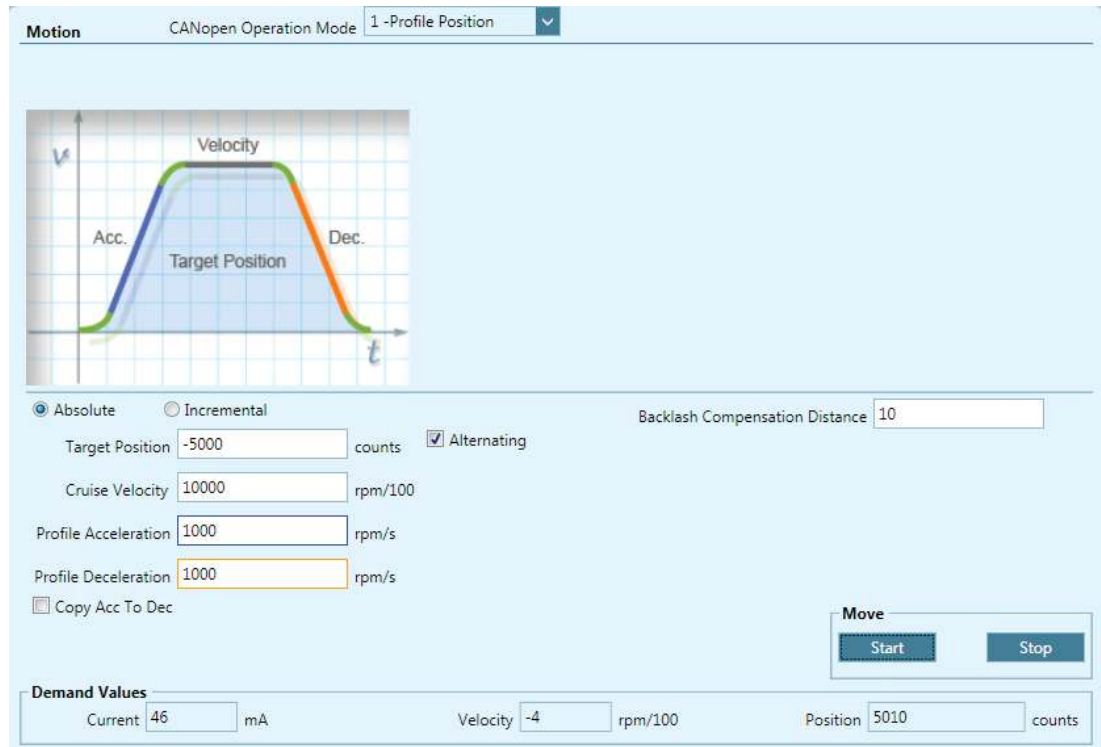


**Figure 11-1. ServoStudio – Motion Screen – CANopen Operation Modes**

**Note:** CANopen Cyclic Synchronous Position operation mode (8) is not available in ServoStudio.

### 11.1 Profile Position Operation Mode (1)

In the Motion screen, select CANopen Operation Mode **1 – Profile Position** to display the schematic and parameters for work in Profile Position mode.



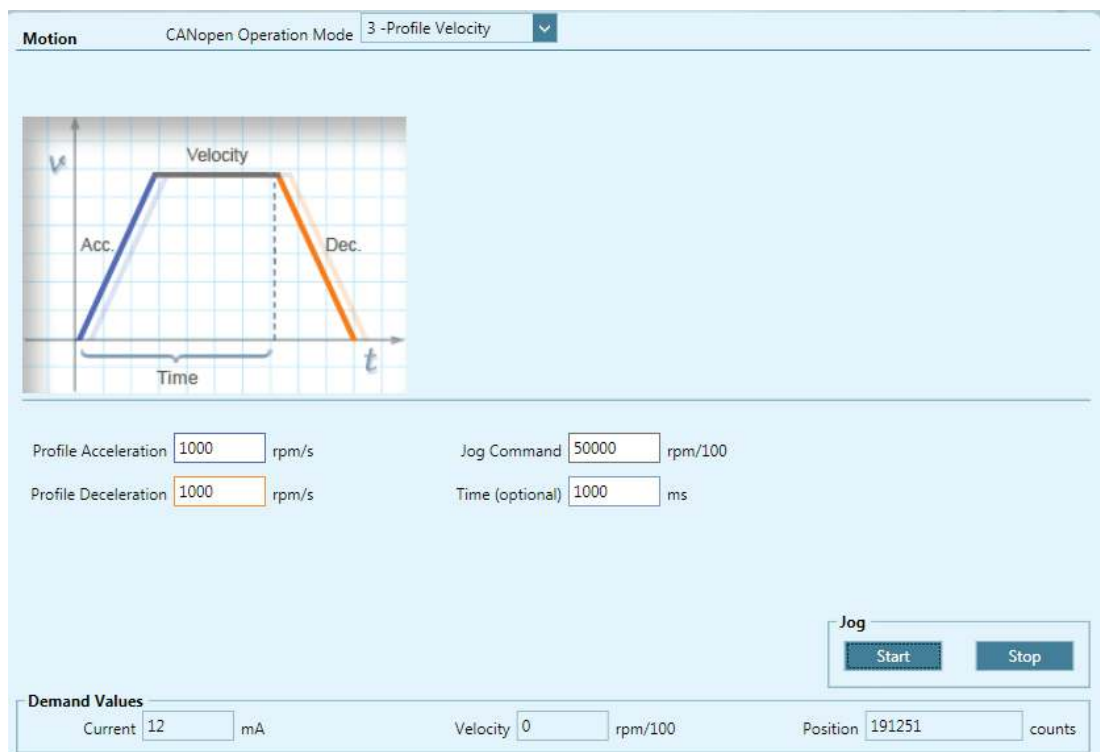
**Figure 11-2. ServoStudio – Motion Screen – ProfilePosition Mode**

Motion Command		
Absolute	Moves the motor the specified number of counts from the encoder 0 position. Executes an absolute position movement according to the acceleration/deceleration settings.	
Incremental	Moves the motor the specified number of counts from its current location. Executes an incremental position movement according to the acceleration/deceleration settings.	
Alternating	Automatically reverses the direction of motion each time <b>Start</b> is pressed.	
Target Position	The destination of the movement command.	
Cruise Velocity	The velocity of the movement command.	
Profile Acceleration	Acceleration value.	<a href="#">Object 6083h</a>
Profile Deceleration	Deceleration value.	<a href="#">Object 6084h</a>

Copy Acc to Dec	Copies the acceleration value to the deceleration value field.	
Backlash Compensation Distance	Sets the backlash compensation distance	<a href="#">Object 2F84h</a>
<b>Move</b>		
Start	Sends the movement command to the motor.	
Stop	Stops the movement.	
<b>Demand Values</b>	Current: Torque Demand Value Velocity: Velocity Demand Value Position: Position Demand Value	<a href="#">Object 6074h</a> <a href="#">Object 606Bh</a> <a href="#">Object 6062h</a>

### 11.2 Profile Velocity Operation Mode (3)

In the Motion screen, select CANopen Operation Mode **3 – Profile Velocity** to display the schematic and parameters for work in Profile Velocity mode.



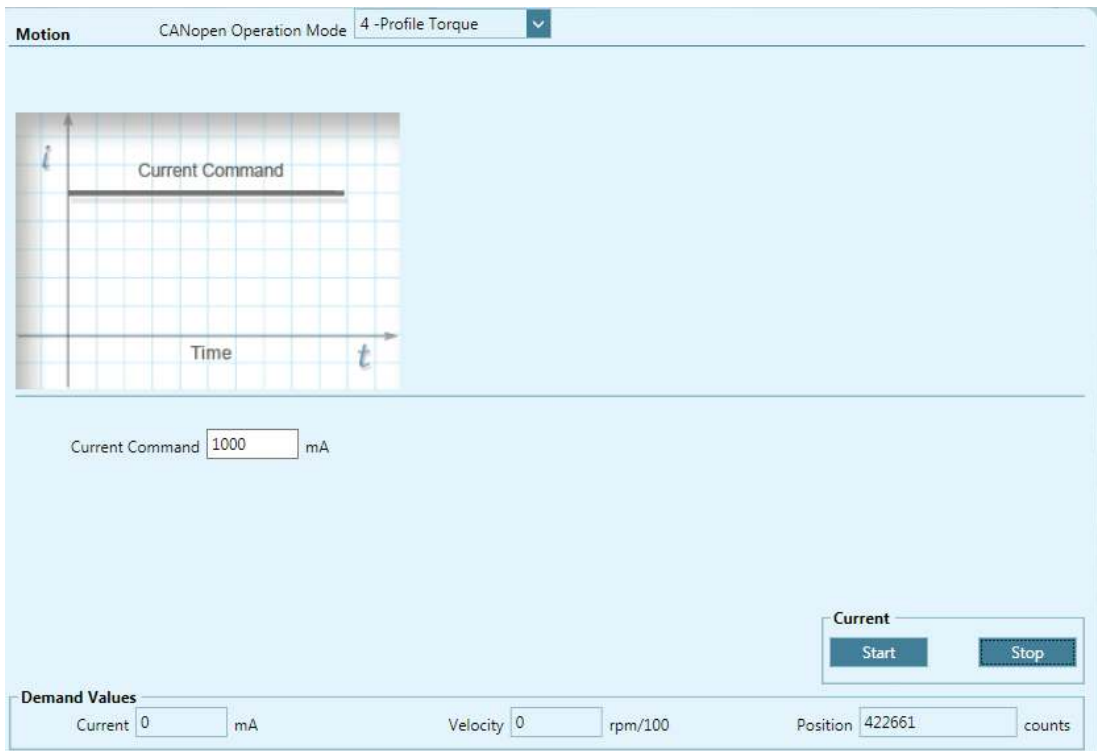
**Figure 11-3. ServoStudio – Motion Screen – Serial Velocity Mode**

Profile Acceleration	Acceleration value.	<a href="#">Object 6083h</a>
Profile Deceleration	Deceleration value.	<a href="#">Object 6084h</a>
Jog Command	The velocity of the motion.	
Time (optional)	The duration of the motion.	

<b>Jog</b>		
Start	Sends the velocity command to the motor.	
Stop	Stops the velocity command.	
<b>Demand Values</b>	Current: Torque Demand Value Velocity: Velocity Demand Value Position: Position Demand Value	<a href="#">Object 6074h</a> <a href="#">Object 606Bh</a> <a href="#">Object 6062h</a>

### 11.3 Profile Torque Operation Mode (4)

In the Motion screen select CANopen Operation Mode **4 –Profile Torque** to display the schematic and parameters for work in Profile Torque mode.



**Figure 11-4. ServoStudio – Motion Screen – Profile Torque Mode**

<b>Current Command</b>	Sets the value of the current.	<a href="#">Object 6071h</a>
<b>Current</b>		
Start	Sends the Current command to the motor.	
Stop	Stops the Current command.	
<b>Demand Values</b>	Current: Torque Demand Value Velocity: Velocity Demand Value Position: Position Demand Value	<a href="#">Object 6074h</a> <a href="#">Object 606Bh</a> <a href="#">Object 6062h</a>

## 11.4 Homing Mode (6)

Refer to the section *Homing* .

The **Homing** screen allows you to select the methods and parameters to be used for homing the motor, and to initiate and monitor the homing process.

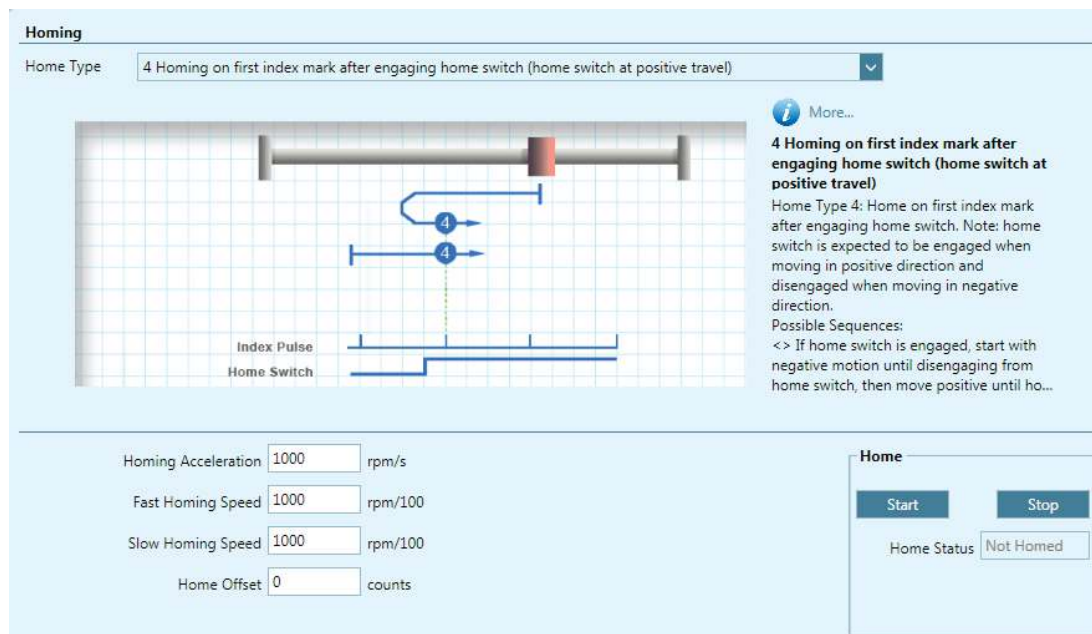


Figure 11-5. ServoStudio – Homing Screen

<b>Home Type</b>	Allows you to select the homing method. Homing types 1 through 14, 17 through 30, and 33 through 35 are according to CiA 402. In addition, homing types -1 and -2 offer additional homing methods.	
<b>[graphic]</b>	A graphic display representing the method selected for the homing process.	
<b>[description]</b>	A description of the selected homing method.	
<b>Homing Acceleration</b>	The value of acceleration and deceleration during the homing process.	<a href="#">Object 609Ah</a>
<b>Fast Homing Speed</b>	The initial velocity used in the homing process during the search for limit switches, home switches, and hard stops.	<a href="#">Object 6099h sub-index 1</a>
<b>Slow Homing Speed</b>	The velocity used in the homing process during the search for the homing trigger, which may be an index mark, a limit switch transition, a home switch transition, or another source.	<a href="#">Object 6099h sub-index 2</a>
<b>Home Offset</b>	Sets an offset, in counts, for the Home position.	<a href="#">Object 607Ch</a>

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<b>Home</b>		
Start	Starts the homing process.	
<b>Stop</b>	Stops the homing process.	
<b>Homing Status</b>	Displays the current state of system homing.	<a href="#">Object 2090h</a>

---

## 12 Velocity Control Loop

The **Velocity Loop** screen allows you to modify parameters in the velocity control loop.

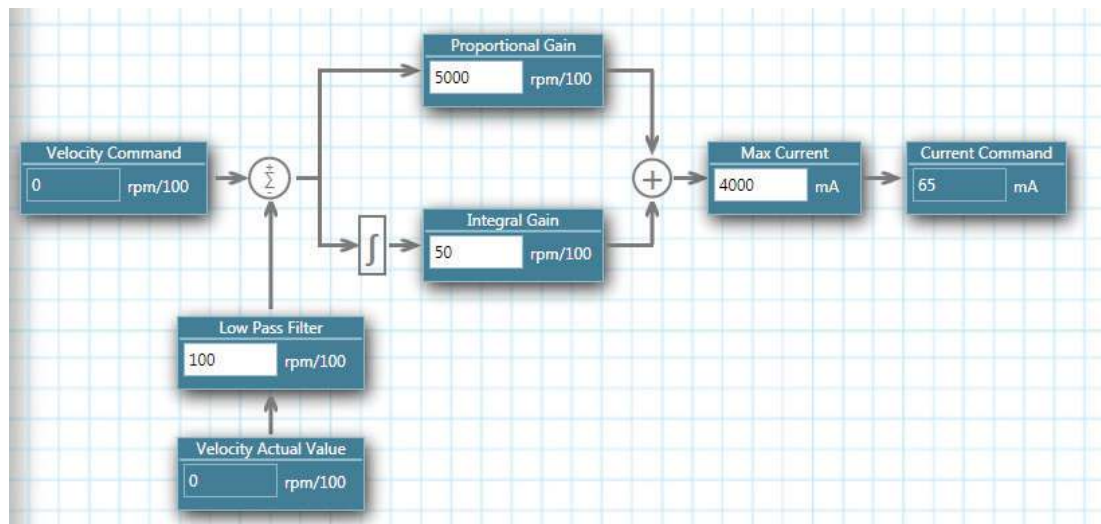


Figure 12-1. ServoStudio – Velocity Control Loop



# 13 Position Control Loop

The **Position Loop** screen allows you to modify parameters in the position control loop.

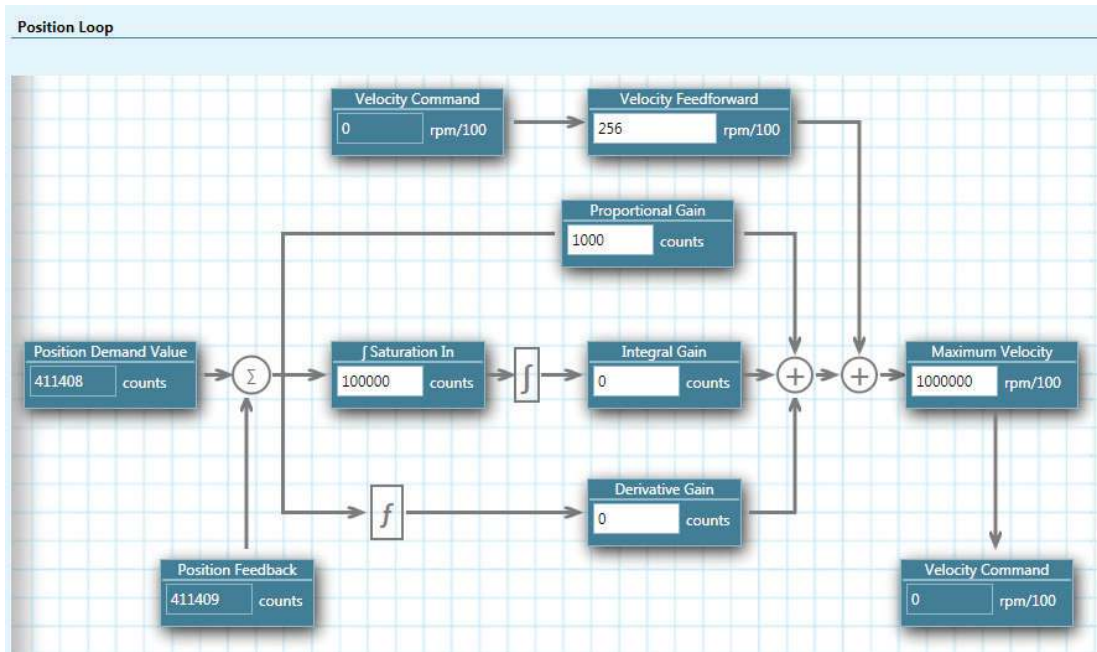


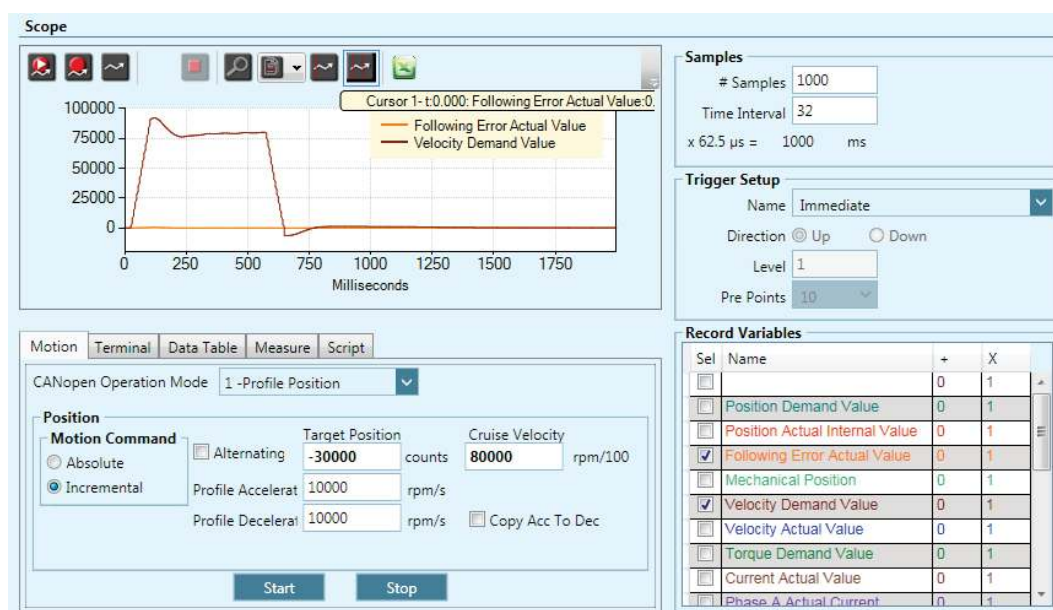
Figure 13-1. ServoStudio – Position Control Loop

## 14 Scope Dashboard

ServoStudio provides extensive recording and data graphing capabilities. Recording is done by the drive in real-time, and sent to the host computer for display.

Recording can be set up to be triggered when a specified event or condition occurs. In addition, ServoStudio enables continuous data recording or a one-time recording. ServoStudio also allows execution of a motion command during recording. This is useful, and even necessary, as a tuning tool.

The ServoStudio **Scope** screen is a dashboard for data recording and plotting.



**Figure 14-1. ServoStudio – Scope Dashboard**

The **Scope** screen allows you to perform the following tasks:

- Configure recording settings, record data from the drive, and display the data according to your preferences.
- Generate motion in order to record data related to that specific motion. Commands can be sent to the drive via the **Move Record and Plot** buttons in the Scope toolbar.
- Program and run scripts using the **Script** panel.

### 14.1 Recording Setup

The **Recorder Setup** panel, on the right side of the Scope screen, allows you to define the variables and conditions for the data recording.

To clear all settings in the Record Variables pane, right-click on any variable cell, and select the option **Reset Variable List**.

## Samples

<b># Samples</b>	The total number of points to be recorded.
<b>Time Interval</b>	The rate at which data is recorded. The interval value is specified in multiples of the drive's basic sampling rate, which is 62.5 $\mu$ s. For example, an interval of 8 means data is recorded once every 8 samples, that is, every 500 $\mu$ s ( $8 \times 62.5 = 500$ ).




## Trigger Setup







<b>Name</b>	Name of a variable that will trigger the recording. The following can also trigger the recording: <b>Immediate.</b> Starts the recording immediately <b>On fault.</b> Starts the recording as soon as a fault occurs.
<b>Direction</b>	Defines whether the trigger occurs when value of the variable goes above the threshold ( <b>Up</b> ) or below the threshold ( <b>Down</b> ).
<b>Level</b>	The threshold value for the trigger.
<b>Pre Points</b>	The number of points to be recorded prior to the trigger point.

## Record Variables

<b>Name</b>	Name of a variable that can be recorded. To add a variable to the list, type the name of the variable in the blank cell in the first row, and press Enter. To define the variables that will actually be recorded, select or clear the checkboxes.
<b>+</b>	<b>Offset.</b> An offset value on the X-axis that serves to separate overlapping traces on the chart, or to move traces closer together for easier viewing and comparison. Whenever an offset is in effect, a plus sign <b>+</b> is displayed next to the variable name in the legend.
<b>X</b>	<b>Multiply.</b> Enlarges a trace that may be too small to view properly because the chart is scaled to the largest value of another variable. Whenever an enlarged trace is in effect, an asterisk <b>*</b> is displayed next to the variable name in the legend.

## 14.2 Scope Toolbar

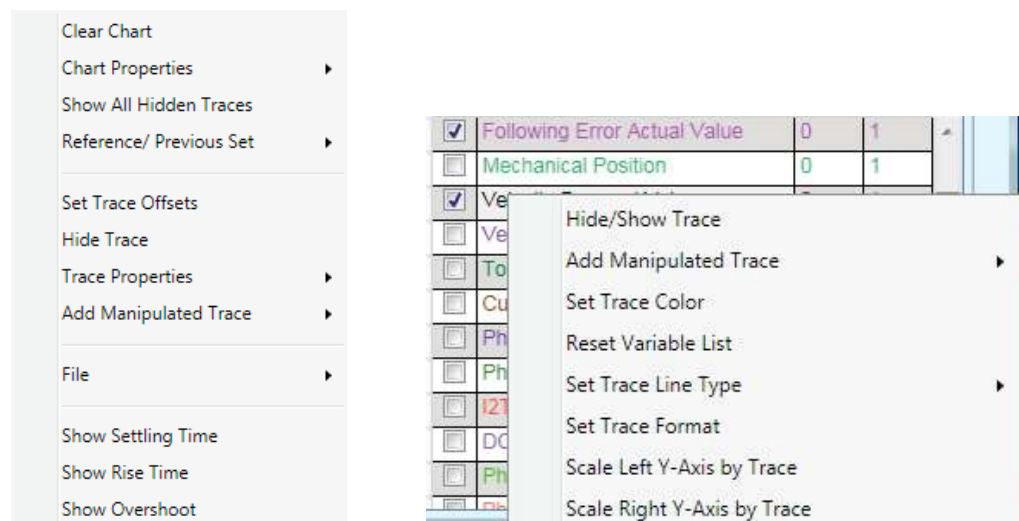
	<b>Move Record and Plot</b>	Executes the command defined in the Motion screen, triggers (and stops) the recording, plots the response and stops the motion.
	<b>Record and Plot</b>	Triggers the recording and plots the response. Does not start or stop the drive.
	<b>Plot</b>	Reads the data last recorded (in the drive), and displays a trace on screen.

	<b>Stop Recording</b>	Stops a recording. Aborts the command.
	<b>Toggle Cursor to Zoom</b>	Toggles Zoom In and Zoom Out view of graph. When Zoom In is selected, a minus sign appears on the button. Using the left mouse button, click-and-drag to select an area on the graph for magnification.
	<b>Chart Options</b>	Refer to <a href="#">Chart Options</a> .
	<b>Toggle Zoom to Cursor</b>	Cancels the cursor zoom. Hides/displays cursor line/s. When cursor is displayed, use left mouse button to select and position the cursor on the graph. Variable values at the cursor point are displayed in a floating box. Use the <b>Measure</b> tab to view additional variable values at the point marked by the cursor.
	<b>Select Cursor</b>	Displays a second cursor line. Click on the graph to position the second cursor.
	<b>View in Excel</b>	Copies recorded data to a temporary CSV file and opens Microsoft Excel to display it.

## 14.3 Chart Options

The options in the Chart Options menu can also be accessed by right-clicking anywhere on the chart.

Some of the chart options, together with additional trace options, are accessed by right-clicking on any of the cells in the Record Variables pane.



**Figure 14-2. ServoStudio – Chart Options menu / Trace Options menu**

## Clear Chart

Clears the displayed chart.

## Chart Properties

<b>Set Background Color</b>	Opens the Colors dialog box, and allows you to modify the background color of the chart.
<b>Grid</b>	Toggles the grid display on and off. Also allows you to modify the grid: <b>X Axis.</b> Toggles the X-axis grid line on/off. <b>Y Axis.</b> Toggles the Y-axis grid line on/off. <b>Dot   Line.</b> Uses either dotted lines or solid lines for the grid.
<b>Show Legend</b>	Toggles the legend display on and off.
<b>Legend Position</b>	Top right or bottom left
<b>Freeze Scale</b>	Sets the Y-axis to a fixed scale. Normally the Y-axis is scaled dynamically as the amplitude of the signals changes. When Scale is frozen, the letter <b>F</b> is displayed next to the Chart Options button on the toolbar. When Scale is frozen, the letter <b>O</b> is also displayed if part of the trace is out of view.
<b>Reset All Trace Offsets</b>	Resets the value of all offset (+) values in the Record Variables list to 1. Whenever an offset is in effect, a plus sign <b>+</b> is displayed next to the variable name in the legend.
<b>Grid Color by Trace</b>	If two grids are used (right and left axis), different colors can be defined to improve the readability of the chart.
<b>Hide Right Y Scale</b>	Hides the Y-axis scale on the right side of the chart, if displayed.
<b>Copy Image to Clipboard</b>	Copies the chart to a graphic image, which can be pasted into other application.

## Show All (Hidden) Traces

Displays all traces on the chart that were hidden by the **Hide Trace** option.

The Show/Hide status of a trace can be toggled by right-clicking on the variable in the Record Variables pane.

## Reference/Previous Set

<b>Show Reference Set</b>	Displays the trace previously saved as a reference.
<b>Show Previous Set</b>	Displays the previously displayed trace in addition to the currently displayed trace.
<b>Save as Reference Set</b>	Saves the trace currently displayed on screen as a reference.
<b>Keep Previous as Background</b>	Displays the previously recorded trace as a background.
<b>Keep Reference as Background</b>	Keeps the reference trace displayed on screen as a background.
<b>Shift Set Position</b>	Allows you to move a set of traces along the X-axis, to separate overlapping traces on the chart, or to align the trigger points on different traces.

## Set Trace Offsets

This option is used to separate overlapping traces, and improve the readability of the chart.

Right-click on a specific trace, and enter offset values.

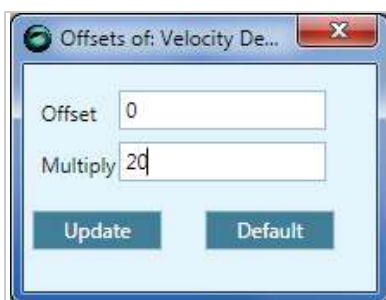


Figure 14-3. Set Trace Offsets Dialog Box

## Hide Trace

Right-click on a specific trace, and select **Hide Trace** to hide just one trace.

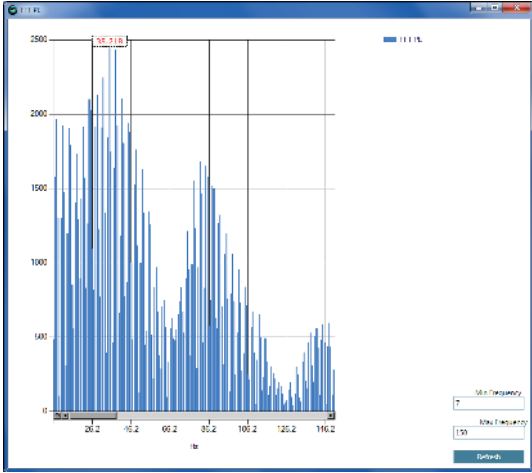
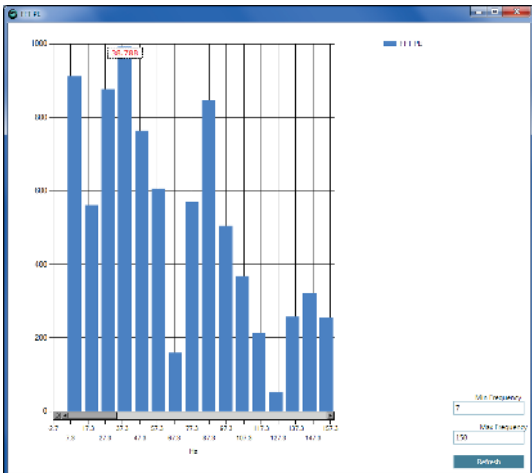
## Trace Properties

<b>Set Trace Color</b>	In Chart Options/Trace Options. Allows you to define the color of the trace.
<b>Set Trace Line Type</b>	In Chart Options/Trace Options. Allows you to define how the trace line is displayed: <b>Line, Spline</b> or <b>Points</b> .
<b>Scale Left Y-Axis by Trace</b>	In Chart Options/Trace Options. Displays a Y-axis on the left side of the chart, scaled to the values of the selected variable.
<b>Scale Right Y-Axis by Trace</b>	In Chart Options/Trace Options. Displays a Y-axis on the right side of the chart, scaled to the values of the selected variable.

<p><b>Scale All</b></p>	<p>In Chart Options only. Adjusts and displays all traces on a scale of 0—100%, for better viewing.</p>
<p><b>As Percentage of MICONT</b></p>	<p>In Chart Options/Trace Options. Displays current as a percentage of motor continuous current, rather than amperage.</p>

**Add Manipulated Trace**

These options define how a fast Fourier transform (FFT) algorithm is performed on the selected trace.

<p><b>Add Derivative Trace</b></p>	<p>In Chart Options/Trace Options. Calculates and displays the derivative of the function.</p>
<p><b>FFT Trace</b></p>	<p>In Chart Options/Trace Options. The FFT is performed on the selected trace, and displays a graph that represents the frequency domain.</p>  <p>The screenshot shows a software window titled 'FFT' with a plot of a frequency spectrum. The y-axis represents amplitude from 0 to 2500, and the x-axis represents frequency in Hz from 0 to 140.2. A prominent peak is labeled with its frequency, 35.97 Hz. The plot shows a series of vertical bars representing the magnitude of different frequency components.</p>
<p><b>FFT Between Cursors</b></p>	<p>In Chart Options only. The FFT is performed on the selected trace between the two cursors, and ignores the data outside the cursors.</p>  <p>The screenshot shows a software window titled 'FFT' with a zoomed-in plot of a frequency spectrum. The y-axis represents amplitude from 0 to 1000, and the x-axis represents frequency in Hz from 0 to 140.2. Two vertical cursors are visible, defining a specific frequency range. The bars within this range are highlighted, and a peak is labeled with its frequency, 35.78 Hz.</p>

**File**

<b>Save As</b>	Exports a recording to a CSV file, so that it can be viewed and analyzed in Microsoft Excel.
<b>Load From</b>	Loads recorded data that was saved in a CSV file.

**Show Settling Time**

Settling time is the time elapsed from the application of a step command to the time at which the output has entered and remained within a specified error window. *Still in development.*

**Show Rise Time**

Rise time is the time required for a signal to change from a specified low value to a specified high value. Typically, these values are 10% and 90% of the step command. *Still in development.*

**Show Overshoot**

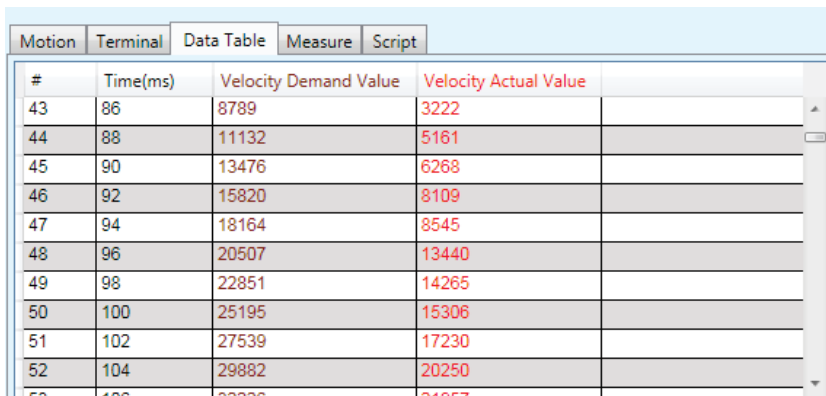
Overshoot is when a signal exceeds its target. *Still in development.*

**14.4 Scope Tabs/Panels**

<b>Motion</b>	Change operation mode and initiate motion using the <b>Motion</b> panel. Refer to <a href="#">Motion – Operating Modes</a> .
<b>Data Table</b>	A tabular view of the data generated by the recording.
<b>Measure</b>	View measurements from the plot of a recording. Refer to <a href="#">Measurements</a> .
<b>Terminal</b>	Not currently supported for use with stepIM system.
<b>Script</b>	Not currently supported for use with stepIM system.

**14.4.1 Data Table**

A tabular view of the data generated by the recording.



#	Time(ms)	Velocity Demand Value	Velocity Actual Value
43	86	8789	3222
44	88	11132	5161
45	90	13476	6268
46	92	15820	8109
47	94	18164	8545
48	96	20507	13440
49	98	22851	14265
50	100	25195	15306
51	102	27539	17230
52	104	29882	20250

**Figure 14-4. ServoStudio – Scope Data Table**



<b>#</b>	A sequential number for identifying the recorded sample.
<b>Time (ms)</b>	The time of the recorded sample.
<b>Recorded Variable</b>	Columns showing the names and values of the variables selected for recording.

### 14.4.2 Measurements

The **Measure** tab in the Scope screen presents several measurements from the data currently displayed in the chart.

The values displayed change as you drag the cursors to different locations on the chart.



**Figure 14-5. ServoStudio – Scope Measurement Tab**

<b>Cursor No.1</b>	X-axis = time (in ms); value of trace at the point crossed by cursor.
<b>Cursor No.2</b>	X-axis = time (in ms); value of trace at the point crossed by cursor.
<b>Cursor Difference</b>	Time difference between the two cursors. (Cursor 2 – Cursor 1)
<b>RMS/RMS Between Cursors</b>	The root mean square for the entire recording; or the root mean square for the recording between the two cursors.
<b>Average/Average Between Cursors</b>	The average value for the entire recording; or the average value for the recording between the two cursors.

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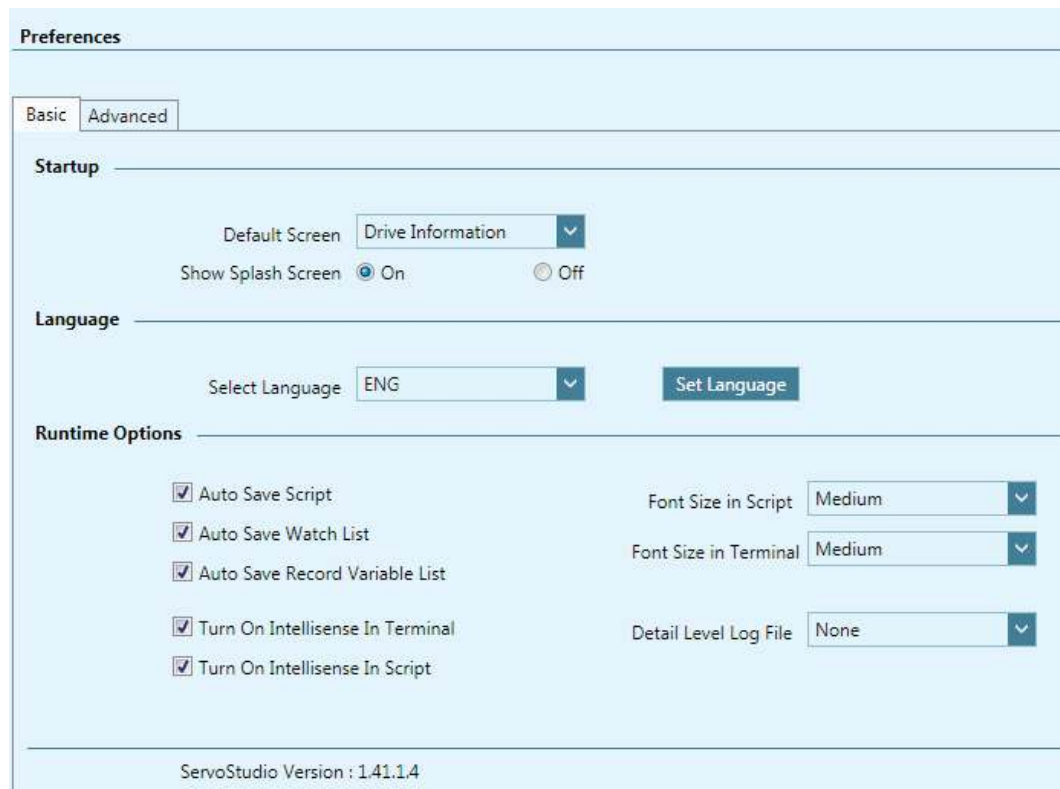
<b>Min</b>	Lowest recorded value in the trace.
<b>Max</b>	Highest recorded value in the trace.
<b>Pk-Pk</b>	The total span, between the highest and lowest recorded values in the trace.
<b>STD</b>	The standard deviation of the trace.

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# 15 Preferences

The Preferences screen allows you to modify file names and locations, runtime options, and other ServoStudio default settings.

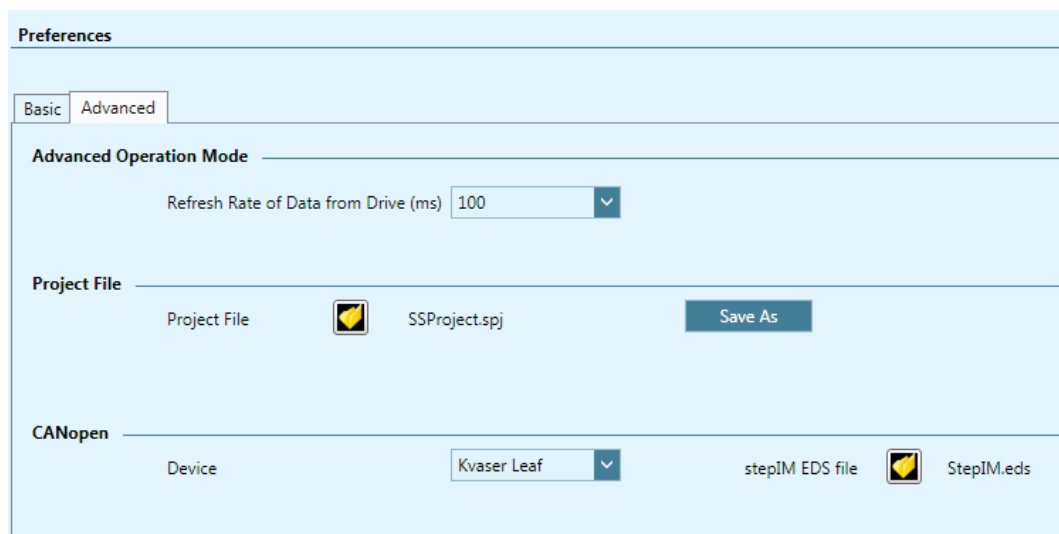
The Preferences screen has two tabs: Basic and Advanced.



**Figure 15-1. ServoStudio – Preferences Screen – Basic Settings**

<b>Startup</b>	
Default Screen	The task screen that is displayed when ServoStudio is activated. It can be any of the screens listed in the sidebar. By default, Drive Information is the default screen.
Show Splash Screen	Defines whether the ServoStudio splash screen is displayed when ServoStudio is activated.
<b>Language</b>	
Select Language	Defines the interface language (options: English, Chinese Simplified/Traditional, Korean).
Set Language	Activates the interface in the selected language.

<b>Runtime Options</b>	
Auto Save options	For Expert users. Selected elements will be automatically saved and restored the next time ServoStudio is opened, even if they were not explicitly saved before closing ServoStudio.
IntelliSense options	Applicable to systems with supported Terminal and Script functionality.
Font options	Applicable to systems with supported Terminal and Script functionality.
Detail Level Log File	Determines the type and amount of information to be included in log files.
<b>ServoStudio Version</b>	The version of the ServoStudio software.



**Figure 15-2. ServoStudio – Preferences Screen – Advanced Settings**

<b>Configuration Files</b>	The names and locations of files used by ServoStudio. For Expert users only.
<b>Advanced Operation Mode</b>	
Refresh Rate of Data from Drive	Sets the rate at which variable values are refreshed on screen. This includes both user-defined watched variables and system-defined variables which may trigger warnings or faults. Defined in milliseconds.
<b>Project File</b>	A project file contains all settings currently defined in ServoStudio, and any autosaved data.
<b>CANopen</b>	
<b>Device</b>	<b>Kvaser Leaf</b> interface. A USB interface for connecting a computer to a CAN bus network.
<b>EDS File</b>	The EDS file for the stepIM.

## 16 Backup & Restore

The **Backup & Restore** screen allows you to save and load parameters to and from files on the host computer.



**Figure 16-1. ServoStudio – Backup & Restore Screen**

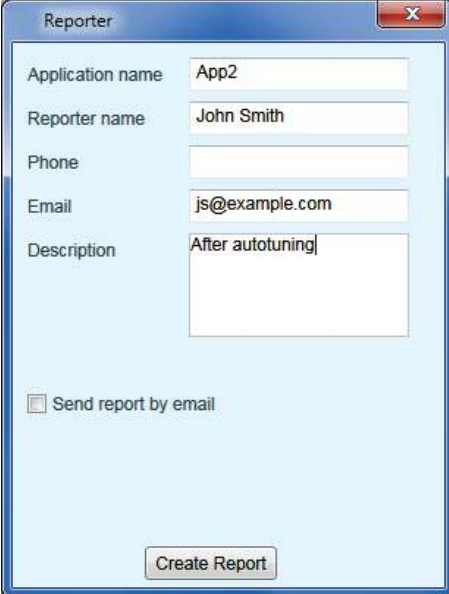
<b>Backup</b>	<p>Opens a <b>Save as</b> dialog box.</p> <p>Saves the parameters and values currently in the drive RAM to a file on the host computer. The parameters are saved in a text file with either TXT or SSV extension. The text file can be edited using Notepad or any other text editor.</p>
<b>Restore</b>	<p>Opens an <b>Open</b> dialog box.</p> <p>Loads the parameters and values from a file on the host computer to the drive RAM.</p>
<b>Generate Report</b>	<p>Opens the <a href="#">Report Generator</a> dialog box.</p> <p>Creates a set of CSV and TXT files within a zip file. The file can be attached to an email that is automatically addressed to Technical Support. You can change the address and send to a different recipient.</p>
<b>All Drives</b>	<p>If ServoStudio detects more than one drive, it will display parameter backup and restore options for multiple drives.</p> <p>Backup file names are automatically created according to the name of each drive.</p>

## 16.1 Report Generator

The **Report Generator** is a ServoStudio utility that allows you to save a copy of all system settings. It creates a set of files which can be sent to technical support and/or kept for reference.

It is strongly recommended that you create a report whenever you complete configuration of your application, even when the system is functioning properly.

When activated, the Report Generator opens a dialog box that allows you to enter application and user information.



**Figure 16-2. Report Generator**

The Report Generator creates a set of CSV and TXT files within a zip file and saves it in the default path:

c:\users\owner\Documents\ServoStudio\Reports\History

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<b>Send report by email</b>	Attaches the report zip file to an email that is automatically addressed to Technical Support. You can change the address and send to a different recipient.
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**ServoStudio Reference Manual**  
**stepIM**