MotionBench User Guide

Created on 1 April, 2019

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This guide introduces you to ANCA Motion's MotionBench software. The guide provides instructions for installing and getting started with MotionBench.

In this user guide, the following instructional icons are used:

Info

Tip

Note

Warning

The information contained in this guide was correct at the time of writing, but is subject to change. Please ensure you always refer to the version of the guide corresponding to the MotionBench version you are using.

1 Related documents

Document	Description
CHANGELOG.md	History of product changes, located in the MotionBench application directory following installation
AMD Servo Drive - SoE Configuration Guide.pdf	AMD servo drive user guide, included with ANCA Motion servo drives
Digital Servo Drive SoE Parameter Reference AMD5x.pdf	Firmware parameter reference, included with ANCA Motion firmware

2 Terms and abbreviations

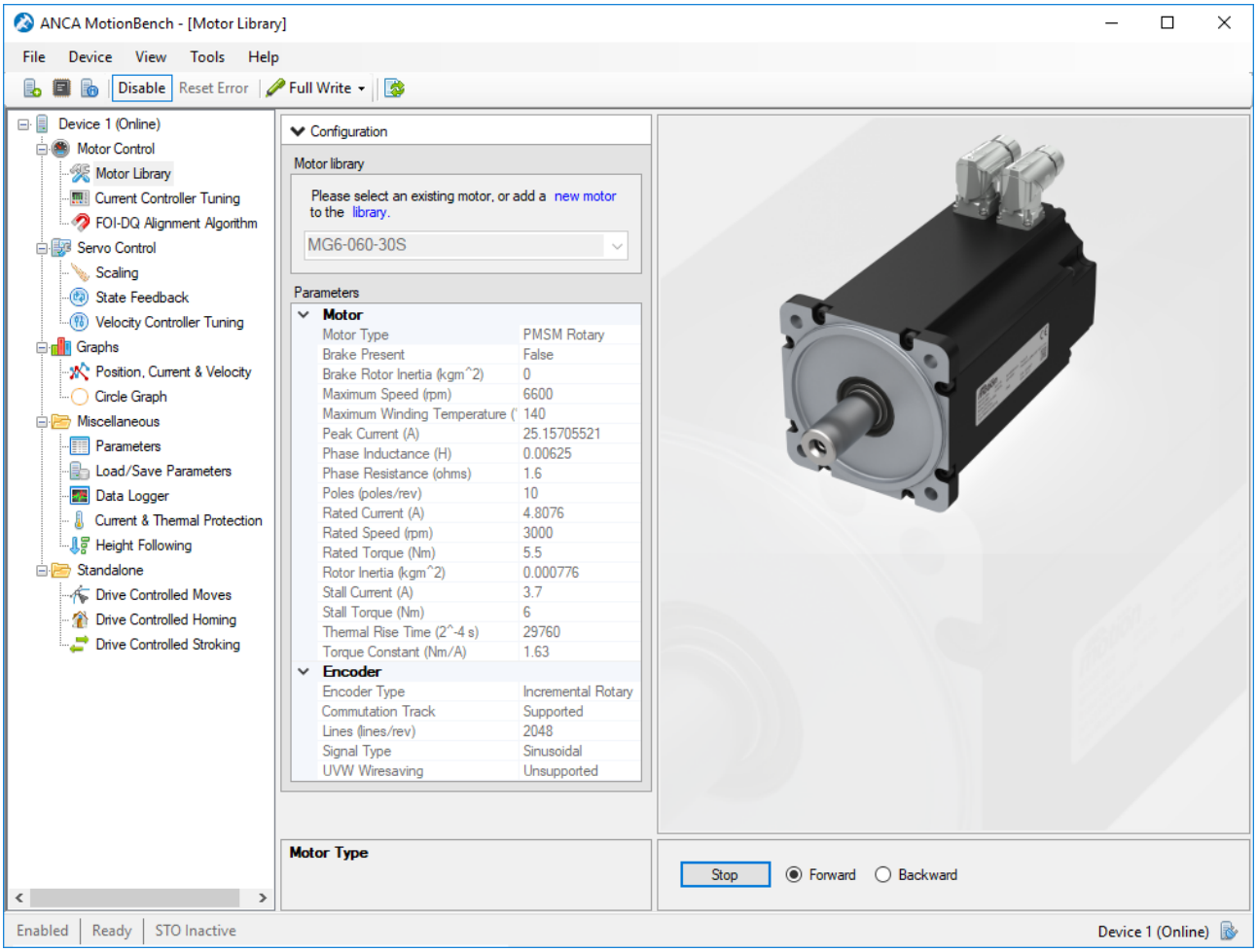
Action Bar	A section of a page dedicated to controlling page operations
ANCA	Australian Numerical Control and Automation
AMCore	ANCA Motion's Motion Control Software
Bode Plot	A magnitude and phase plot of the frequency response of a system
Chirp	A signal in which the frequency increases with time
Configuration Panel	A section of a page dedicated to configuration
CNC	Computer Numerical Control
Display Area	A section of a page dedicated to visual representation of data
EoE	Ethernet over EtherCAT
EtherCAT	Ethernet for Control Automation Technology
IO	Input/Output
RAM	Random Access Memory
SoE	Servo over EtherCAT
Standalone	A type of network configuration that involves connecting the drive directly to a network adapter
Step	A command signal in which the command instantly changes from one value to another
TDMS	A file format optimized for saving measurement data to disk
UI	User Interface

3 What is MotionBench?

ANCA MotionBench is a Windows based tool that is designed to work with ANCA Motion's range of EtherCAT servo drives.

MotionBench offers an easy to use graphical interface for configuring, monitoring, and diagnosing problems with AMD2000 and AMD5x servo drives.

- Communication via any EtherCAT master supporting EoE
- Real-time graphing of drive signals
- Guided and free-form workflows
- Powerful configuration and tuning features



4 Get started

4.1 System requirements

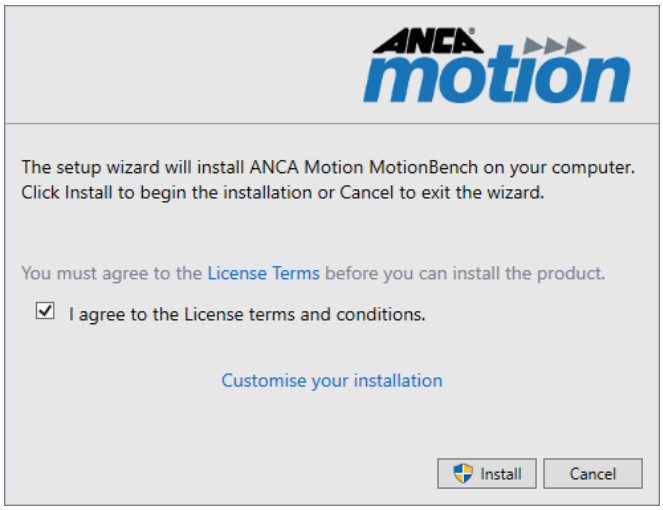
Component	Requirement
Platform	• Laptop • Desktop • ANCA Motion CNC
Computer and processor	1 gigahertz (GHz) or faster x86- or x64-bit processor with SSE2 instruction set
Memory (RAM)	1 gigabyte (GB) RAM (minimum)
Hard disk	30 MB Free Disk Space (minimum)
Display	1280 x 960 Screen Resolution (recommended)
Operating system	• Microsoft Windows XP SP2 • Microsoft Windows Vista / 7 • Microsoft Windows 8 / 8.1 • Microsoft Windows 10
.NET version	4.0
Supported (tested) network adapters	• Intel 82577LM Gigabit • Broadcom NetXtream 57xx Gigabit • Broadcom 57765-B0 PCI • Marvell Yukon 88E8053 Gigabit • ASIX AX88772A (USB2.0 to Ethernet dongle) • Realtek RTL8139-810X
Minimum firmware version	• 5.1.15 (AMT variant) • 6.1.5 (AMD5x and AMD2000 variants)
Additional requirements and considerations	Some functionality may vary, based on the system configuration. Some features may require additional or advanced hardware or network connectivity.

ⓘ The hard disk system requirement is intentionally larger than the actual disk space usage of the software.

4.2 Install via Windows desktop

This section describes how to install MotionBench via the Windows desktop. If you are upgrading from a previous version of MotionBench, the steps are the same. Before installing MotionBench, make sure that your computer meets the system requirements.

1. Visit the MotionBench download link provided by ANCA Motion in any browser.
2. Click on the link to download the relevant version of the MotionBench installer. Depending on your connection speed, the download may take up to a few minutes.
3. If prompted, click "Run" or "Save".
4. If you have saved the installer, double-click the installer file to start the installation process.
5. After reading and agreeing to the license terms (available by clicking the "License Terms" link) click "Install".



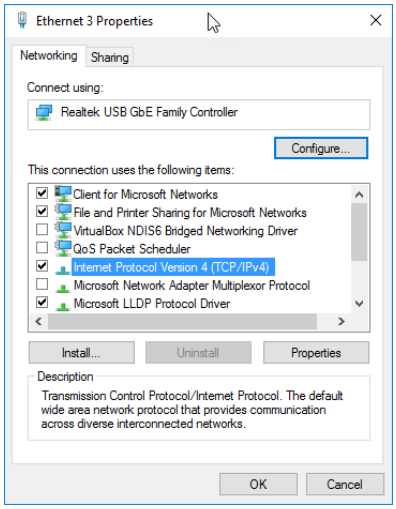
4.2.1 Prepare the network connection

Connecting to a drive directly through an Ethernet port is known as the **standalone** configuration. To use this configuration, you will first need to change the network adapter settings by following the steps below.

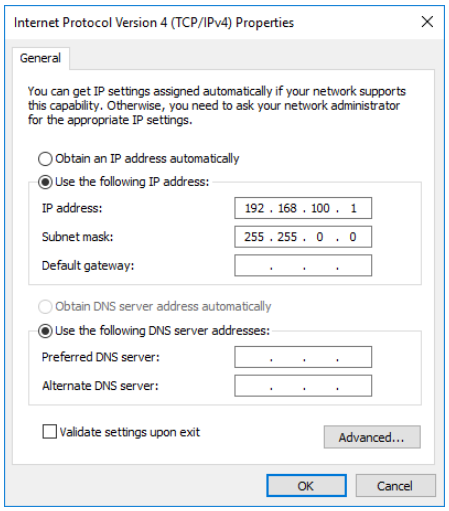
WARNING! Changing network settings may affect your computer's network connection. If you are uncomfortable about making changes to your Ethernet adapter configuration, or do not have the required user permission levels, then please consult with your IT administrator.

Installing a second Ethernet adapter which is dedicated for use with the drive will prevent this possible limitation.

1. Open Local Area Connection properties for the network adapter to be connected to the drive(s).



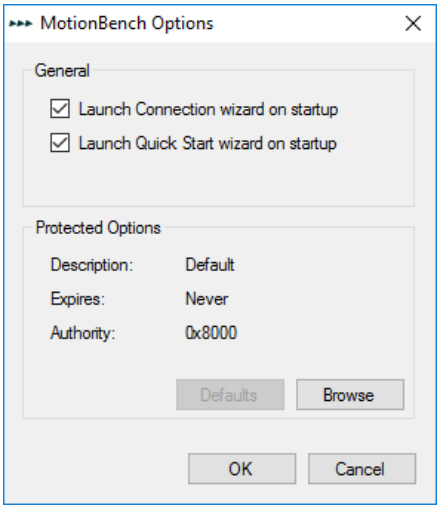
2. Double-click "Internet Protocol Version 4 (TCP/IPv4)" to open the properties window for this protocol.
3. Select "Use the following IP address:" and set the IP address to 192.168.100.1 and the subnet mask to 255.255.0.0.



4. Click "OK", and close the Local Area Connection properties window.

5 General settings

The start behavior of MotionBench can be configured by clicking Tools → Options from the menu bar.



⚠ The controls shown in the "Protected Options" section are intended for internal use only and should not be used.

The following table list the available startup options:

Options	Description
Launch Connection wizard at startup	This option specifies whether MotionBench displays the connection wizard. If the option is not selected MotionBench starts with an empty window. A user can manually add a device by clicking Add on the Device menu.
Launch Quick Start wizard on startup	This option specifies whether MotionBench displays a dialog to select a landing page on startup.

6 Features

This section details some common workflows and procedures that are enabled by MotionBench.

6.1 Connect to a drive

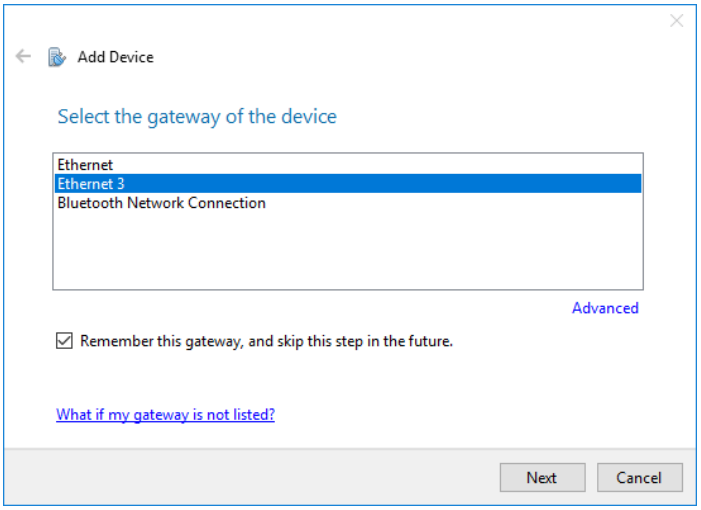
MotionBench communicates with drives using EtherCAT via a standard Ethernet port.

A drive connection is established through the connection wizard. Opening MotionBench will open the connection wizard (by default) (see page 13).

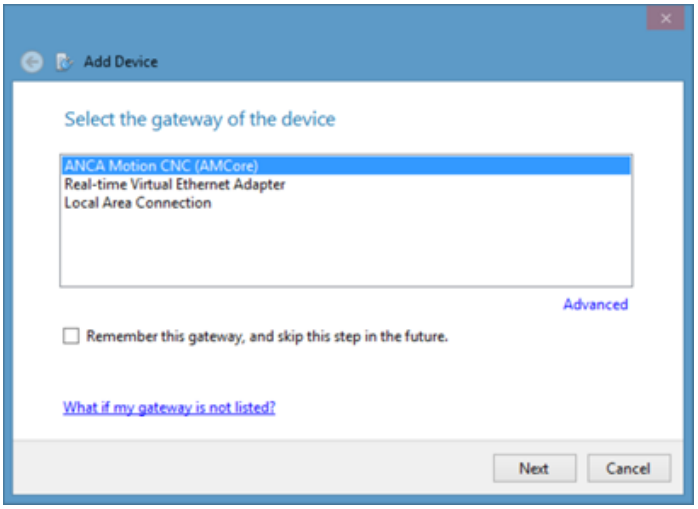
6.1.1 Select a gateway

The first step in the wizard is to select a gateway.

Communication with a drive is established through a gateway, which can either be a standard network adapter (standalone) or a conduit to an external control system like AMCore.



The tick box “Remember this gateway, and skip this step in the future.” will ensure that this gateway is used for future MotionBench session.



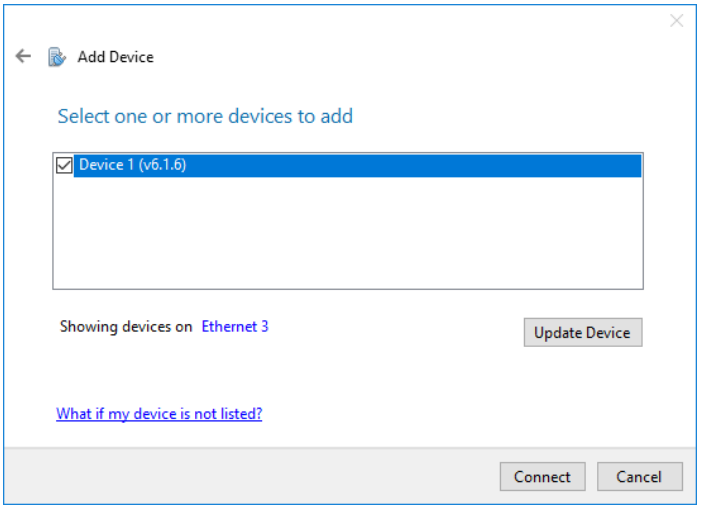
⚠ AMCore must be running for the AMCore gateway to be detected.

If no gateway module is available for the current external control system, MotionBench can connect to a drive by manually specifying an IP address. To manually specify an IP address, select the "Advanced" link.

⚠ If MotionBench is not using a gateway to connect to a drive, MotionBench will not be able to request control for the drive from the control system. In this case a user can only achieve partial control and some parameters will be marked as read only.

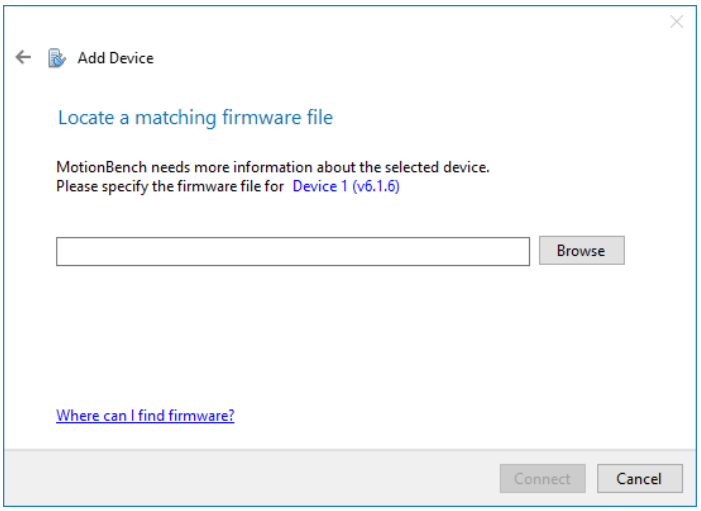
6.1.2 Select devices

For the next step in the wizard, you will need to select which devices to connect to. When a drive is physically connected, MotionBench will automatically detect it and show it in the device list.



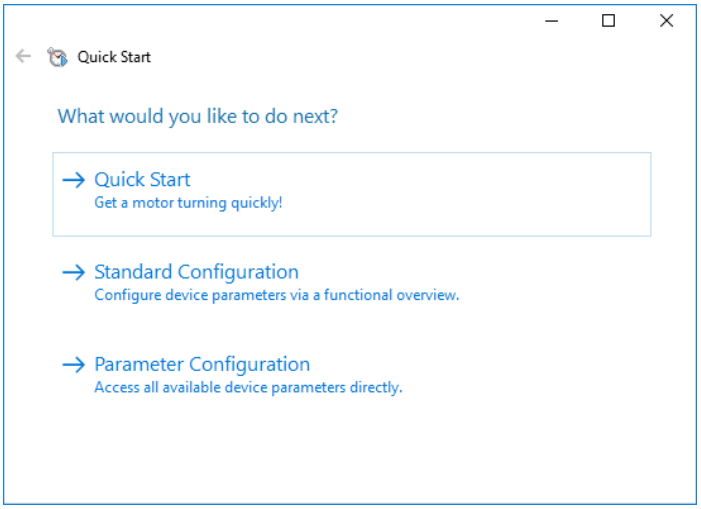
⚠ In a **standalone** configuration, the devices will not be detected unless the network adapter has the correct IPv4 properties set. To change the adapter properties, refer to prepare the network connection (see page 11).

The version of the firmware currently installed on the drive is indicated. If required, this can be updated using the “Update Device” button. If MotionBench cannot locate the firmware file (.amf) which matches the firmware currently installed on the device the following screen is shown to allow the user to select the matching firmware.



6.1.3 Finish up

Finally MotionBench shows the Quick Start menu. The Quick Start menu allows you to select a landing page. It can be disabled in MotionBench general settings (see page 13).



The following options are available:

Option	Landing Page	Description
Quick Start	Motor Library	Select a standard motor from the ANCA Motion range and get the motor turning with minimum effort.
Standard Configuration	Overview	Functional overview of the drive, where you can drill down into specific function modules.
Parameter Configuration	Parameters	Table where all variables in the drive profile can be accessed.

6.2 Monitor a connection

Once connected to a drive, MotionBench considers the drive either **Online** or **Offline**. A drive is considered online if MotionBench is able to communicate with it; otherwise, it is considered offline.

6.2.1 Connection status

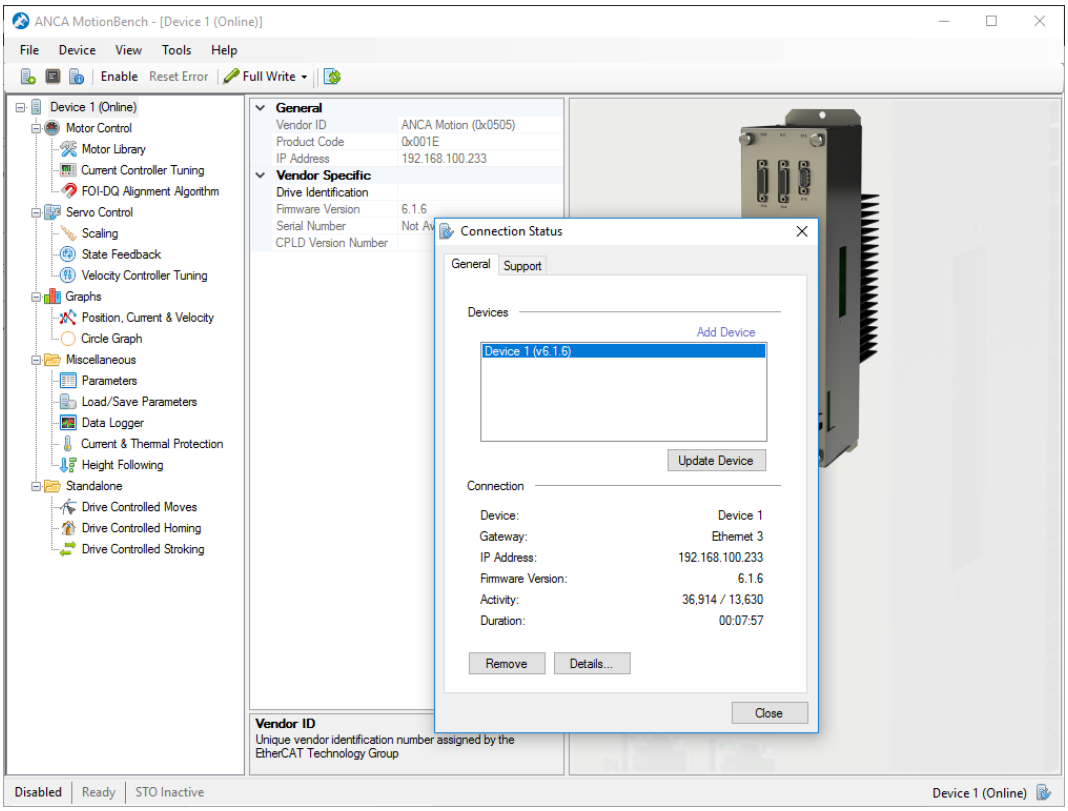
The Connection Status screen can be accessed at any time via the following methods:

- Press F10.
- Click the "Connection Status" icon on the toolbar.
- Navigate to and click the menu entry: Device → Connection Status.
- Click on the connection information in the lower right corner of the status bar and select "Open Connection Status".

The Connection Status screen provides the following information:

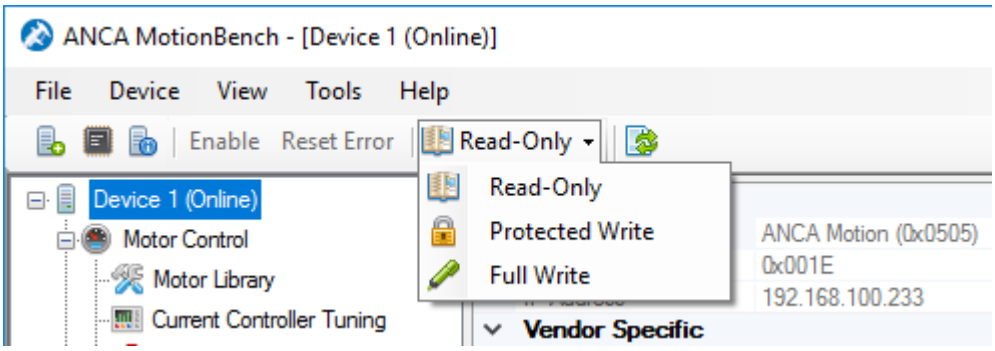
- Device - The name of the device.
- Gateway - The name of the gateway through which the device is connected.
- IP Address - The IP (Internet Protocol) address of the device.
- Firmware Version - The current firmware version of the device.
- Activity - The number of bytes sent / received to / from the device.

- Duration - The duration of time that the device has been Online.



6.2.2 Access drive parameters

Before any device parameter can be modified, MotionBench needs to negotiate access permission for the drive. This is done from the toolbar.



The following permission levels are available:

Level	Description
Read-Only	In Read-Only mode, MotionBench is allowed to display any device parameter. Parameter modification is not allowed. This mode is used to monitor a drive.

Level	Description
Protected Write	In Protected Write mode, MotionBench is allowed to display any parameter and modify parameters that do not interfere with a field-bus master controlling the drive.
Full Write	In Full Write mode, MotionBench is allowed to display and modify any device parameter.

6.3 Move a motor

MotionBench allows a user to get a motor moving. This can be done in a number of ways.

6.3.1 Motor Library

The Motor Library page contains some basic functionality for getting a motor turning.

To do this:

1. Select your motor from the drop-down.
2. Click "Start".
    a. In the dialog that follows, choose if you want some initial (no load) tuning set prior to enabling the motor.
3. Ensure safe operating conditions, then click "OK".
4. Click "Forward" or "Backward" to change the direction of movement.

For more information, refer to Motor Library (see page 54).

6.3.2 Drive Controlled Moves

ANCA Motion drives can perform a sequence of up to 64 preset movements.

To configure the movements:

1. Go to the Drive Controlled Moves page.
2. Click "Load From Drive".
3. Modify the table of movements, then click "Save To Drive".
4. Enable the drive.
5. Click "Run" to begin the sequence of movements.

For more information, refer to Drive Controlled Moves (see page 46).

6.3.3 Drive Controlled Stroking

ANCA Motion drives can be configured to perform cyclic moves.

To do this:

1. Go to the Drive Controlled Stroking page.

2. Modify the stroking settings.
3. Enable the drive
4. Click "Run" to begin the movements.

For more information, refer to Drive Controlled Stroking (see page 48).

6.3.4 Drive Controlled Homing

ANCA Motion drives can perform some movements to find a home-switch, setting it to zero (or "home").

To do this:

1. Go to the Drive Controlled Homing page.
2. Enable the drive.
3. Click "Run".

For more information, refer to Drive Controlled Homing (see page 45).

6.4 Tune a system

Most servo systems require some level of tuning (setting up the desired response of the system usually with the load attached). This can be done through several methods available within MotionBench.

6.4.1 Initial tuning

MotionBench has two methods for setting initial tuning.

6.4.1.1 Motor Library

After selecting a motor in the Motor Library page, clicking "Start" will recommend some initial tuning for the motor, and enable the drive. It will also start the motor turning, as it is intended to be used for a motor with no load attached.

For more information, refer to Motor Library (see page 54).

6.4.1.2 Tuning pages

At times, you may not want to enable the drive immediately after setting the tuning.

In this case, you can set initial current and velocity tuning by going to the current and velocity tuning pages and clicking "Apply" in the suggested tuning calculator.

For more information, refer to Current Controller Tuning (see page 35) and Velocity Controller Tuning (see page 62).

6.4.2 Fine tuning

Once you have some initial tuning set, you can fine tune the system by analyzing the performance of the control loops.

6.4.2.1 Current loop

Fine tuning of the current loop can be performed as follows:

1. Go to the Current Controller Tuning page.
2. Ensure you have "Full Write" access.
3. Select your stimulus type and set the stimulus settings to be appropriate for your system.
4. Click "Start".
5. Click "Stimulate & Capture" or "Capture".
6. Analyze the results and make an appropriate change to the tuning parameters.
7. Click "Retune".
8. Repeat from step 5 until you are satisfied with your tuning performance.

For more information, refer to Current Controller Tuning (see page 35).

6.4.2.2 Velocity loop

The velocity loop can be tuned in two different ways.

External motion controller

Fine tuning of the velocity loop using an external motion controller (i.e. AMCore) can be performed as follows:

1. Go to the Velocity Controller Tuning page.
2. Ensure you have "Protected Write" access.
3. Set your stimulus input amplitude to be appropriate for your system.
4. Click "Start".
5. Command the motor to move at a constant velocity greater than the stimulus input amplitude.
6. Click "Stimulate & Capture".
7. Analyze the results and make an appropriate change to the tuning parameters.
8. Click "Retune".
9. Repeat from step 5 until you are satisfied with your tuning performance.

Only stimulus type "Chirp" is available when tuning via an external motion controller.

Standalone

Fine tuning of the velocity loop in a standalone set up can be performed as follows:

1. Go to the Velocity Controller Tuning page.
2. Ensure you have "Full Write" access.
3. Select your stimulus type and set the stimulus settings to be appropriate for your system.
4. Enable the drive.
5. Click "Start".
6. Click "Stimulate & Capture" or "Capture".

7. Analyze the results and make an appropriate change to the tuning parameters.
8. Click "Retune".
9. Repeat from step 6 until you are satisfied with your tuning performance.

For more information, refer to Velocity Controller Tuning (see page 62).

6.5 Configure drive settings

6.5.1 All parameters

There are two ways to set any firmware parameter.

6.5.1.1 Parameters page

On this page, parameters appear as a row in a table. With write access greater than "Read-Only", the parameters that can be modified will have a white background for their row.

To modify the value, simply click on the value column of the row, type your value, then press enter (or click somewhere else). The write is successful if the value doesn't change back to it's previous value.

For more information, refer to Parameters (see page 57).

6.5.1.2 Advanced mode

In this configuration mode, all firmware parameters are listed on the list, in the "Parameter Explorer".

To modify a parameter, drag the parameter into a "Calibration Window", then modify it's value column.

Advanced mode allows modification of any firmware parameter. Do not change anything unless you know what you are doing.

For more information, refer to Advanced mode (see page 70).

6.5.2 Digital inputs

Digital inputs may have their polarity changed. With DCSM firmware variant, the inputs can also be mapped to DCSM functions, i.e. enable, start drive controlled moves, etc.

To do this, go to the Digital IO page and click on "Digital Input Configuration". For each input, change the polarity by selecting "Active High" or "Active Low", or select a DCSM function from the drop-down.

For more information, refer to the Digital Input Configuration (see page 45) section of Digital IO.

6.5.3 Digital outputs

Digital outputs can have their polarity, safe state and command changed. Additionally, their state can be mapped to a parameter value.

To do this, go to the Digital IO page and click on "Digital Output Configuration". For each output:

- Change the polarity by selecting "Normal" or "Inverted".
- Change the safe state or command by selecting "High" or "Low".
- Set up a parameter controlled value by changing the "Control Method" to "Parameter", then click "Select".

For more information, refer to the Digital Output Configuration (see page 42) section of Digital IO.

6.5.4 Analog inputs

Analog inputs can be transformed by applying some functions to the actual input.

To do this, go to the Analog IO page and modify the parameter values in the configuration panel.

For more information, refer to Analog IO (see page 29).

6.5.5 Analog outputs

Analog outputs can have their voltages directly commanded.

To do this, go to the Analog IO page and modify the parameter values in the "Analog Output" section of parameters.

For more information, refer to Analog IO (see page 29).

6.5.6 Adjust scaling

The type of scaling (linear or rotary), as well as the scaling of the position, velocity, acceleration, and force can be modified.

To do this, go to the Scaling page, change the scaling parameters, then click "Apply Scaling".

For more information, refer to Scaling (see page 59).

6.6 Diagnose common drive issues

MotionBench provides various pages to monitor and to visualize feedback from the drive. These pages are provided to aid the engineer to commission a system or to diagnose faults in the feedback signals.

6.6.1 Control loops

Once a drive is enabled, you may want to check the behaviour of one of the control loops.

To view these feedback signals:

1. Go to the Position, Current & Velocity page.
2. Click "Start".
3. Click the legend items to remove signals that you are not interested in.

For more information, refer to Position, Current & Velocity (see page 58).

6.6.2 Encoder feedback

If you are experiencing problems with encoder feedback, there are two pages you can visit to ensure your encoder is configured correctly.

6.6.2.1 Circle graph

This page will allow you to view the circle formed by the encoder data. If you can't see any feedback, you may have the wrong channel configured.

To compensate abnormalities in the circle:

1. Go to the Circle Graph page.
2. Click "Start".
3. Set the "Cos/Sin Offset" parameters such that the circle is centered.
4. Set the "Encoder Cos Phase Compensation" parameter such that the circle is aligned with the axes.
5. Set the "Cos/Sin Gain" parameters such that the circle vertical and horizontal amplitude are equal and do not exceed the minimum and maximum trip thresholds.
    a. You can modify the minimum and maximum thresholds, but keep in mind that the maximum ADC values the compensated signals will have is ±32768.

For more information, refer to Circle Graph (see page 31).

6.6.2.2 State feedback

The State Feedback page allows you to change encoder configuration, set up a secondary encoder, view feedback directions, and more.

For more information, refer to State Feedback (see page 60).

6.6.3 FOI

The only FOI algorithm currently supported in MotionBench is DQ alignment (DQA). To monitor the progress of DQA:

1. Go to the FOI-DQ Alignment Algorithm page.
2. Click "Start".
3. Enable the drive.
4. Check the electrical angle feedback follows the command (with an offset).

For more information, refer to FOI-DQ Alignment Algorithm (see page 50).

6.7 Log drive signals

In many MotionBench pages, some parameters are measured in real time and displayed in a graph. The parameters are relevant to the purpose of the page. However, you may want to monitor a parameter value that is not the subject of a standard page. To do this, there are two methods.

6.7.1 Data logger

ANCA Motion drives have an internal mechanism known as the Data Logger. This mechanism allows four parameter to be measured at up to the highest resolution (62.5 µs) for 2048 samples. MotionBench supports configuration of this mechanism in the Data Logger page.

For more information, refer to Data Logger (see page 38).

6.7.2 Advanced mode

To set up live measurements for any drive parameter:

1. Switch to Advanced mode.
2. From the "Parameter Explorer", drag your desired parameter into the "Measurement List".
3. Change the "Event" column to the task rate you desire (lower number means faster sample rate).
4. Drag the measurement into the main window and select "Show in new Graph Window".
5. Press F5 to start measurements, and Shift+F5 to stop.

For more information, refer to Advanced mode (see page 70).

6.8 Save your drive configuration

There are two methods for saving drive configuration in MotionBench.

6.8.1 Single drive

When saving a single drive, there are two options available.

6.8.1.1 Save to file

To save modified parameters to a file:

1. Go to the Load/Save Parameters page.
2. Click "Save To File".
3. Select a file, or type the name of a file to create, then click "Save".
    a. You can change the file format by choosing a format from the drop-down.
4. Enter any required information for the export to complete.

For more information, refer to Load/Save Parameters (see page 52).

6.8.1.2 Save to non-volatile memory

To save parameter values to non-volatile parameters (NVP):

1. Go to the Load/Save Parameters page.
2. Click "Save To Drive".
3. Move any parameters to be saved to the right list.
4. Click "Save".

For more information, refer to Load/Save Parameters (see page 52).

6.8.2 Multiple drives

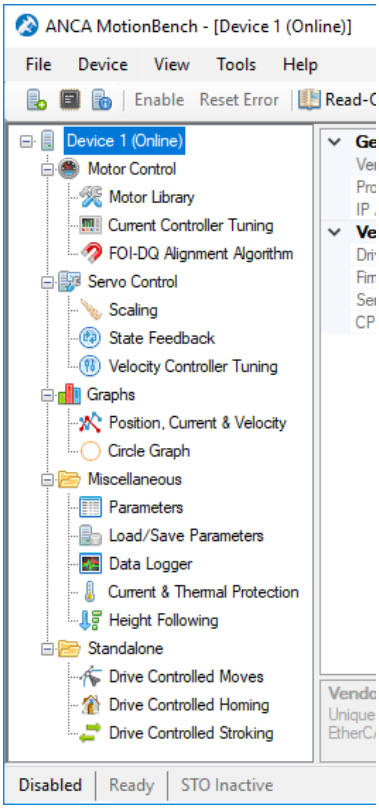
The CSV format save option from Load/Save Parameters is available as a multiple drive operation. Click File → Export... to begin the operation.

For more information, refer to Save all configuration (see page 67).

7 Standard mode

The default mode for MotionBench is **Standard mode**.

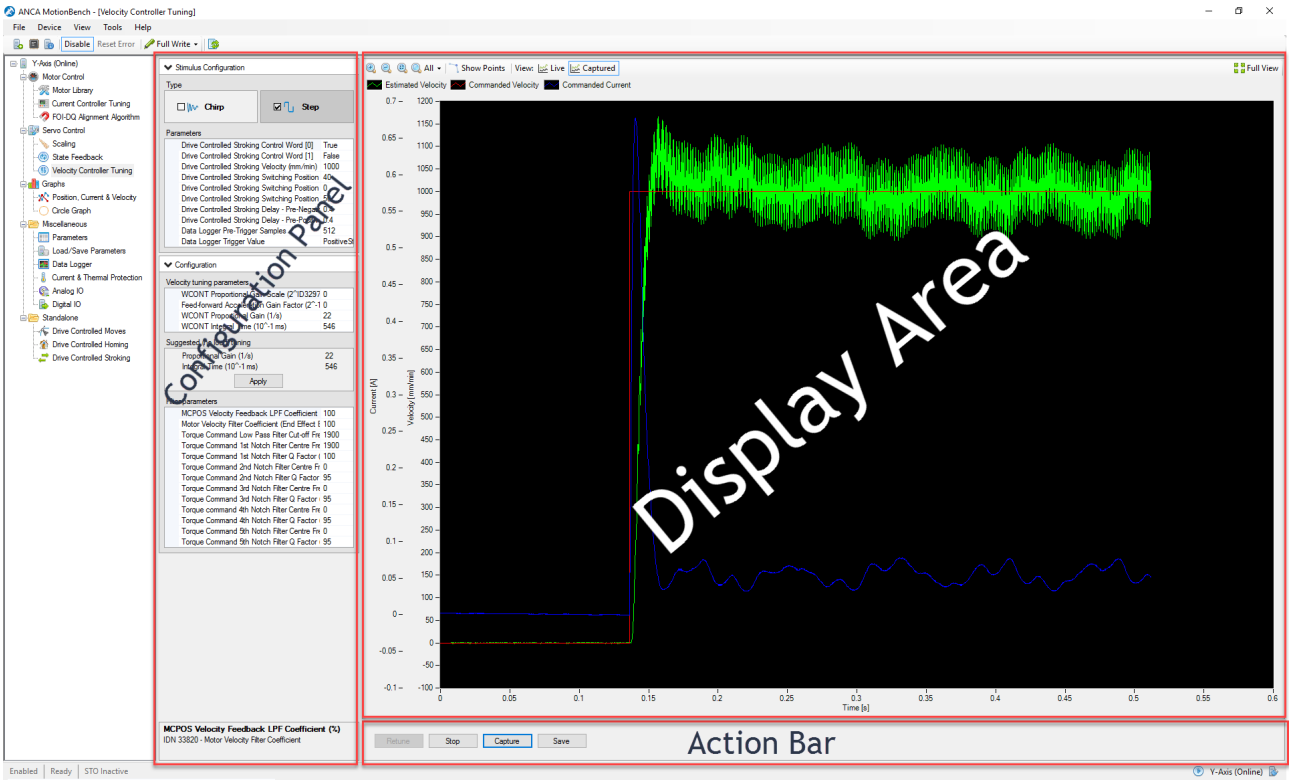
In this mode, a navigation tree is added to the left of the window. This panel can be hidden by clicking View → Navigation Tree in the menu bar, or by pressing F11.



Within the navigation tree, each connected drive is displayed with it's available pages as children. Clicking on a page will load the page in the remainder of the window. The pages available for a drive depends on the drive's firmware variant.

7.1 Page layout

Most pages have a **Configuration Panel, Action Bar** and a **Display Area**.



7.1.1 Configuration Panel

The configuration panel section of a page is nested to the left of the window. It contains interface elements related to configuring the drive, or the experiment.

> An **experiment** is a procedure performed by MotionBench to assist with drive configuration. For example, obtaining a current chirp response (experiment) assists with current tuning (configuration).

7.1.2 Action Bar

The action bar section of a page is nested to the bottom of the window. It contains buttons (or similar) for controlling page operation.

7.1.3 Display Area

The display area section of a page is the biggest section, taking up any remaining space in the window. Usually, it will contain a **Plot**, but it may contain any graphical UI.

7.1.3.1 Plot

A plot displays measured drive data as a graph. Each plot has the following controls available to control the graph:

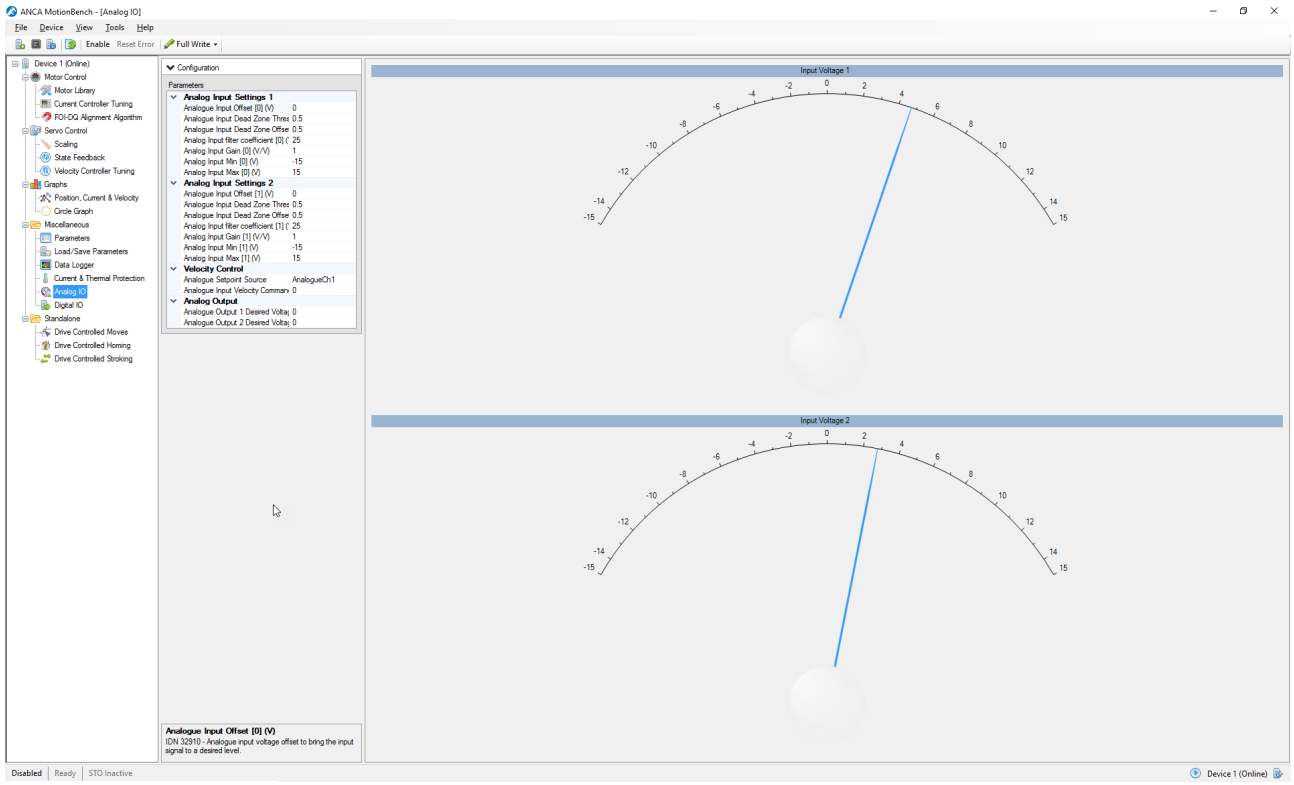
Control	Description
	Zoom in
	Zoom out
	Zooms in or out so that the entire graph is visible
 All	Specify the zoom type whether it vertical, horizontal or all
 Show/Hide Points	Toggles the visibility of data points on the graph
View:	Followed by a list of views as buttons (e.g.  Circle Plot). Clicking a button changes the active plot view. Each page implement it's own set of views
 Show/Hide Cursor	Toggles the visibility of the data cursor on the graph
 Full/Normal View	Collapses the configuration panel and the legend so the plot is expanded to the whole page
 Legend	Toggles the visibility of the parameter's data in the plot

7.2 Pages

This section contained detailed descriptions of each page that can appear in the navigation tree. For descriptions of workflows involving multiple (or single) pages, refer to section Features (see page 14).

7.2.1 Analog IO

The Analog IO page allows the user to monitor the analog voltage inputs, transform the input voltages, and directly control the voltage of the analog outputs.



7.2.1.1 Configuration

A brief summary of each category of firmware parameters is described below. For a more detailed description of each of the parameters, please refer to the firmware parameter reference (see page 7).

Inputs

For each analog input, the effective input voltage can be transformed by applying the following functions:

Function	Description
Offset	This value will be **subtracted** from the actual input voltage
Dead Zone Threshold	An actual input voltage that has magnitude lower than this value will be mapped to 0
Dead Zone Offset	When the actual input voltage is above the threshold, this directional offset is added
Filter Coefficient	Removes **noise** from the actual input voltage
Gain	The actual input voltage will be **multiplied** by this value
Min/Max	The effective input voltage will be **saturated** to remain between these limits

Outputs

These firmware parameters will directly command the voltage of corresponding analog output.

Velocity Control

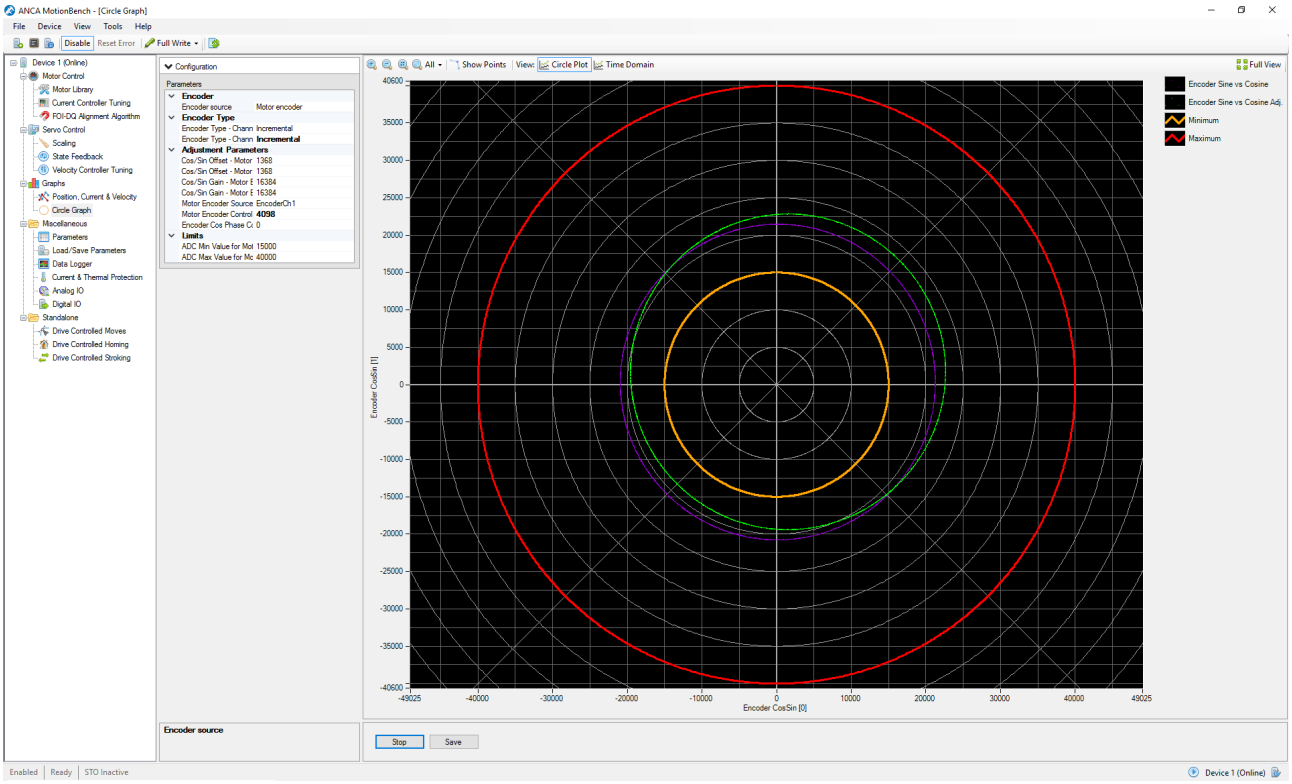
These firmware parameters allow modification of the mapping from analog input voltage to the input velocity command.

7.2.1.2 Display

The display shows the live transformed (effective) voltage for each analog input.

7.2.2 Circle Graph

This page allows a user to diagnose a fault with an analog encoder. The image below shows the circle plot for an analog encoder.



7.2.2.1 Configuration

A brief summary of each category of firmware parameters is described below. For a more detailed description of each of the parameters, please refer to the firmware parameter reference (see page 7).

Category	Description
Encoder	Changes the encoder feedback signals that are display in the plot window

Category	Description
Encoder Type	Verify that the correct encoder type firmware parameter is set: the connected channel should display **Incremental**
Adjustment Parameters	Allows imperfections in the encoder feedback signal to be manually adjusted
Limits	Defines the minimum and maximum magnitude encoder signal before a drive error is thrown

7.2.2.2 Actions

For this page, the following actions can be performed.

Action	Description
Start	Begins the live plotting of the encoder feedback signals
Save	Saves the plotted data to a file

7.2.2.3 Display

The display is a plot containing **two** views.

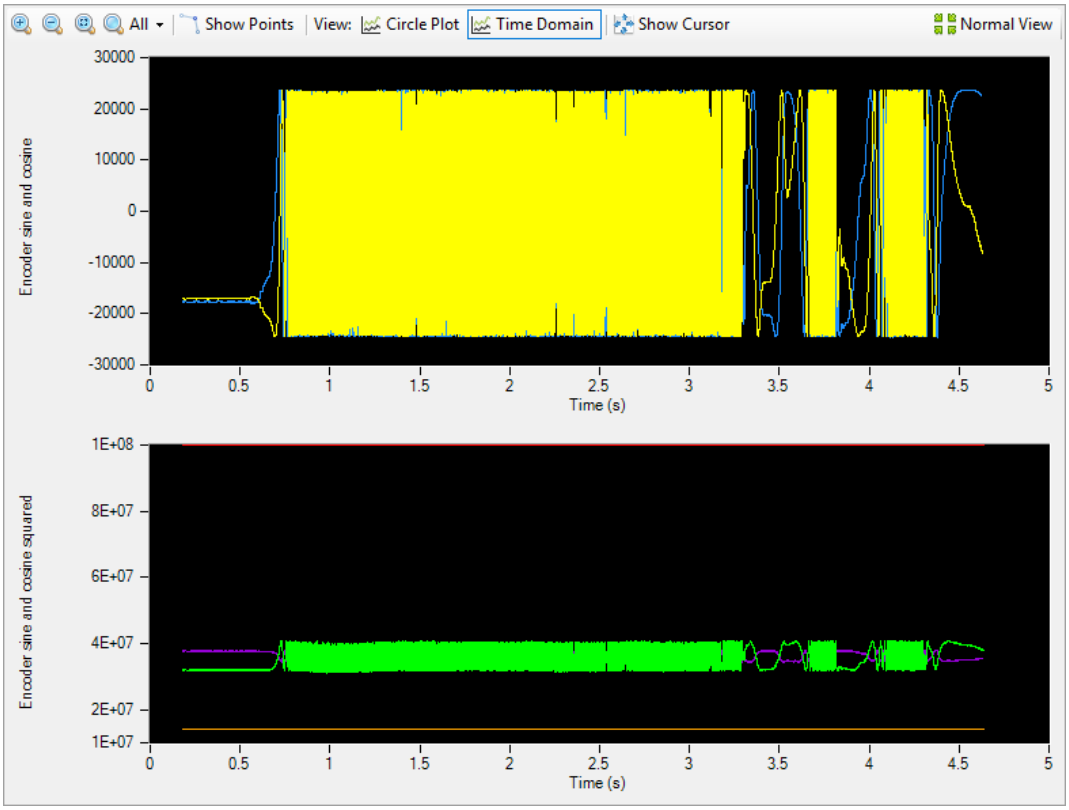
Circle Plot

The circle plot displays live encoder data in the form of a scatter graph. The sampled points will form a circle when the encoder is rotated, hence the name.

The orange and red circle shows the minimum and maximum amplitude before a drive error is thrown; the green signal must always lie between the two circles for normal operation.

Time Domain

The time domain plot is split into two graphs.

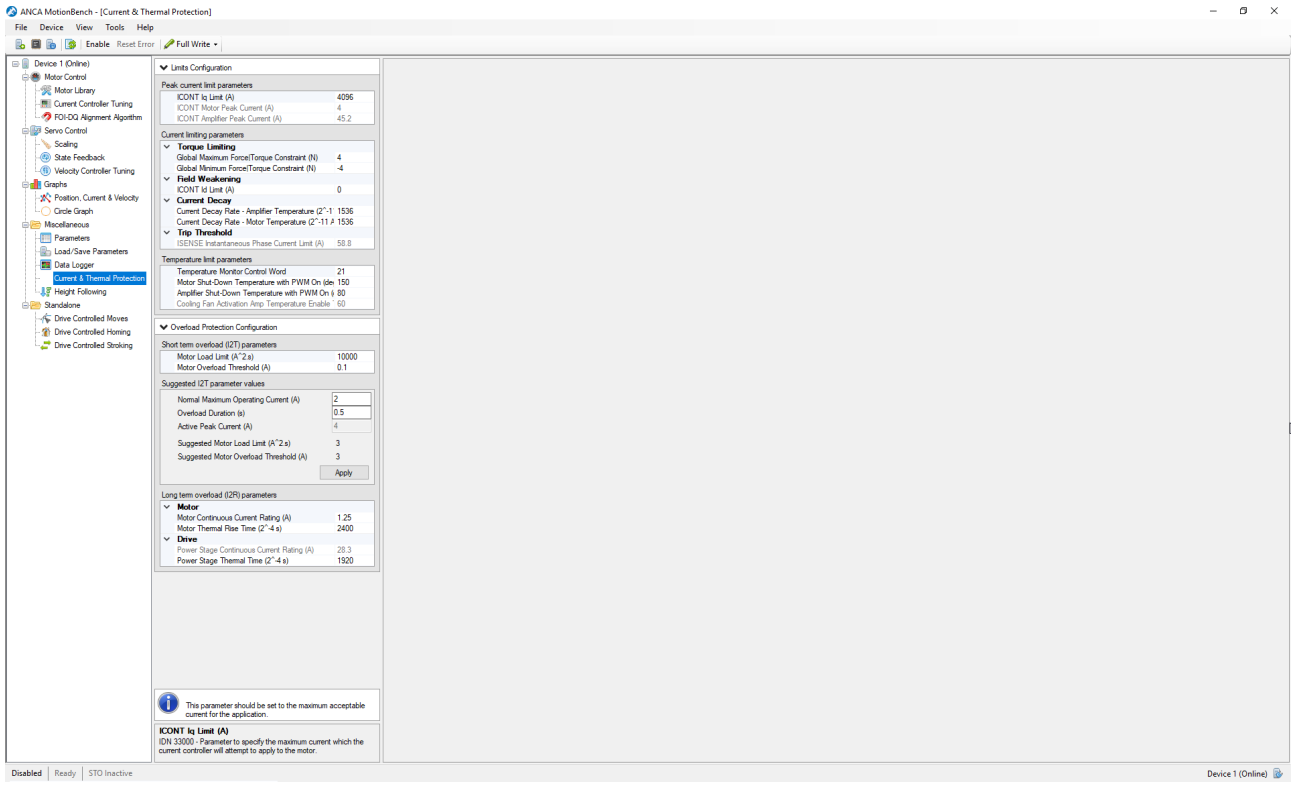


The upper graph shows the same data as the purple signal in the circle plot, but in time domain.

The lower graph shows the squared amplitude of the two signals from the circle plot, in time domain. With properly set adjustment parameters, the green signal in this plot should be almost completely constant.

7.2.3 Current & Thermal Protection

This page allows configuration of firmware parameters related to protecting the drive from damaging the motor.



7.2.3.1 Configuration

There are two configuration sections: **Limits** and **Overload Protection**.

Limits

There are three types of parameters in this section.

Type	Description
Peak current limit	Saturate the current command to the lower of the three values
Current limiting	Indirectly limit the current command
Temperature limit	Subsystem of the drive that cause a shutdown when the temperature of different components gets too high

Overload Protection

There are two types of parameters configured by this section.

Type	Description
Short term	Subsystem which throws an error when the current is too high for a short period of time
Long term	Subsystem which throws an error when the current is too high for a long period of time

The short term parameters have accompanying suggested values: click Apply to set these values.

> The suggested values are calculated such that a peak current will cause an error after the number of seconds passed equals the overload duration.

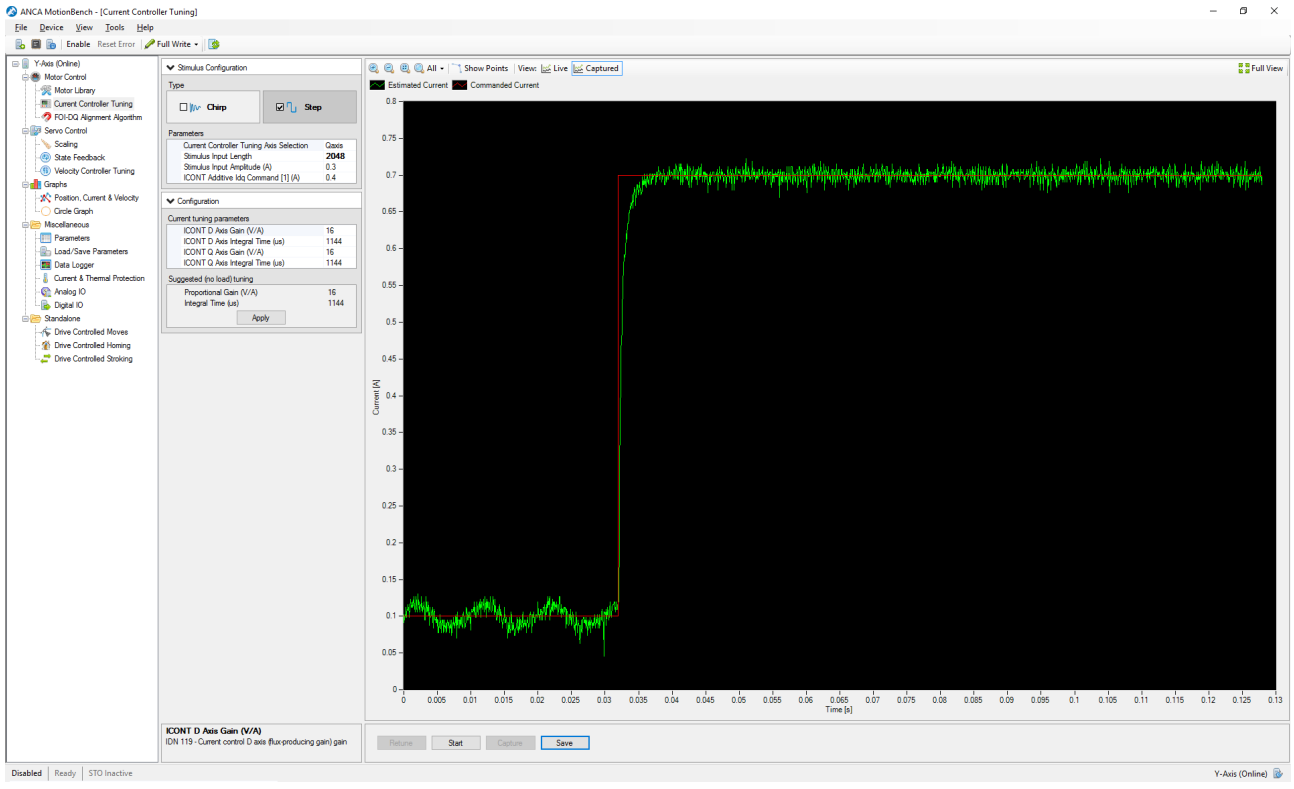
7.2.3.2 Actions & Display

Reserved for future development.

7.2.4 Current Controller Tuning

This page allows the user to tune the current loop of the drive. By obtaining chirp or step responses, you can determine an appropriate change to the tuning parameters, then see the effect of your changes.

> The physical parameters affecting current loop tuning are primarily the resistance and inductance of the winding circuits. These parameters are usually fixed for any particular motor, thus the current loop tuning is determined primarily by the motor.



7.2.4.1 Configuration

In the configuration panel, there are two types of configuration:

Type	Description
Stimulus	Allows selection of the the stimulus type (chirp or step), as well as modify the amplitude and offset of the stimulus.
Tuning	Allows direct modification of the properties that define the current loops. Also suggests (and optionally sets) initial tuning, assuming no load is attached to the motor.

There are two current loops in the drive: D-axis and Q-axis. Under normal circumstances, these loops should be the same. For more information, refer to the servo drive user manual.

7.2.4.2 Actions

The following actions are used to control the tuning process.

Action	Description
Retune	Retune the drive.
Start (Chirp)	Begin the experiment by starting live measurements and drive controlled moves.
Stimulate & Capture (Chirp)	Set up data logger, wait for trigger, and display the results.
Start (Step)	Begin the experiment by starting live measurements and drive controlled stroking.
Capture (Step)	Set up data logger, wait for trigger, and display the results.
Save	Saves the captured data for offline analysis.

7.2.4.3 Display

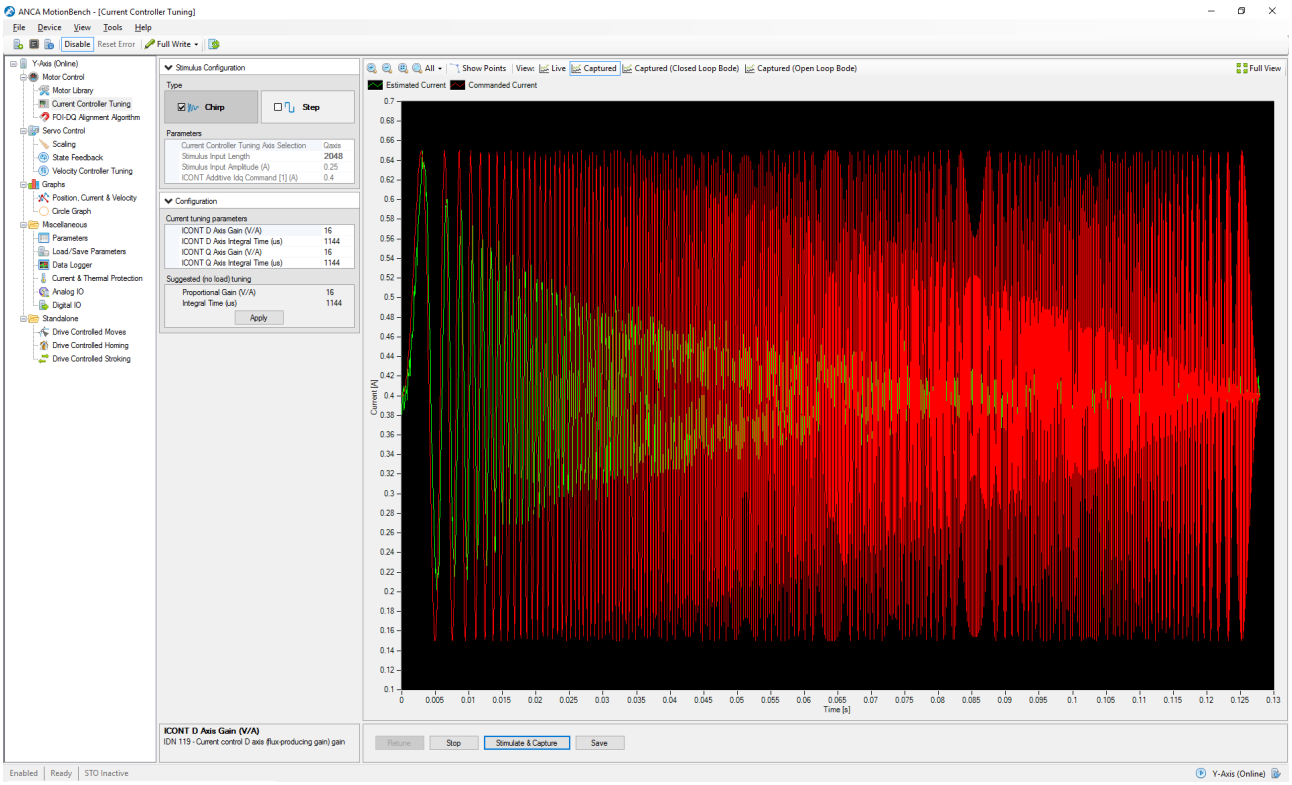
The display area contains a plot with the following views:

Live

This plot view shows the live measured data of the current command and feedback signals. The measurements are shown in a time domain graph with a history of 10 seconds.

Captured

This plot view shows the data that was captured during stimulation. It is captured by the drive data logger, and is plotted in the time domain. A sample chirp capture is shown below.

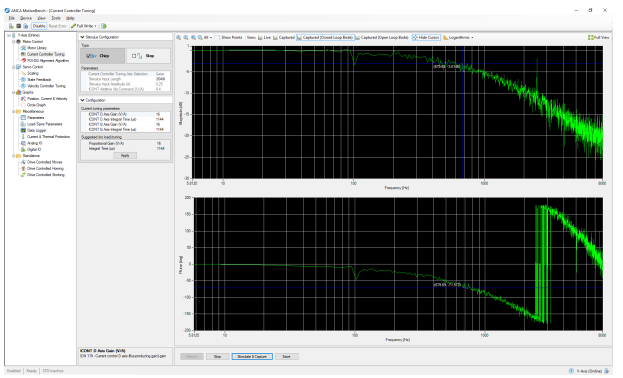
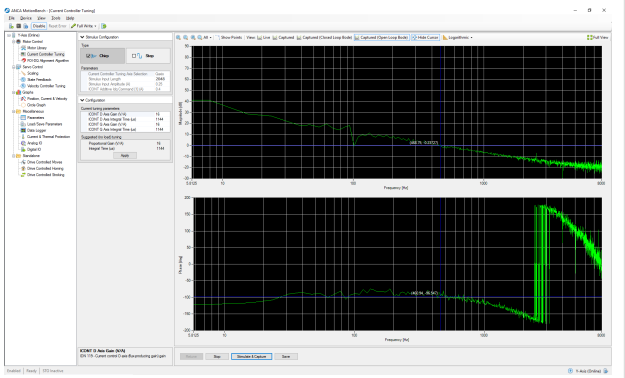


Captured (Closed Loop Bode)

This plot shows the captured chirp data in the frequency domain. It is split into two graphs, containing the magnitudes and phases. These are calculated based on the response relative to the stimulus. This is known as a closed loop Bode plot.

Captured (Open Loop Bode)

This plot also shows captured chirp data in the frequency domain, split into magnitude and phases. In this case, the magnitudes and phases are calculated based on the response relative to the following error. This is known as an open loop Bode plot.

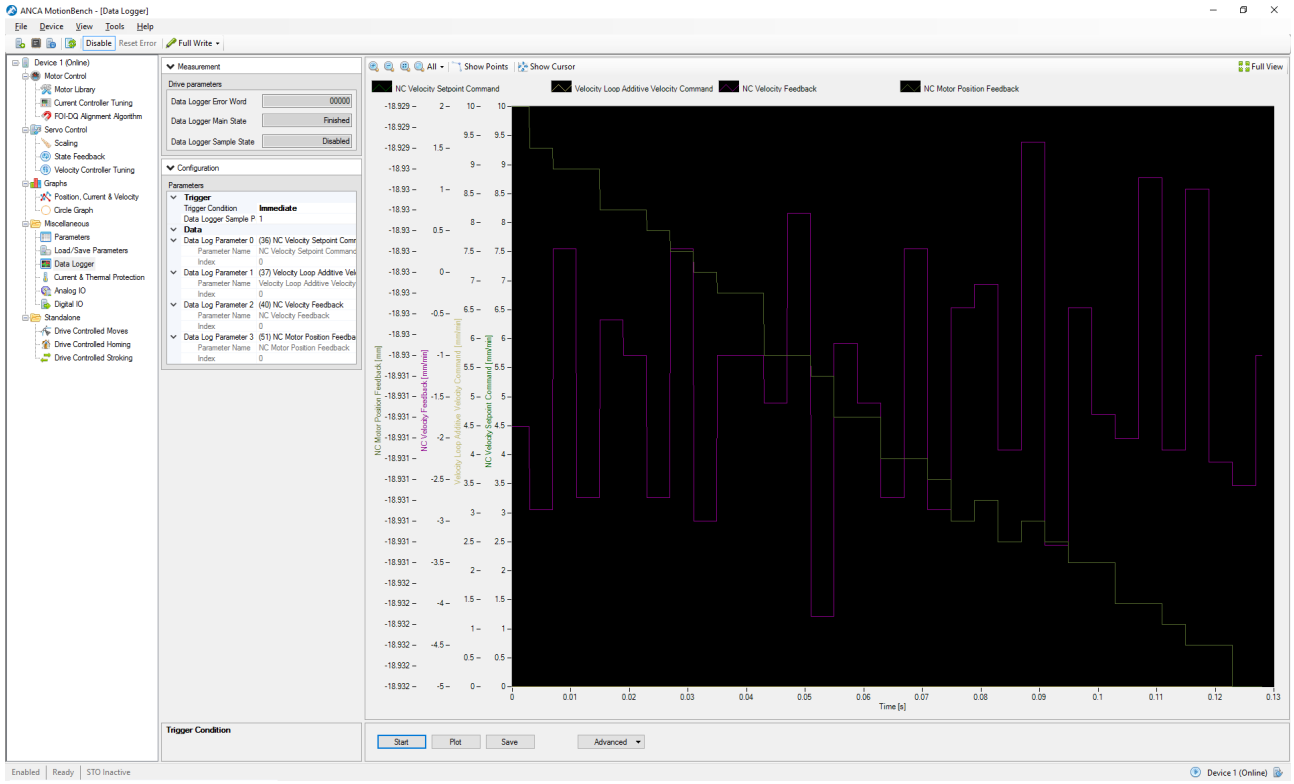
Closed Loop Bode	Open Loop Bode
	

Users can switch the X-Axis scale type between Logarithmic or Linear via this button 

. This is only available on the Captured (Closed/Open Loop Bode).

7.2.5 Data Logger

This page allows you to setup the drive to sample up to four different parameters from the drive, each with 2048 data points.



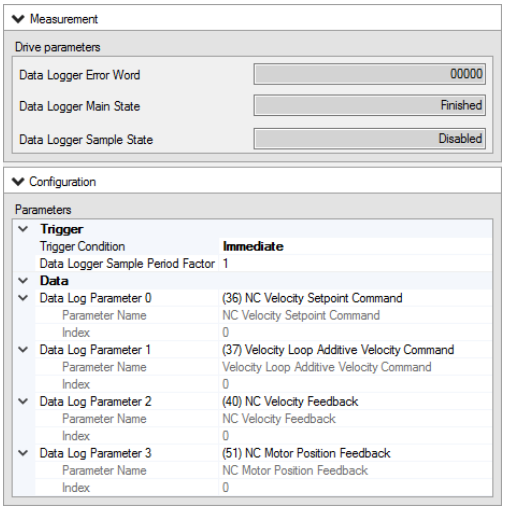
7.2.5.1 Configuration

Three different triggers types are available to control under what conditions the data log will trigger.

- Immediate
- Parameter Controlled
- Class 1 Diagnostic (C1D) Fault

Immediate Trigger

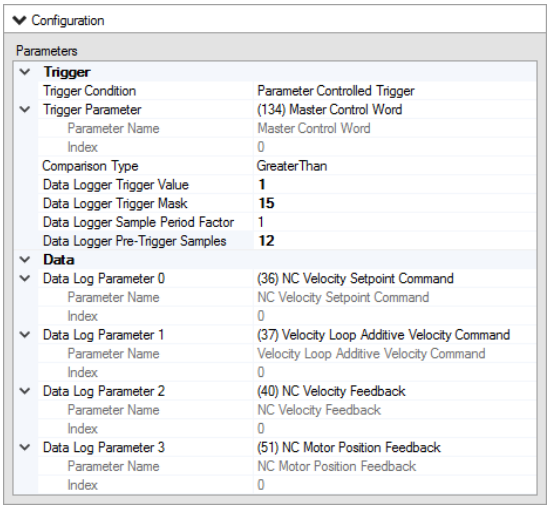
If immediate is selected and the Run button is clicked MotionBench instructs the drive to immediately start sampling the parameters and upon completion displays the captured data.

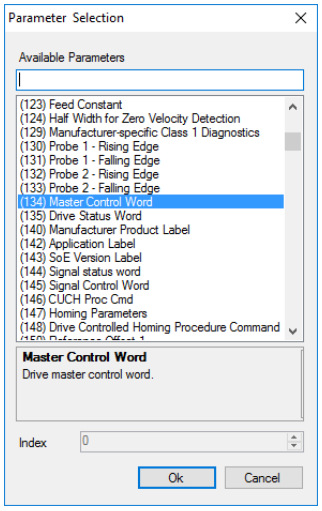
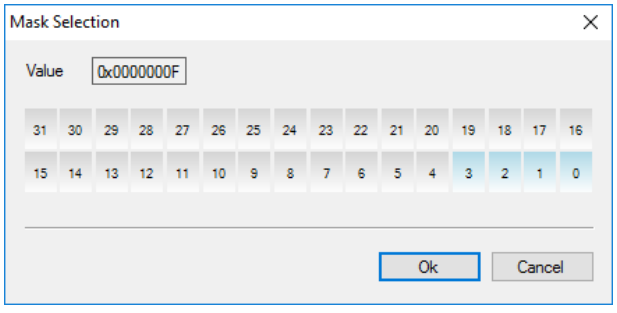


Parameter	Description
Data Logger Sample Period Factor	The data log is sampled at the rate of the motor control update, 62.5us. Sample Period Factor provides the ability to skip integer multiples of 62.5us.

Parameter Controlled Trigger

If Parameter Controlled Trigger is selected and the Run button is clicked MotionBench instructs the drive to arm the drive data logger. The drive will use the selected trigger parameter to determine when to begin finalizing data logging. When MotionBench detects that the data log has been completed it will automatically display the results.



Parameter	Description
Trigger Parameter	Any parameter within the profile can be selected as the trigger. If the selected parameter is an array the Index field specified the array index of the parameter. 
Data Logger Trigger Mask	This mask is applied to the value of the trigger parameter for selecting the bits to trigger off. Setting this parameter to zero disables the mask (Equivalent to a mask of 0xFFFF FFFF). 

Parameter	Description
Data Logger Trigger Value	This is the value that the trigger parameter is compared to (with the trigger mask applied if applicable) for the data logger to trigger its completion.
Data Logger Sample Period Factor	The data log is sampled at the rate of the current control update, 62.5us. Sample Period Factor provides the ability to skip integer multiples of 62.5us.
Data Logger Pre-Trigger Samples	Specify the number of pre-trigger samples to log. The Pre-Trigger Samples parameter informs the drive of how many samples to keep prior to the trigger event. For instance if this value is set to 500 the buffers returned on completion of the data log will include 500 samples taken immediately before the trigger event occurred and 1548 after for a total of 2048 data points.
Comparison Type	Defines how the Data Logger Trigger Value is compared with the trigger parameter.

Class 1 Diagnostic Fault Trigger

If Class 1 Diagnostic (C1D) Fault trigger is selected the drive will begin finalizing data logging when a critical fault that disables the drive is detected. When MotionBench detects that the data log has been completed it will automatically display the results.

7.2.5.2 Actions

On this page, the following actions are available.

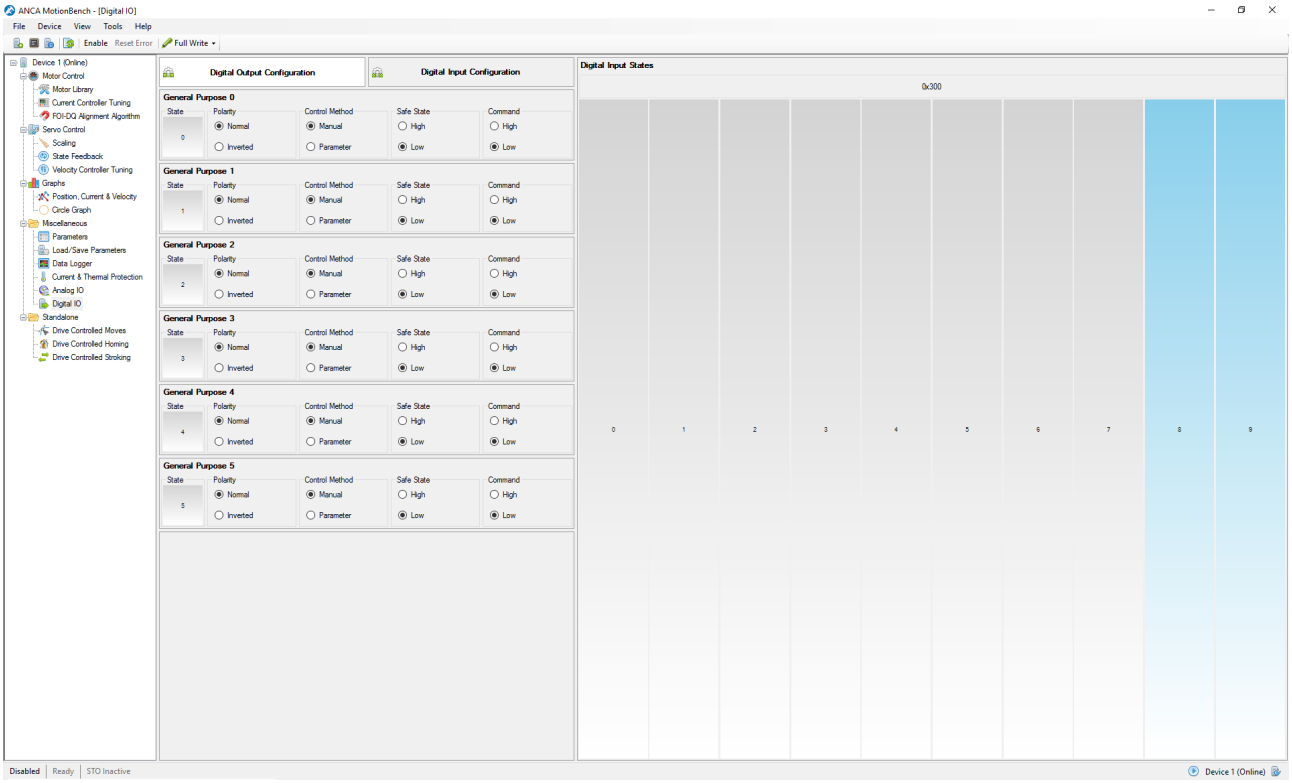
Action	Description
Start	Start the data logger
Plot	Plots the contents stored in the data buffers. It is only available/clickable if the data buffers are not empty
Save	Saves the plotted data to a file (.dat)
Advanced	Allows the user to import or export a configuration

7.2.5.3 Display

The display is a plot containing a time domain graph of the drive data logger data.

7.2.6 Digital IO

The Digital IO page allows the user to specify how the drive is controlling the digital outputs, and inputs.



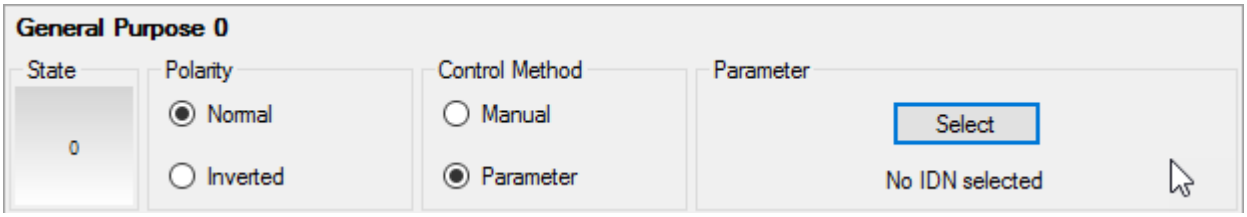
7.2.6.1 Configuration

There are two modes of configuration available: **Digital Output Configuration** and **Digital Input Configuration**.

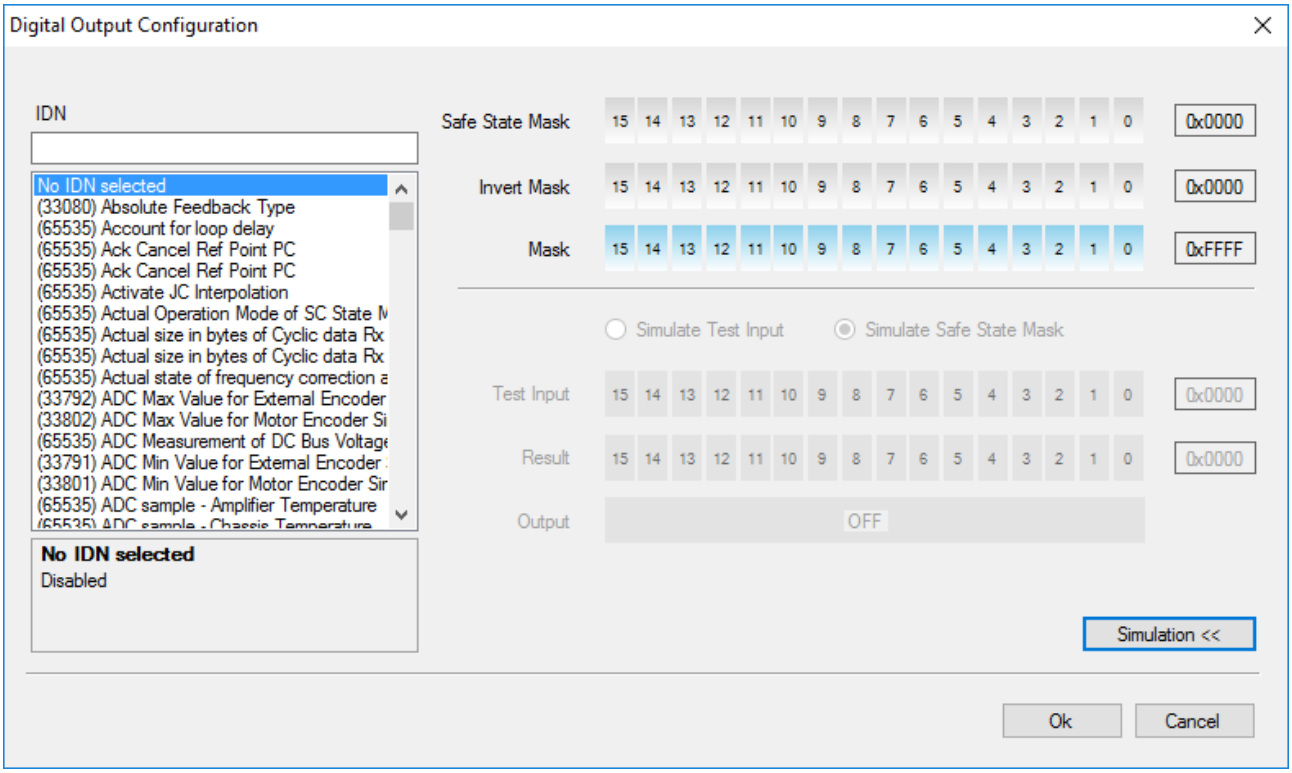
Digital Output Configuration

If the selected "Control Method" is "Manual" mode, a user can use the "Command" button to toggle the physical output to be high or low.

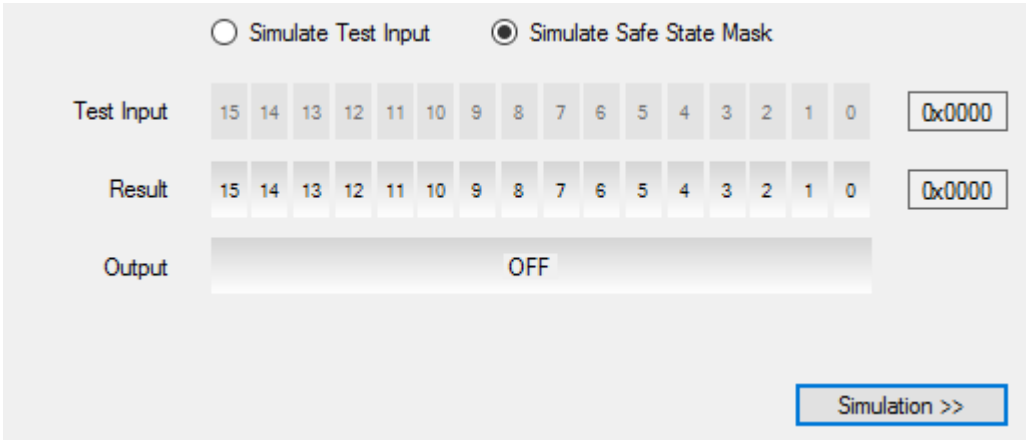
In "Parameter" mode, any drive parameter can be selected to trigger a digital output.



Pressing the "Select" button brings up the following dialog to specify the parameter from which the value will be obtained for constructing the digital output.

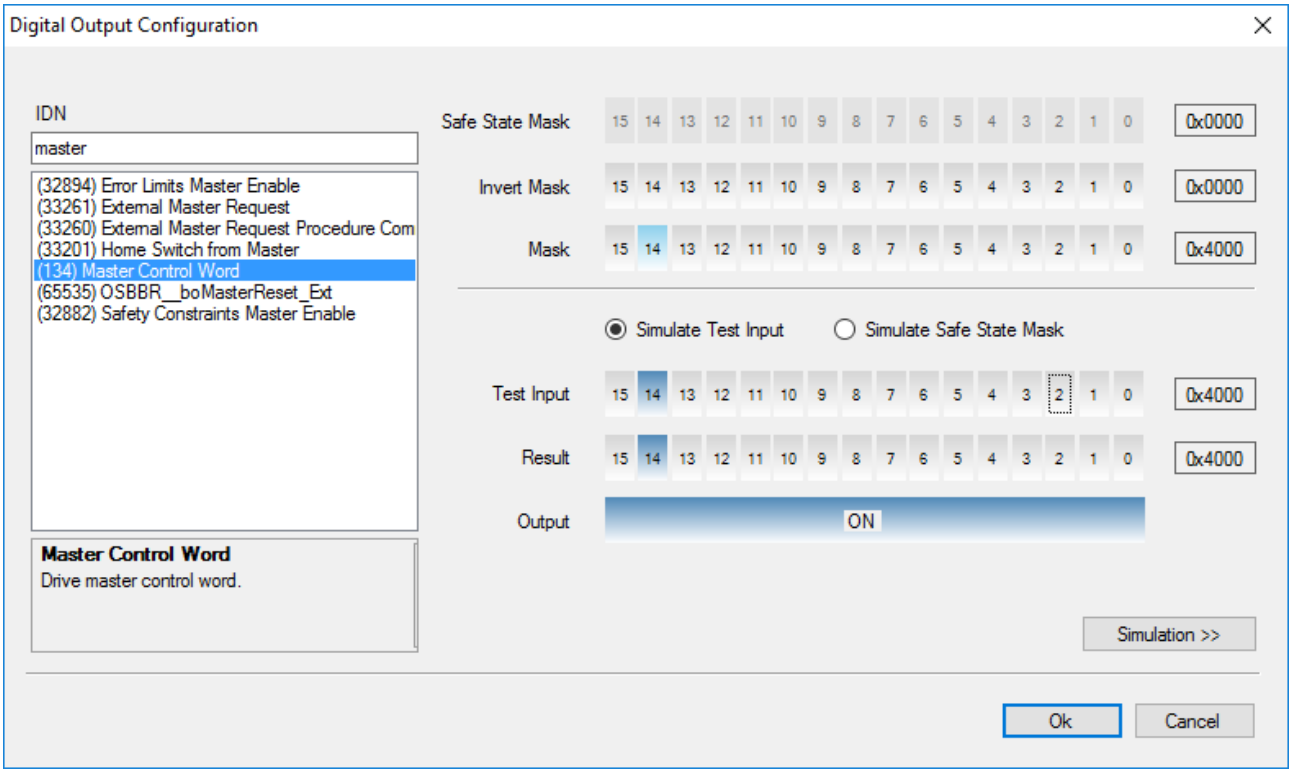


The "Safe State Mask" specifies the default user-defined digital output safe state. This is the value used when the drive enters the EtherCAT state SAFEOP as a result of abnormal conditions. The "Invert Mask" specifies whether a selected bit of the input value needs to be inverted before the digital output is constructed. The "Mask" is used to mask out the required bits from the parameters value. The simulation section of the dialog allows a user to test out the required settings before applying the parameter.

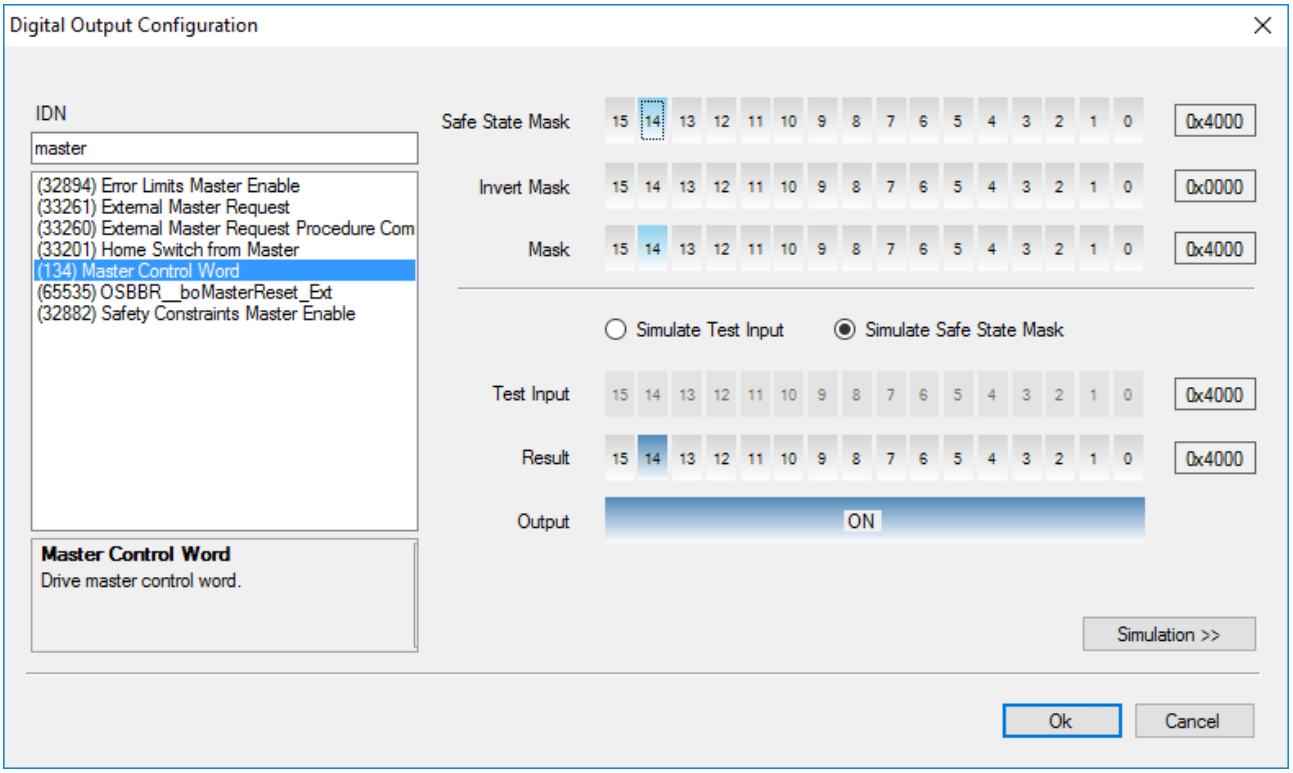


The simulation is enabled or disabled by pressing the button.

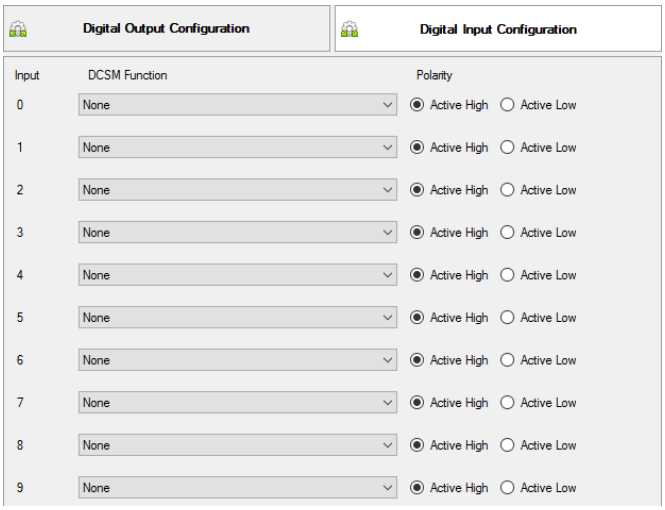
Example:
Let's assume the "Master Control Word" parameter has been selected to control a digital output. When the drive is enabled the user also wants to activate a digital output. Bit 14 of the master control word is drive enable. Any other bit of the control word should be ignored. The following image shows how the mask can be configured to only trigger when bit 14 of the master control word is set. When you toggle test input 14 the output should follow. Toggling any other bit in the test input should not affect the state of the output.



To define the safe state for the digital output specify the bit in the safe state mask that will set the output state. See the image below.



Digital Input Configuration



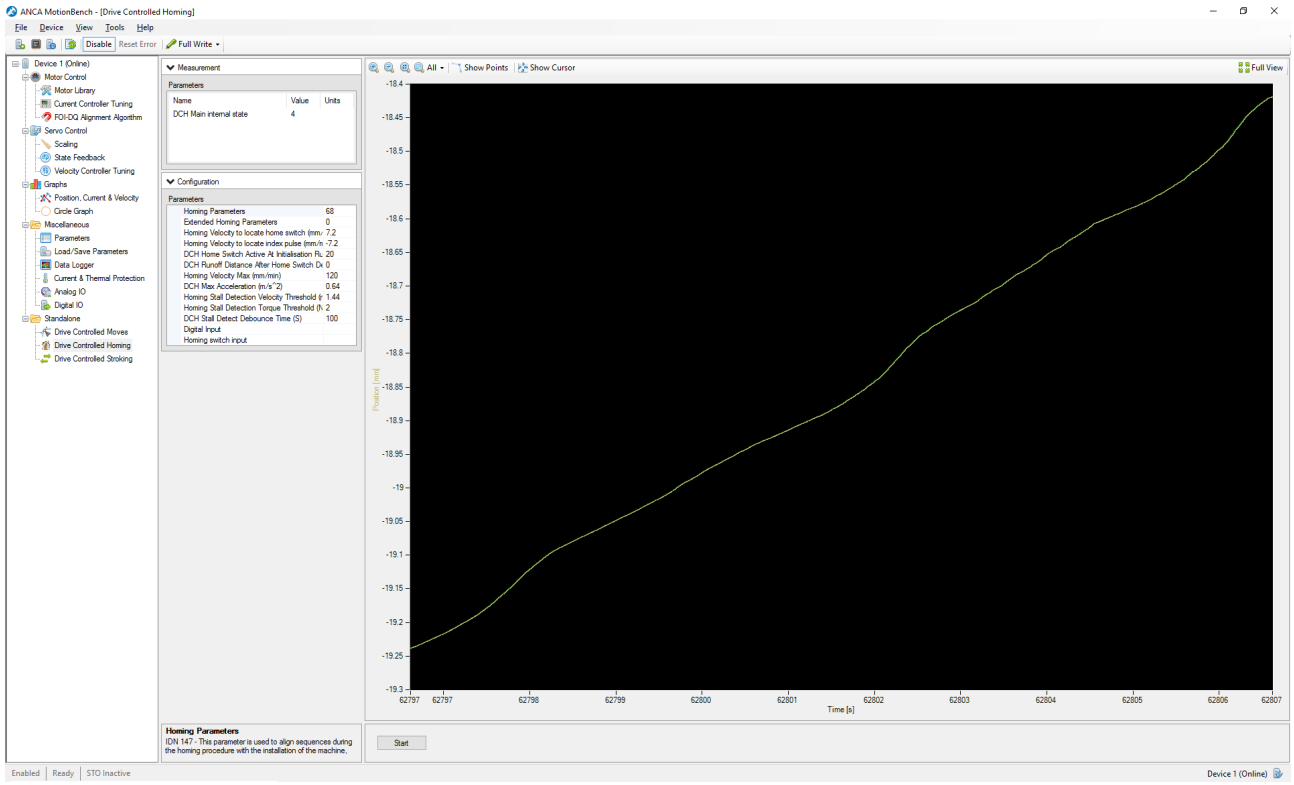
The user can select from the drop-down box a digital input to trigger one of the drive controlled functions. The "Polarity" control indicates whether the drives need to invert the value read from the digital inputs. Changes on this page immediately updates the drive.

Display

Live update and display of digital inputs are reflected here. If the digital input is on, it displays the bit in a light blue colored bar. If it is off, it will be a light grey colored bar.

7.2.7 Drive Controlled Homing

The Drive Controlled Homing page allows the user to configure the homing routine of the drive. The homing routine can be executed by the drive in standalone operation (i.e. without an external control unit).



7.2.7.1 Configuration

The configuration section contains two collapsible panels. The "Measurement" panel shows a live display of the drive controlled homing state. The "Configuration" panel contains parameters that alter operation of the homing algorithm.

Any changes to the drives parameters takes immediate effect. Please refer to the Parameter Reference (see page 7) for a detailed description of the parameters that configure Drive Controlled Homing.

7.2.7.2 Actions

Only a single action is available for this page:

Action	Description
Start	Triggers the drives homing routine and starts monitoring the feedback signals.

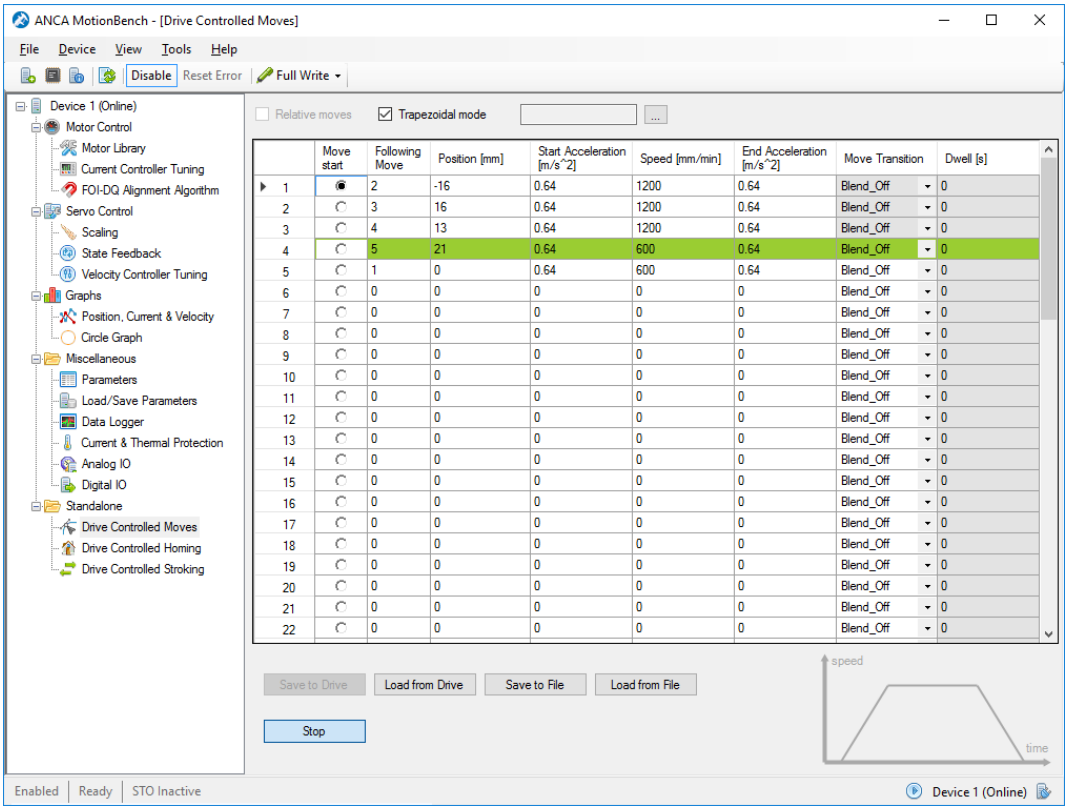
7.2.7.3 Display

The display is a graph of position feedback versus time. It allows observation of the homing routine in progress.

7.2.8 Drive Controlled Moves

The **Drive Controlled Moves** screen in MotionBench allows you to easily enter and manipulate moves in a tabular format.

In the table, you can enter specific moves and edit moves. The table you build remains in MotionBench until you load the moves into the drive. Once the moves are loaded, you can execute the moves from a specified **Start Index** and see the current move highlighted live.



7.2.8.1 Actions

The following actions are available on this page:

Action	Description
Save to Drive	Saves the modified parameters in the table to the drive.
Load from Drive	Loads drive controlled moves table with current values from the drive. This action overwrites the current content of the table.
Save to File	Saves the parameter information in the table to a file.
Load from File	Loads and overrides the drive controlled moves table with values from selected file.
Run/Stop	Execute the moves from a specified **Start Index.**

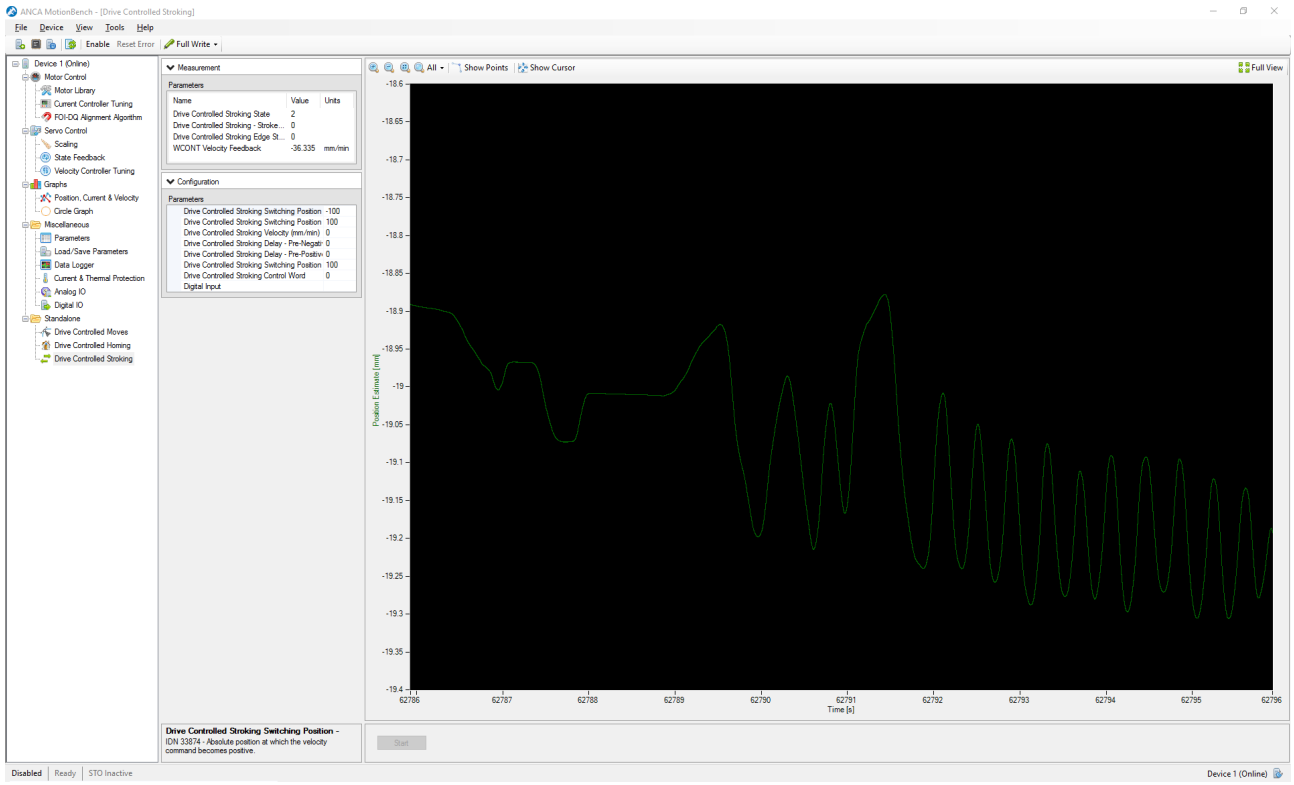
7.2.8.2 Display

The data table includes the following editable fields:

Column	Description
Move start	First segment of drive controlled move to be executed.
Following Move	Next move for a drive controlled move sequence.
Position	Drive controlled move segment Target Position.
Start Acceleration	Start acceleration limit for move segment.
Speed	Velocity limit for move segment.
End Acceleration	End acceleration limit for move segment.
Move Transition	Move transition type for move segment. Changing the move transition type is only possible if the previous and next move segment don't force a change in direction.
Dwell	Delay Time to wait before starting next move. Changing the delay time is only available if the move transition type is set to Blend_off.

7.2.9 Drive Controlled Stroking

The Drive Controlled Stroking page allows the user to configure the drive to perform cyclic moves. On this page the user can make modification to the drive parameters and observe the various feedback from the drive.



7.2.9.1 Configurations

The configuration section contains two collapsible panels. The "Measurement" panel shows a live display of the drive controlled stroking state, stroke count, edge state and velocity feedback. The "Configuration" panel contains parameters that alter behaviour of the stroking algorithm.

Any changes to the drives parameters takes immediate effect. Please refer to the Parameter Reference (see page 7) for a detailed description of the parameters that configure Drive Controlled Stroking.

7.2.9.2 Actions

Only a single action is available for this page:

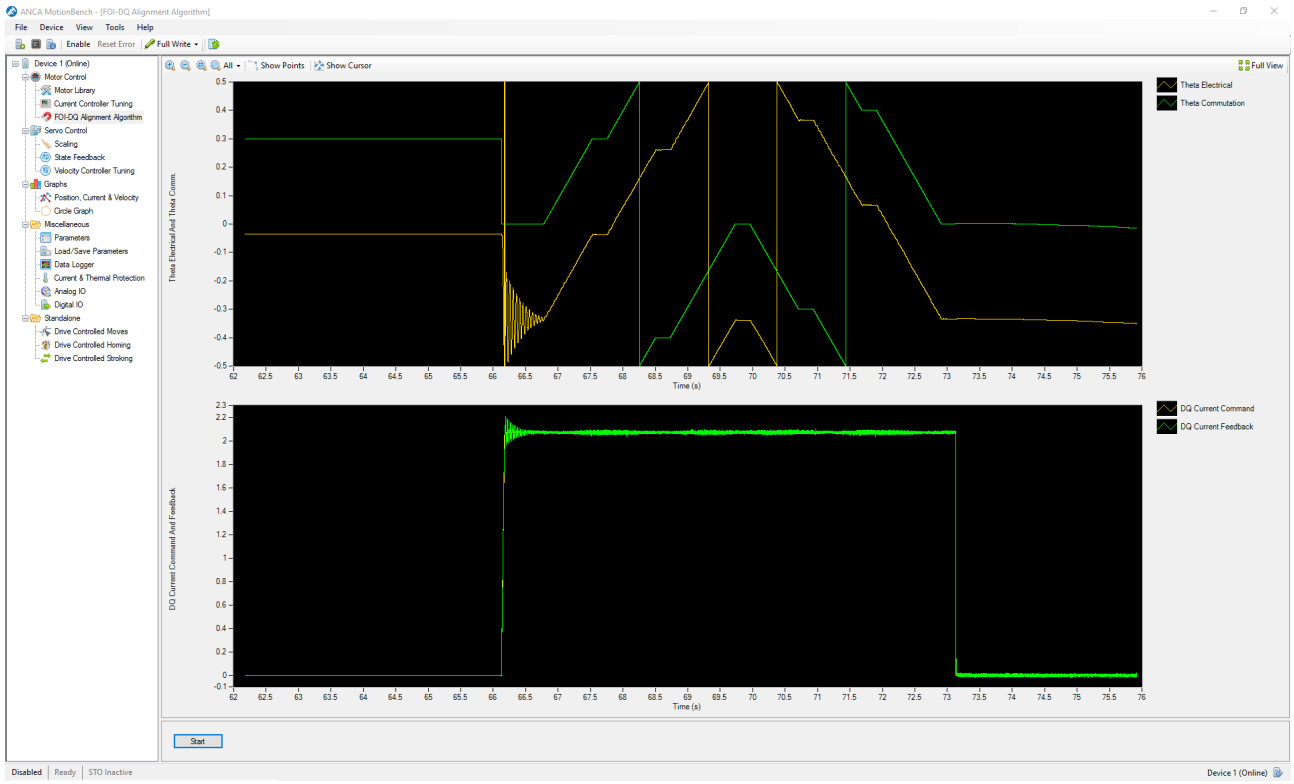
Action	Description
Start	Triggers the drive to perform the stroking moves and starts monitoring the feedback signals.

7.2.9.3 Display

The display is a plot containing a time domain graph of the estimated joint position. This allows observation of the cyclic moves in progress.

7.2.10 FOI-DQ Alignment Algorithm

This page allows the user to diagnosis issues with the Field Orientation initialization (FOI) algorithm known as DQ Alignment (DQA).



This algorithm is capable of detecting a large number of configuration / hardware based issues, specifically:

- incorrect motor poles configured
- incorrect motor phase sequence
- incorrect motor encoder line count configured
- incorrect motor encoder polarity configured
- the configured alignment current is too low to drive the motor
- motor/axis is jammed
- poorly tuned current loop
- DC bus voltage too low
- motor armature cable is disconnected
- STO is active

7.2.10.1 Actions

Only a single action is available for this page:

Action	Description
Start	Starts monitoring the signals.

7.2.10.2 Display

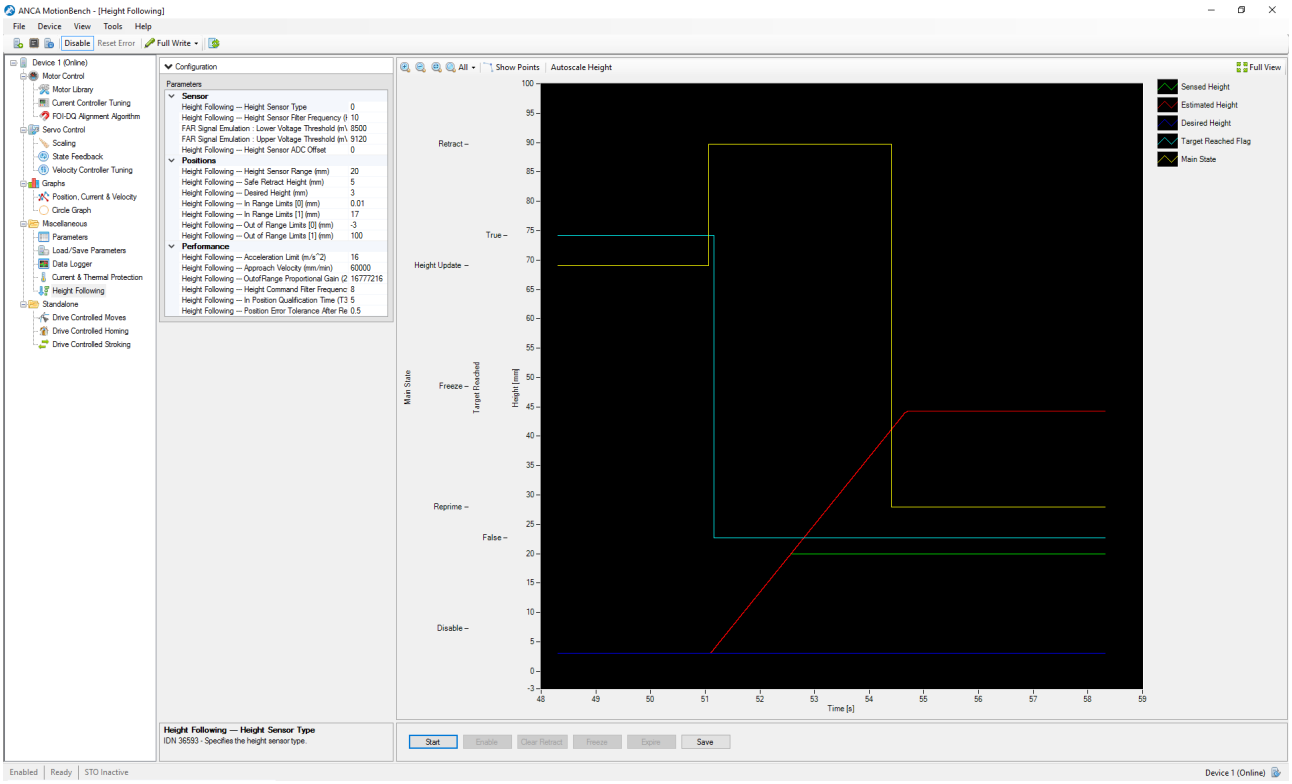
The display is a plot split into two graphs.

The upper graph shows the commanded electrical angle against the measured electrical angle.

The lower graph shows the commanded current against the measured current.

7.2.11 Height Following

It allows users to configure height following, which maintains a constant cutting height even if the sheet is not flat. On standalone mode, users can set parameters related to height following and able to control the device's movements. On the CNC, the users are able to monitor height following states via the display area.



Configuration

In the configuration panel, it contains parameters the enable the users to set sensor properties, locations of important axis heights, and better performance properties.

7.2.11.1 Actions

Action	Description
Start	Enables the position loop and starts plotting.

Action	Description
Enable	Enables the height following firmware algorithm.
Retract	Retracts the axis to a predefined height.
Freeze	Pauses the approach at it's current height.
Expire	Tells the drive that it's height estimate is invalid, causing a movement to enter the sensor range to re-estimate the sheet height.
Save	Save the plotted data into a file (.dat).

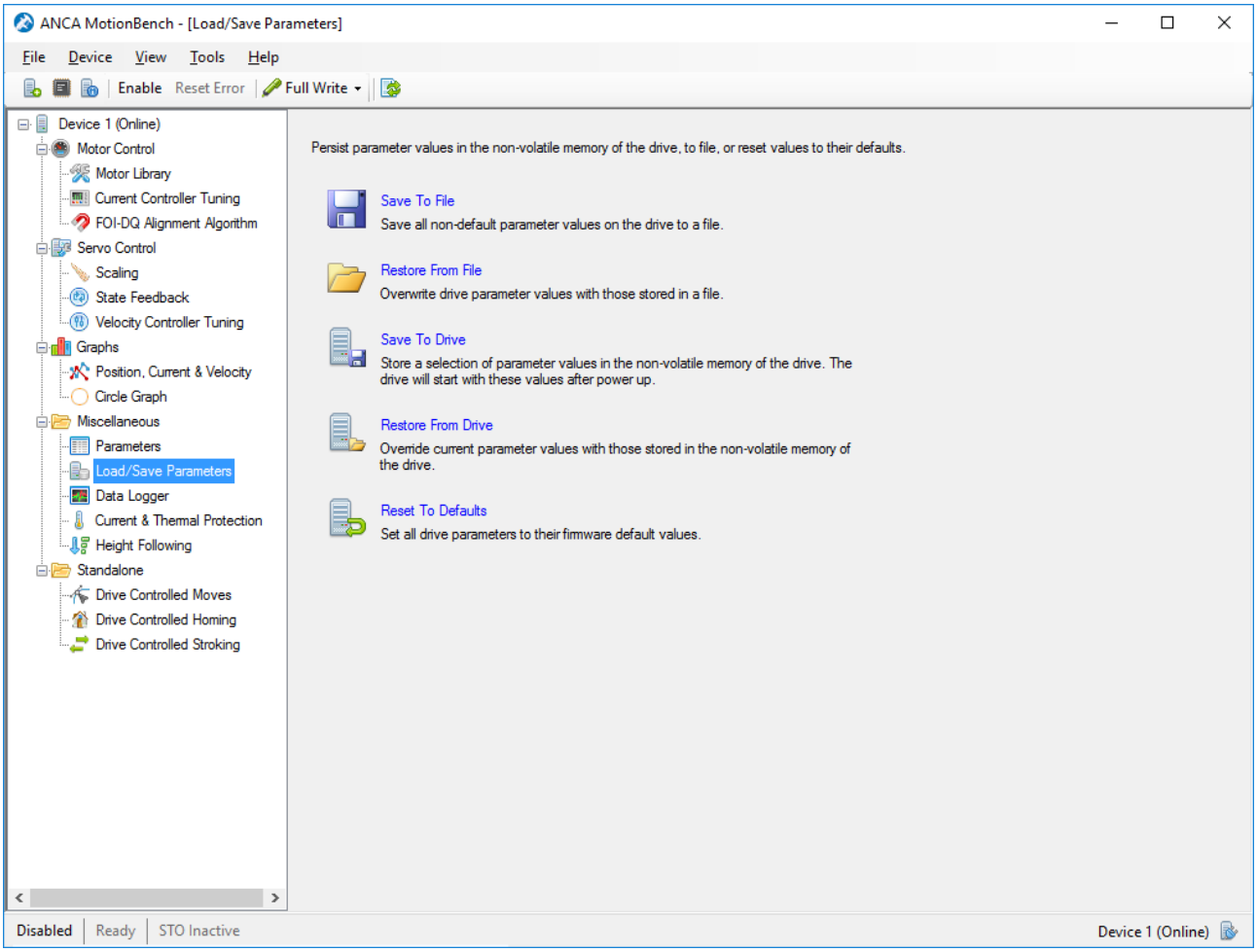
7.2.11.2 Display

A plot that graphs the desired, estimated and sensed heights of the axis. It also shows the main state of height following.

7.2.12 Load/Save Parameters

MotionBench typically works with volatile parameters in the drive. In order to persist any configuration of the drive MotionBench offers a number of options for saving and restoring your configuration via the **Load/Save Parameters** screen.

To copy a configuration from one drive to another, click the **Save to File** button on the first drive and then use the **Restore from File** on the second drive. If you wish the second drive to keep these new parameters after the drive is turned off, then you can save the parameters to the non-volatile memory with **Save to Drive**.



7.2.12.1 Actions

The following actions are available on Load/Save Parameter page:

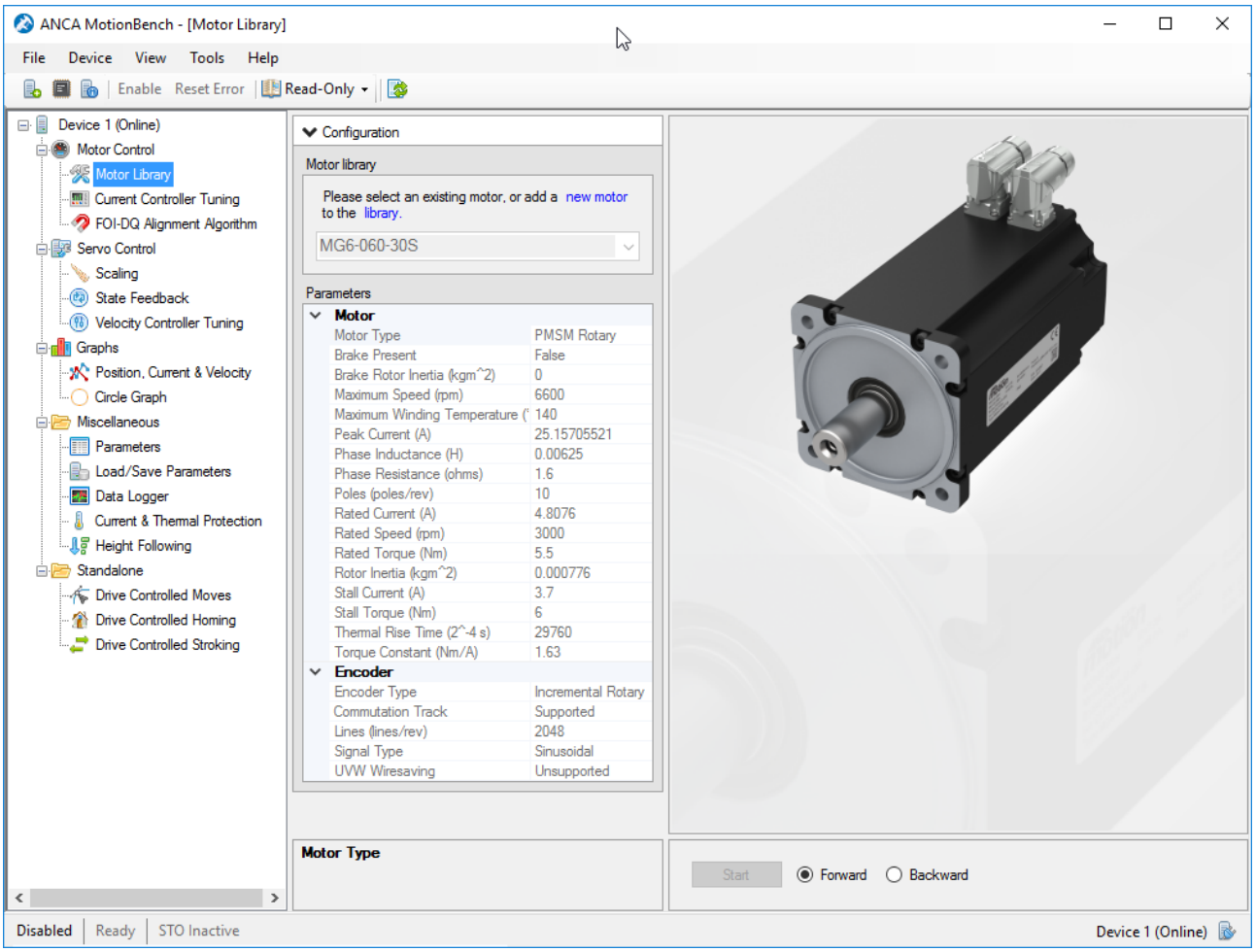
Action	Description
Save To File	Reads all drive parameters and saves those that differ from the firmware defaults to file
Restore From File	Writes the values of parameters in the selected file to the drive
Save To Drive	Saves a selection of parameters into the non-volatile memory of the drive. Each time the drive powers on, it will start with these saved parameters. The drive has limited memory to store parameters. A user can specify in the following dialog which parameters can be retained on drive restart.

Action	Description
Restore From Drive	Overwrites current drive parameter values with those of parameters stored in the drive's non-volatile memory
Reset To Defaults	Returns all drive parameters back to their default values. Any changes you have made are lost

7.2.13 Motor Library

The Motor Configuration page is used to set up or confirm the parameters associated with the motor that is connected to the drive.
The Motor Configuration screen includes the following functionality:

- ANCA Motion motors which are compatible with the drive are available in the motor library.
- Custom motor parameter sets can be created and added to the motor library if the connected motor is not listed.
- All motors can be imported and exported from the motor library.
- Drive motor parameters are automatically detected and imported to the library if necessary.



Configuration

The configuration panel is split into two sections: the motor library and the parameters.

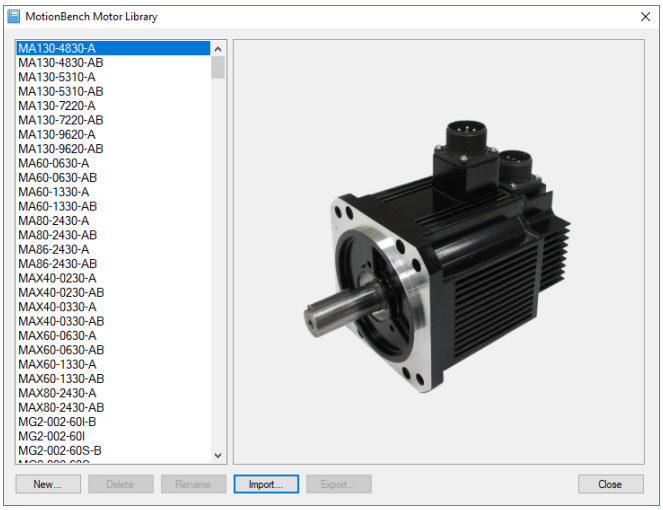
7.2.13.1 Motor library

The motor library section contains a drop-down list of standard motors (ANCA Motion motors) and custom motors. Selecting a motor will configure the drive parameters for the selected motor.

It also allows you to create a new motor or manage the motor library.

Manage the motor library

Clicking the "motor library" link (or selecting it from the drop-down) will bring up the motor library dialog, shown below.

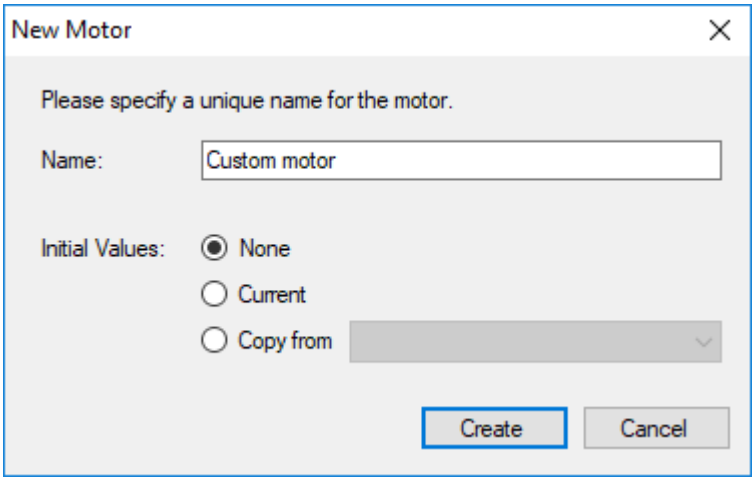


The dialog allows you to:

- Create a new (custom) motor.
- Delete a custom motor.
- Rename a custom motor.
- Import a motor.
- Export a custom motor.

Create a new motor

Clicking the "new motor" link (or the "New..." button in the motor library dialog) brings up the new motor dialog, shown below.



The dialog allows you to:

- Change the name of the new custom motor.
- Choose initial values for the new custom motor.
  - None: All initial values are 0.
  - Current: Copy initial values from the currently selected motor.
  - Copy from: Select a motor from the library; the initial values will be copied from it.

7.2.13.2 Parameters

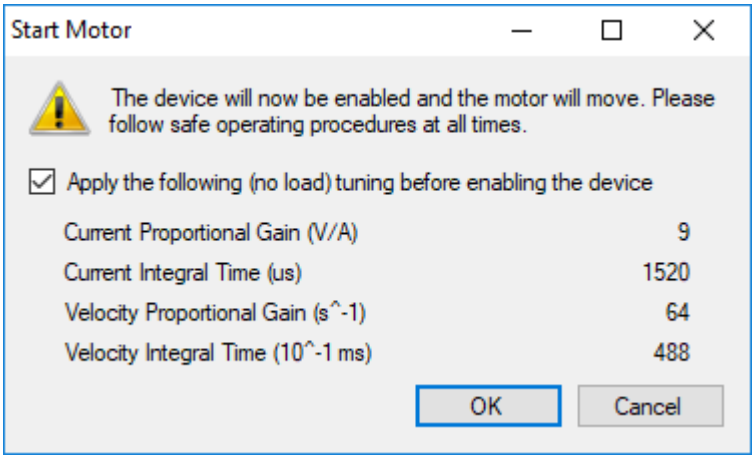
The parameters section contains the configurable parameters related to the motor and the encoder.

7.2.13.3 Actions

The following actions are available to test and confirm correct configuration of the drive.

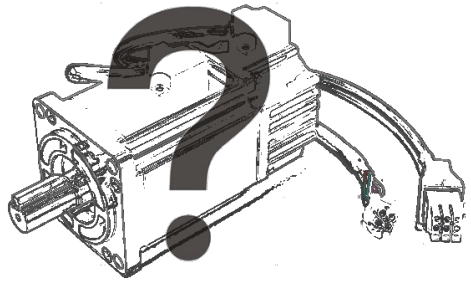
Action	Description
Save	Saves the current motor parameters to the drive. This button will be enabled when any of the motor parameters have changed.
Start	Allow the user to start motor movements to confirm correct motor parameters.
Forward / Backward	Controls the direction of the movement.

Clicking "Start" will display a dialog allowing you to first set some recommended tuning (see below). The tuning assumes no load is attached to the motor.



7.2.13.4 Display

The display area contains the rendered image of the actual motor if it is a standard ANCA Motion motor. For custom motors, the image shown below will be displayed.

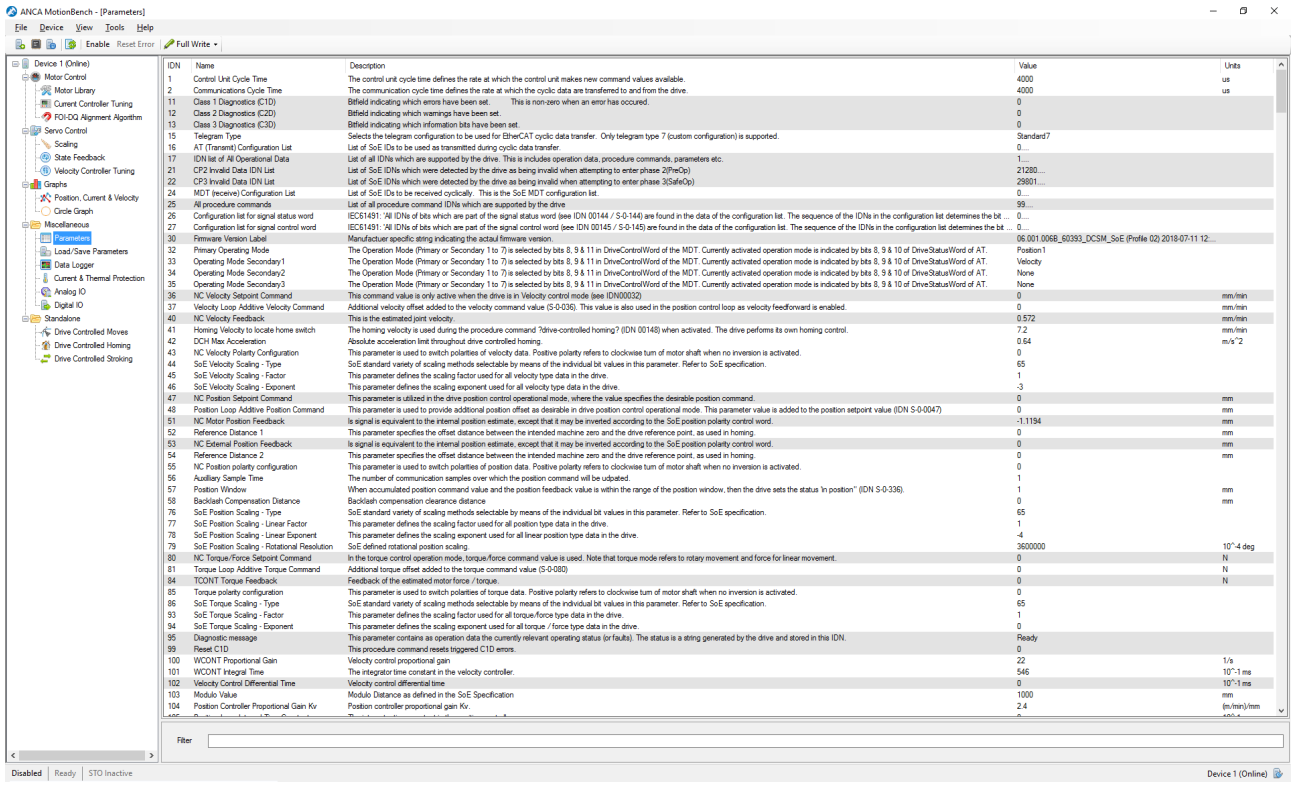


7.2.14 Parameters

This page displays a list of the current values of all the parameters that the drive supports and is continually updated.

Parameter values can be changed as necessary. Any changes to the parameter take effect immediately.

Parameters with a grey background are read-only and cannot be modified. ANCA Motion drives have a vast amount of configuration parameters that can be used to optimize the drive for a particular application. To help find a specific parameter this page provides a filter function that allows the user to search and filter for any information listed in the table. The table rows can be sorted by clicking any of the column headers.

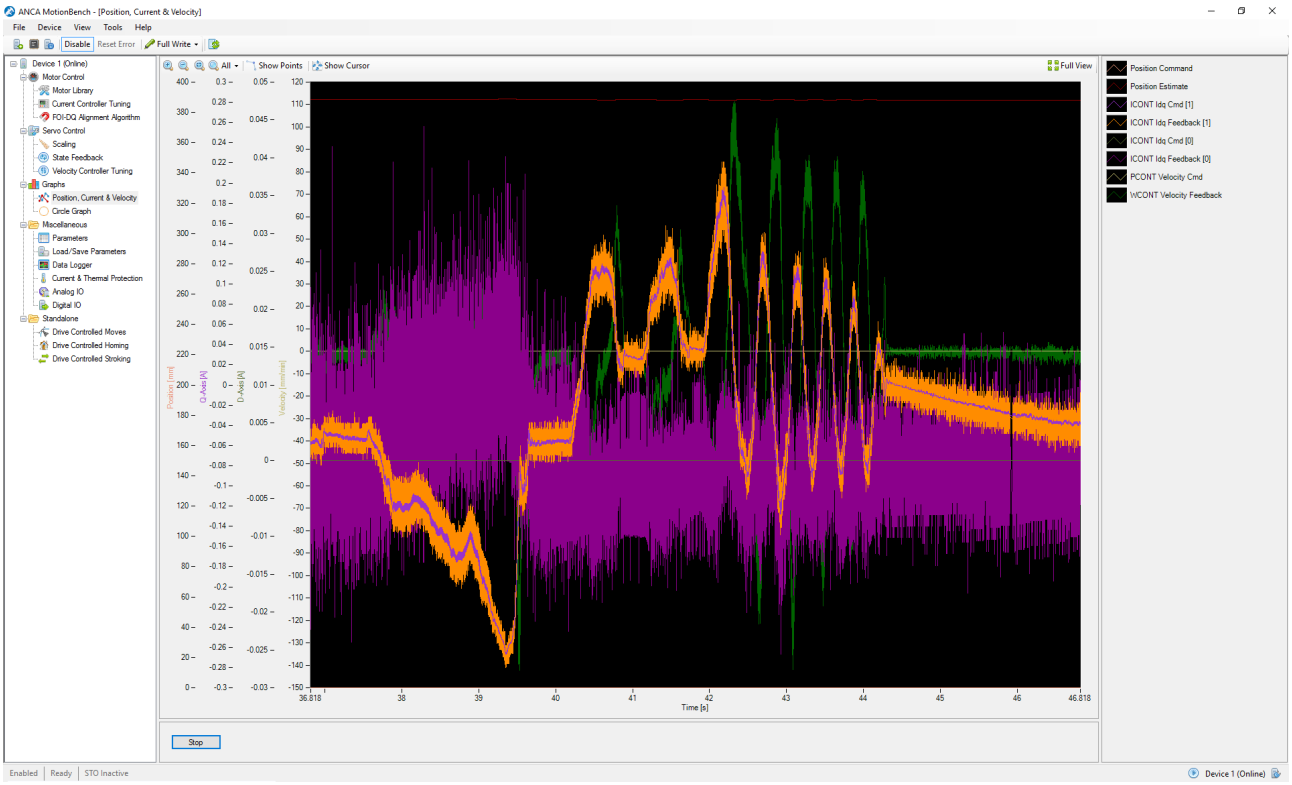


7.2.14.1 Actions

A search "Filter" text box allows the users to type in a text that filters the parameters being displayed. The search filter applies across all the columns. The users are then able to modify the values of the parameters by directly clicking and typing in the new value in the "Value" column.

7.2.15 Position, Current & Velocity

This page allows a user to investigate whether one of the control loops is experiencing saturation or is not performing normally.



7.2.15.1 Actions

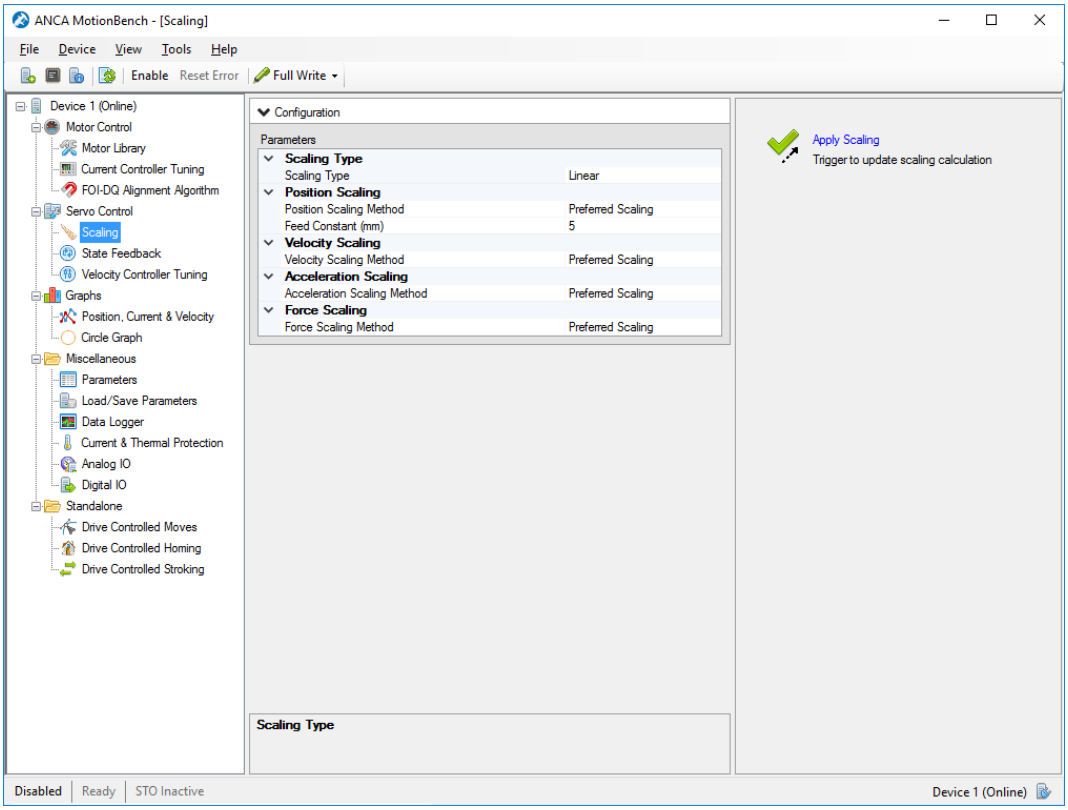
Action	Description
Start	Starts plotting the control loops

7.2.15.2 Display

A time domain graph that shows the feedback of the control loops.

7.2.16 Scaling

On the scaling configuration page, a user can configure the drive to convert data into units that are more meaningful to the application.



7.2.16.1 Configuration

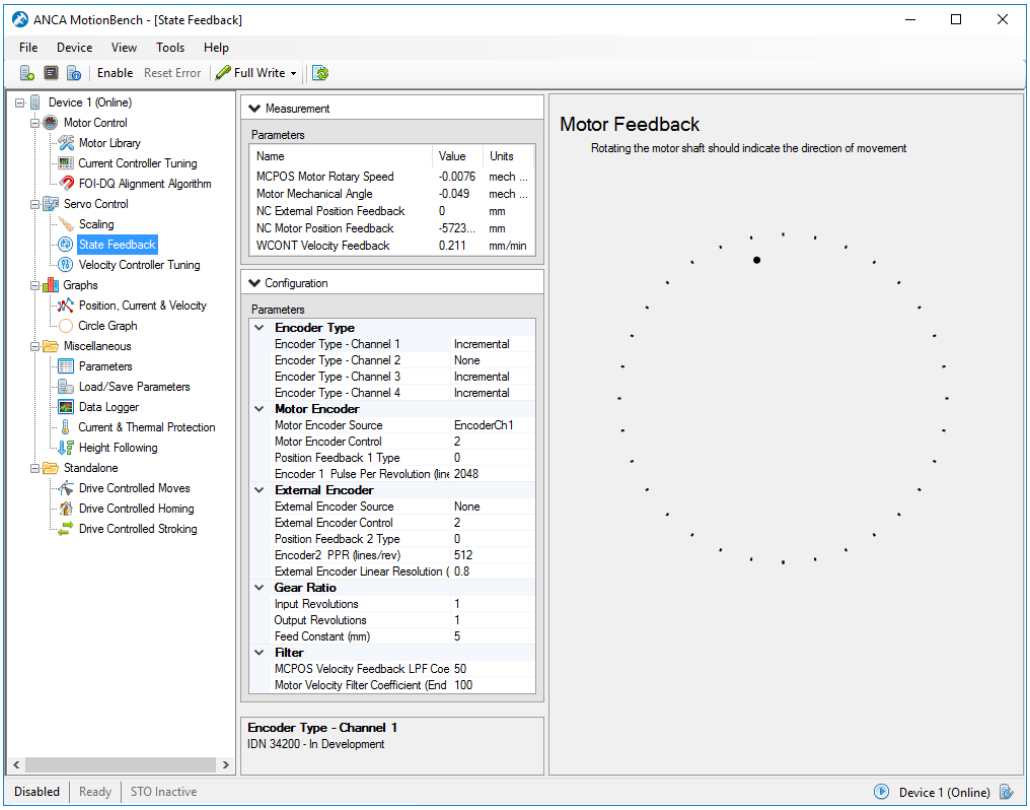
For more information about the scaling related parameters refer to the drive firmware parameter reference (see page 7) document.

7.2.16.2 Actions

Modifying the scaling parameters does not take immediate effect. To instruct the drive to apply the new scaling parameters the user needs to select the "Apply Scaling" button.

7.2.17 State Feedback

This page allows the user to configure the parameters related to mechanical configuration (gear-box ratio, ball screw feed constant, etc.), and the encoder configuration. It also gives real-time feedback of the measured position and velocity of the axis.



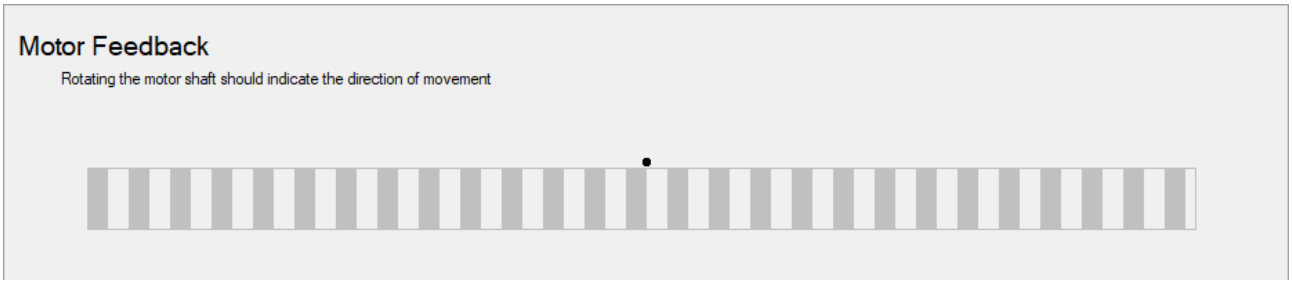
7.2.17.1 Configuration

A brief summary of each category of firmware parameters is described below. For a more detailed description of each of the parameters, please refer to the drive firmware parameter reference (see page 7).

Category	Description
Encoder Type	Allows the user to select the encoder type for each channel.
Motor Encoder	Settings for the motor encoder.
External Encoder	Settings for an external encoder.
Gear Ratio	The input and output revolutions and the feed constant.
Filter	The motor velocity filters.

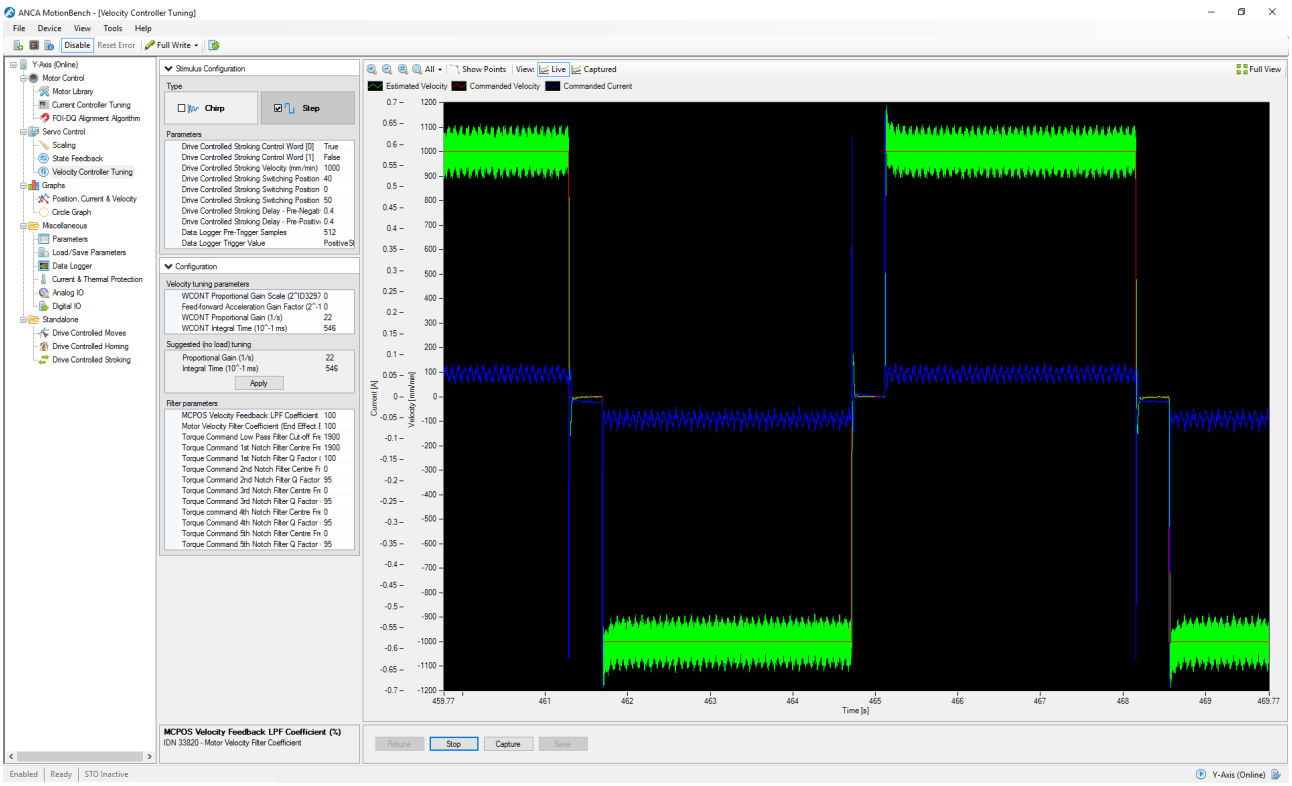
7.2.17.2 Display

The display shows an image indicating the direction the motor is moving. For rotary motors, the display is shown above. The linear motors, the display is shown below.



7.2.18 Velocity Controller Tuning

This page allows the user to perform experiments to capture data that can be used to tune the velocity loop controller and torque reference filters. The page supports both chirp and step stimulus signals. The page gives direct access to the stimulus configuration parameters, the tuning parameters and the retune procedure command. With the step stimulus, tuning can be conducted in real-time.



7.2.18.1 Configuration

In the configuration panel, there are two types of configuration:

Type	Description
Stimulus	Allows selection of the the stimulus type (chirp or step), as well as modify the amplitude and offset of the stimulus.

Type	Description
Tuning	Allows direct modification of the properties that define the velocity loops and the torque filters. Also suggests (and optionally sets) initial tuning, assuming no load is attached to the motor.

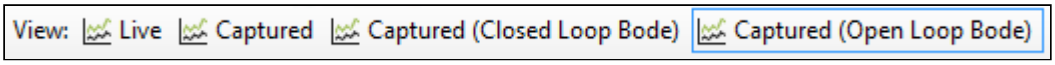
7.2.18.2 Actions

The elements in the next table are used to control the tuning process.

Action	Description
Retune	Retune the drive.
Start (Chirp)	Begin the experiment by starting live measurements and drive controlled moves.
Stimulate & Capture (Chirp)	Set up data logger, wait for trigger, and display the results.
Start (Step)	Begin the experiment by starting live measurements and drive controlled stroking.
Capture (Step)	Set up data logger, wait for trigger, and display the results.
Save	Saves the captured data for offline analysis.

7.2.18.3 Display

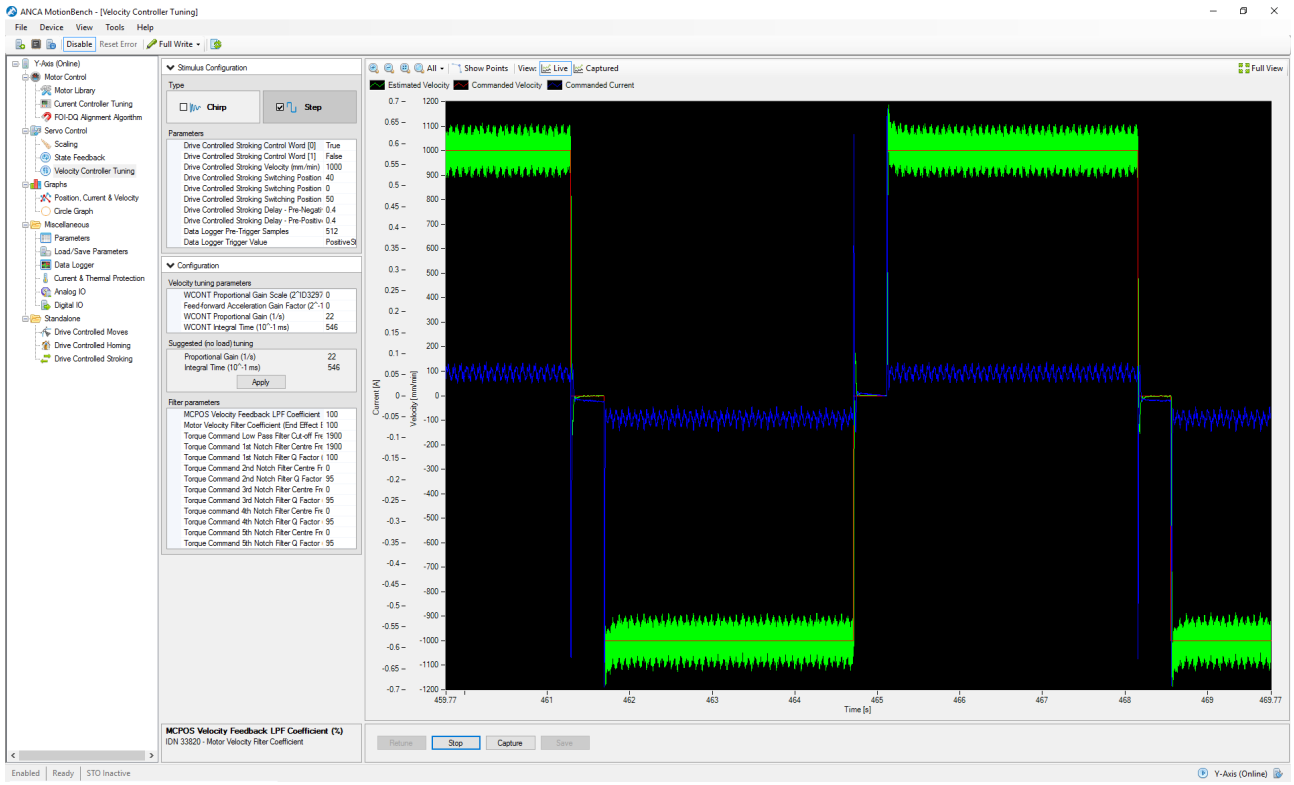
The display area contains a plot with the following views:



Live

This plot view shows the live measured data of the current command and feedback signals. The measurements are shown in a time domain graph with a history of 10 seconds.

The image below shows the time domain data from a velocity step stimulus signal, the response and the motor current command updating in real-time. With the data updating in real-time, the user can immediately see the result of changes to the tuning parameters.



Captured

This plot view shows the data that was captured during stimulation. It is captured by the drive data logger, and is plotted in the time domain. A sample chirp capture is shown below.

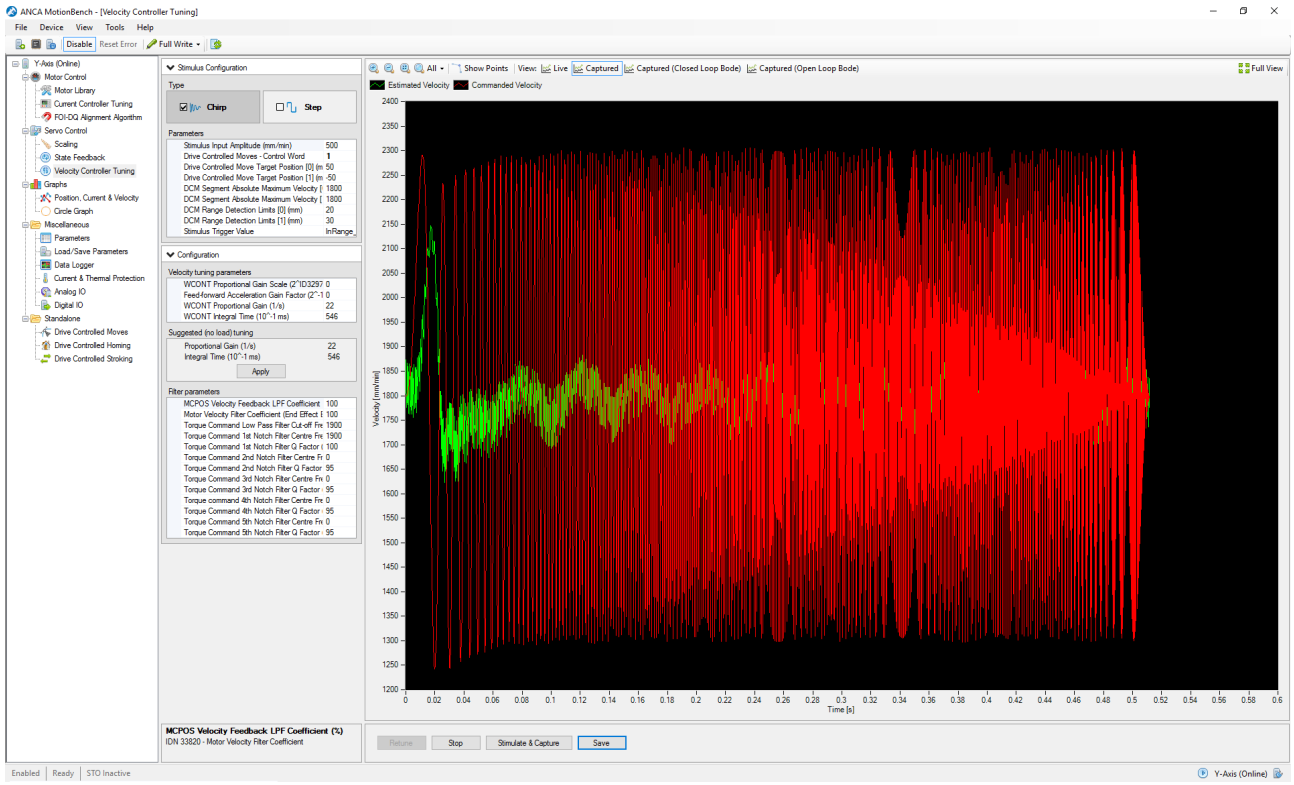


Figure 1

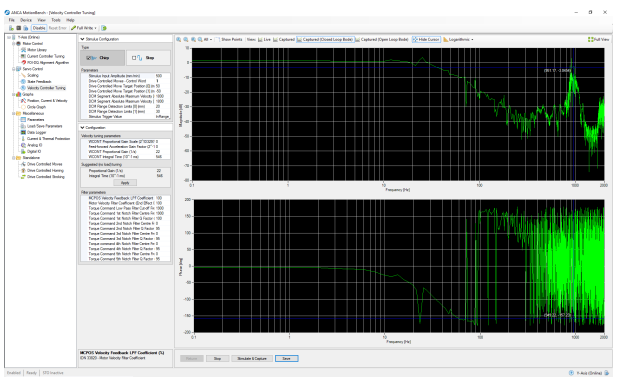
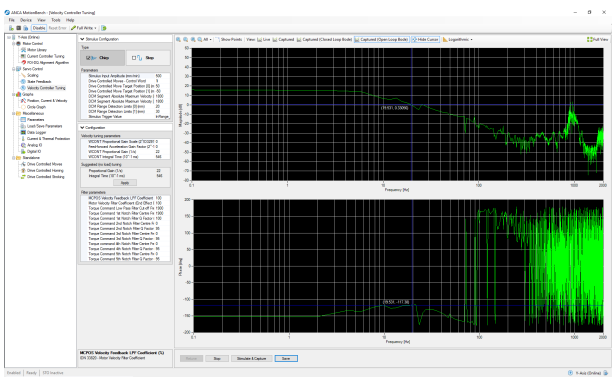
Captured (Closed Loop Bode)

This plot shows the captured chirp data in the frequency domain. It is split into two graphs, containing the magnitudes and phases. These are calculated based on the response relative to the stimulus. This is known as a closed loop Bode plot.

Captured (Open Loop Bode)

This plot also shows captured chirp data in the frequency domain, split into magnitude and phases. In this case, the magnitudes and phases are calculated based on the response relative to the following error. This is known as an open loop Bode plot.

The table below shows the data from **Figure 1** converted into a Bode plot (Open or Closed loop frequency response). From this data the user can measure velocity loop bandwidth and identify mechanical resonance.

Closed Loop Bode	Open Loop Bode
	

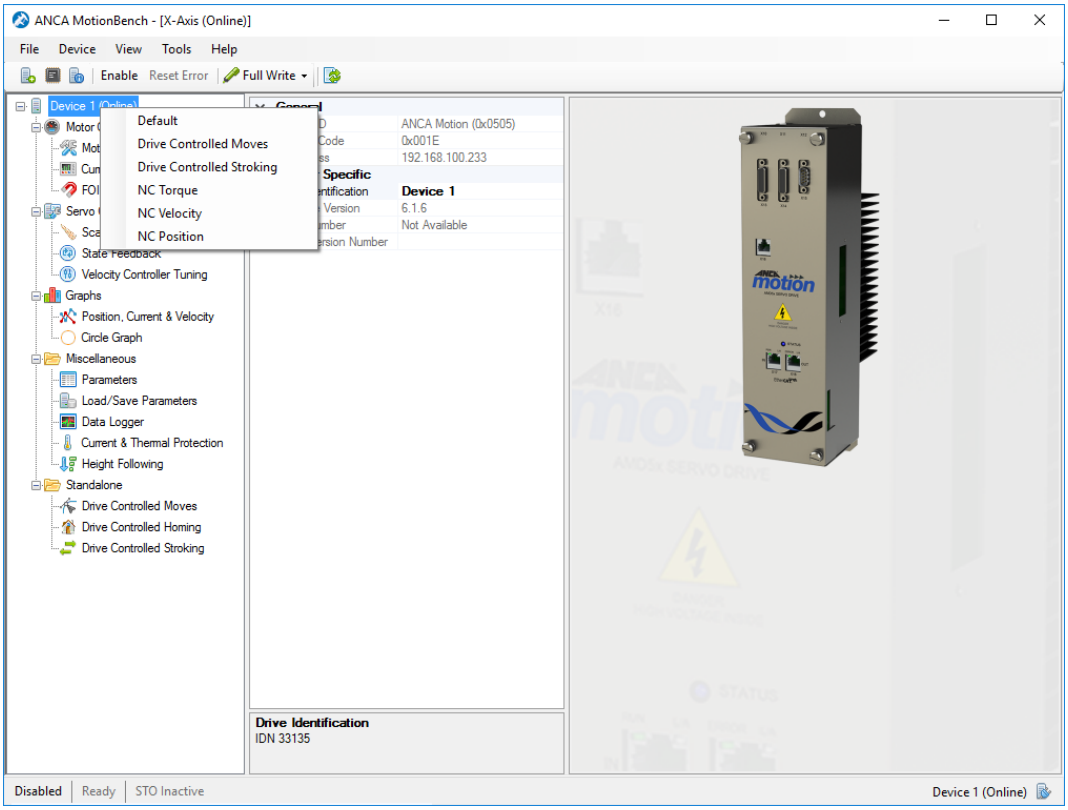
Users can switch the X-Axis scale type between Logarithmic or Linear via this button 

. This is only available on the Captured (Closed/Open Loop Bode).

7.3 Guided configuration

MotionBench provides various configuration modes to configure a drive for a specific application. You can select a configuration mode by right clicking a device node in the device tree and then selecting one of the available modes. Once a mode has been selected MotionBench applies a set of mode specific parameters to preconfigure the drive and presents configuration pages relevant for the selected mode

To return to the default view listing all available configuration pages right click a device and select Default. When MotionBench returns to the default view it does not modify any parameters and leaves the drive in the current modes of operation.



7.3.1 Modes

The following modes are available:

Mode	Description
Drive Controlled Moves	Guides the user to set up a drive to automatically execute a sequence of pre-programmed moves.
Drive Controlled Stroking	Guides the user to set up a drive to automatically execute cyclic moves.
NC Velocity	Guides the user to set up a drive to receive motion commands via a higher level controller, such as a CNC.
Gantry Tuning	Guides the user to set up a pair of drives in a gantry axis to receive motion commands via a higher level controller, such as a CNC.

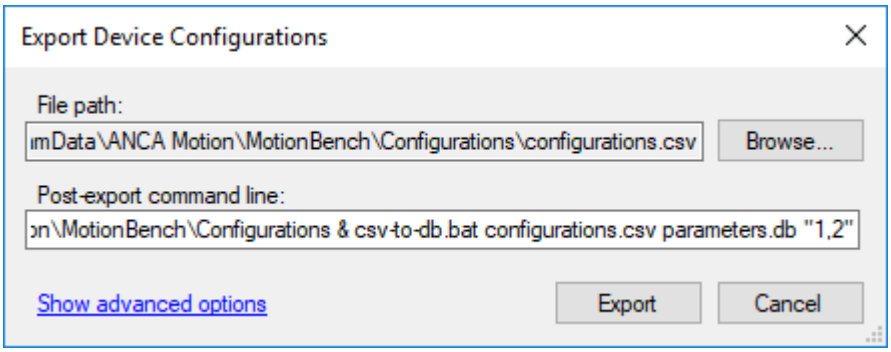
7.4 Save all configuration

Two menu items allow the configuration of multiple devices to be exported and imported in a single operation.

An exported device will be referred to as a **device configuration**. It is a text representation of all of the non-default firmware parameters.

7.4.1 Export multiple devices

Click File → Export... to begin the multiple device export operation. This operation performs the Save To File (CSV) operation from the Load/Save Parameters page for multiple drives in one operation.

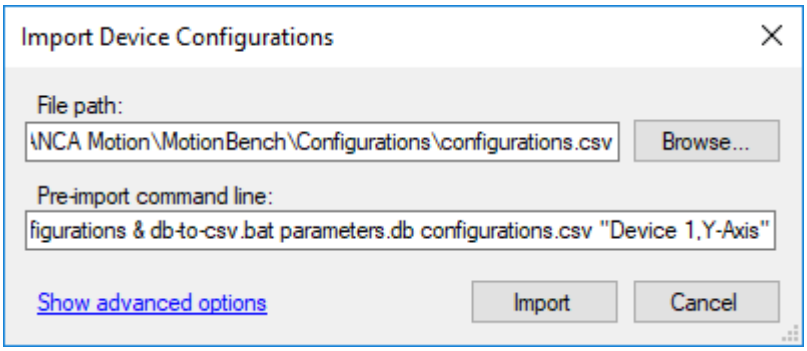


Additionally, you can optionally execute a command *after* the export completes to merge the exported CSV to your own format.

The advanced options allows you to select which devices are exported, as well as change the device configuration name.

7.4.2 Import multiple devices

Click File → Import... to begin the multiple device import operations. This operation performs the Load From File (CSV) operation from the Load/Save Parameters page for multiple devices in one operation.



Additionally, you can optionally execute a command *before* the import begins to merge from your own format to the CSV file to be imported.

The advanced options allows you to modify which device configuration is imported for each device. By default, a device will be matched to a device configuration with the same name.

7.4.3 Customize database integration

Migration from the CSV format to your own custom database format can be achieve using the "post-export command line" and "pre-import command line" text boxes.

The text entered into one of these text boxes will be ran in cmd after the export completes or before the import starts.

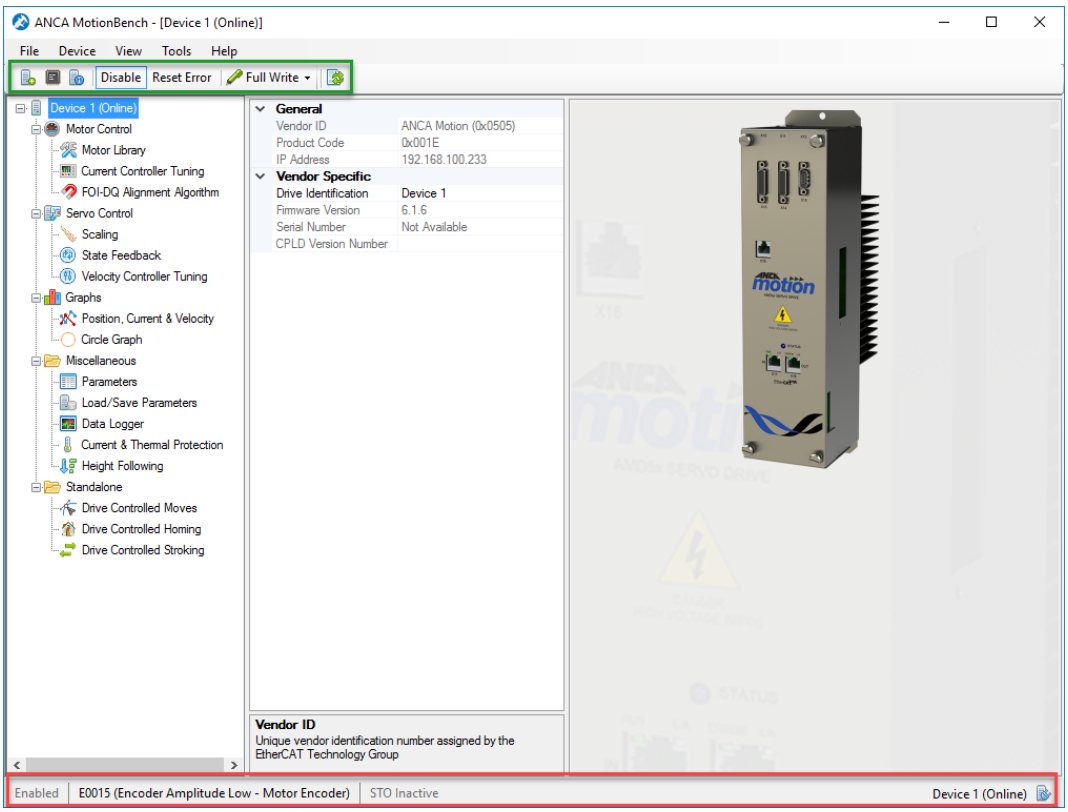
You will need to write two scripts (or executables) that convert to and from your format. Then, modify the command line text boxes in the import and export dialogs such that your scripts are run before the import and after the export.

Two sample scripts are included by default that migrate to and from an AMCore parameter database (.db)

7.5 Faults and warnings

When a fault occurs, the drives output stage is switched off (motor loses all torque), and the drive state becomes Disabled.

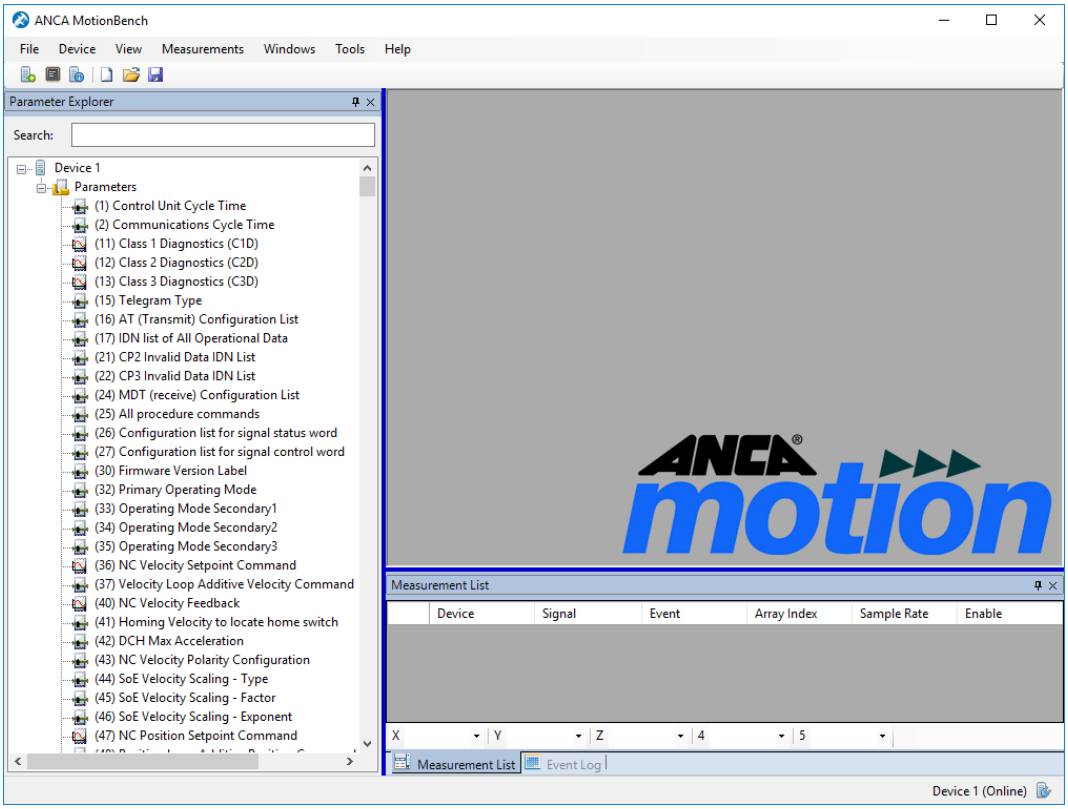
The status bar (highlighted in the image below in red) along the bottom of the MotionBench application window displays the associated error number and message, as well as the state of the drive.



Most faults can be cleared without power cycling the drive. Once the fault cause is remedied, you can clear the fault using the "Reset Error" button in the MotionBench toolbar (highlighted in the image above in green). Note that if the drive was Enabled when the fault occurred, the "Enable" button in the MotionBench toolbar remains primed. Clicking "Reset Error" in this scenario will return the drive to Enabled.

8 Advanced mode

Advance mode is a special mode in MotionBench that allows access to all parameters and signals in the drive.



This mode is selected by clicking Advanced in the Device-Configuration Mode menu. In advanced mode you have the ability to graph and modify any parameter by dragging it into the workspace. To add a parameter select the parameter in the parameter Explorer tree and drag the parameter while holding the right mouse button. When you release the mouse button in the workspace you have the option to display the parameter in a measurement or a calibration window.

If the measurement window is selected the parameter is first added to the measurement list. The measurement list is a container for parameters that need to be streamed from the drive. Any parameter in the measurement list can be dragged into the workspace and displayed in a numeric or graph window. Parameter in the measurement list are read-only and updated when the measurement is started. To start measurements select Start in the Measurements menu or press F5. To stop measurements select Stop from the Measurements menu or press Shift+F5.

Parameters displayed in a calibration window can be modified. Any modification to a parameter in the calibration window takes immediate effect. The new value is transferred to the drive when the current Value edit field loses focus.

The buffers of the current measurement list can be saved in TDMS file format by clicking Save Buffers in the Measurements menu. TDMS is a structured file format by National Instruments that can be loaded by LabVIEW, Excel or any other application that supports the TDMS format.

9 Troubleshoot

This chapter provides troubleshooting techniques to assist if you are experiencing problems connecting to a drive.

1. Configure the network adapter (refer to Prepare the network connection (see page 11)). To ensure the network adapter is functional try pinging the network address you specified in the previous step.
   To ping the network adapter open a new command window by pressing Window-Key + R and type "cmd".
   In the command window type "ping 192.168.100.1".
2. Confirm that the network adapter connected to the drive is enabled. You can check the status of the network adapter by pressing Window-Key + R and type *ncpa.cpl*. Check in the network connection window if the status of the adapter is set to "Enabled". If the network adapter is disabled enable the adapter. Right click on the adapter in the list and select "Enable".
   If the adapter is in an error state which is usually indicated by a red cross on the network icon, try to disable and then re-enable the network adapter. Right click on the adapter in the list and select Disable and then Enable to re-enable the adapter.
   By default Windows will disable a network device to save power if it is not in use. If you have just connected the drive to the computer it can take a couple seconds for windows to recognize that the network adapter is now active. If you have to frequently connect and disconnect drives it is recommended to disable power saving on the network adapter. Please consult the Microsoft documentation on how to adjust the power management features.

If after reading the User Manual you still require assistance for installation, training or other customer support issues, please contact the closest ANCA Motion Customer Service Office in your area for details.

10 Contact Information

10.1 General Enquires

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