



Flexi SUITE

Reference Manual

FLEXI PRO Servo Drive

DDHD Dual Drive

Revision: 1.3

Software Version: 1.41.2

SEE IT BEFORE IT HAPPENS

***MOTOR
POWER***

COMPANY

Revision History

Document Revision	Date	Remarks
1.3	May 2016	Autotuning wizard revision.
1.2	May. 2016	General release.
1.1	Feb. 2016	Limited release.
1.0	Nov. 2015	Internal release.

Software (GUI) Version
1.41.2

Copyright Notice

© 2016 Motor Power Company s.r.l.

All rights reserved. No part of this work may be reproduced or transmitted in any form or by any means without prior written permission of Motor Power Company s.r.l.

Disclaimer

This product documentation was accurate and reliable at the time of its release. Motor Power Company s.r.l. reserves the right to change the specifications of the product described in this manual without notice at any time.

Trademarks

All marks in this manual are the property of their respective owners.

Contact Information

Motor Power Company s.r.l.
Via Leonardo Da Vinci , 4
42024 Castelnovo Sotto
Reggio Emilia - Italia
Tel: +39 0522 682710
Fax: +39 0522 683552
Website: www.motorpowerco.com

Technical Support

If you need assistance with the installation and configuration of the product, contact Motor Power Company technical support: info@motorpowerco.com

Contents

1	Introduction	7
1.1	Flexi SUITE Overview	7
1.2	Manual Format	7
2	Software Setup	8
2.1	Computer Requirements	8
2.2	Software Installation	8
2.3	Serial Connection	8
2.4	Drive Selection	9
3	Software Interface Elements	10
3.1	Flexi SUITE Screen Components	10
3.2	Dashboards	13
3.3	Wizards	13
3.4	Help	13
3.5	Command Entry	14
3.6	Parameters	14
3.6.1	Data Entry	14
3.6.2	Schematics	15
3.6.3	Parameter Tables	15
4	Motor Setup Wizard	19
5	Autotuning Wizard	21
5.1	Drive-Based Autotuning	21
5.1.1	Drive-Based Autotuning – Express	21
5.1.2	Drive-Based Autotuning – Advanced	22
5.2	PC-Based Autotuning	22
6	Communication	23
7	Drive Information	25
8	Power Rating	27
8.1	Drive Power	27
8.2	Bus AC Power Line Loss	28
9	Motor	30
9.1	Motor Properties from Electronic Nameplate	30
9.2	Motor Selection	30
9.3	Motor Parameters	32
9.4	New Motor Wizard	32
10	Feedback	33
10.1	Feedback Properties from Electronic Motor Nameplate	33
10.2	Feedback Device Settings	33
11	Motion Units	39
12	Limits	41
12.1	Current Limit	41
12.2	Velocity Limit	42
12.3	Position Limit	43
13	Current Foldback	45
14	Digital Inputs	46
14.1	Digital Inputs Configuration	46
14.2	Digital Input Activation of Drive Scripts	47

15 Digital Outputs	53
16 Analog Inputs	54
17 Analog Output	55
18 Homing	57
19 Disable Mode	59
20 Enable Faults	61
20.1 Drive Enable	61
20.2 Faults.....	63
21 Motion – Operating Modes	65
21.1 Serial Current Operation Mode (OPMODE 2)	65
21.2 Analog Current Operation Mode (OPMODE 3)	66
21.3 Gearing Control Operation Mode (OPMODE 4)	67
21.4 Serial Velocity Operation Mode (OPMODE 0).....	68
21.5 Analog Velocity Operation Mode (OPMODE 1)	69
21.6 Positioning Control Operation Mode (OPMODE 8)	70
22 Tuning – Control Loops	72
22.1 Position Control Loop	72
22.1.1 HD (Nonlinear Position) Controller	72
22.1.2 Linear Position Controller	73
22.2 Velocity Control Loop	73
22.3 Current Control Loop.....	76
23 Terminal Dashboard	77
23.1 Terminal.....	78
23.2 Watch Variables.....	78
24 Scope Dashboard	79
24.1 Recording Setup	79
24.2 Scope Toolbar	81
24.3 Chart Options.....	81
24.4 Scope Tabs/Panels.....	86
25 Expert Dashboard	89
25.1 Expert Screen Layout.....	89
25.2 Expert Tabs/Panels	90
26 Preferences	91
27 Backup & Restore	93
28 Report Generator	94
29 Software Scripts	95
29.1 Software Scripts Overview	95
29.2 Software Script Panel	95
29.3 Software Script Syntax and Special Characters.....	97
29.4 Software Script Variables.....	97
29.5 Software Script Commands.....	97
29.5.1 Software Script Program Flow	98
29.5.2 Software Script Data	99
29.5.3 Software Script Operation.....	100
29.6 Software Script Examples	101

1 Introduction

1.1 Flexi SUITE Overview

Flexi SUITE is a graphical user interface (GUI) supplied with the drive to enable setup, configuration and tuning of the servo drive. Flexi SUITE allows you to configure parameters for the motor to which the drive is connected and for the particular operation the drive will perform in the machine.

Flexi SUITE is the recommended tool for commissioning the drive. It provides two methods for setting up the drive servo drive.

- **Wizards:** Use the Motor Setup for basic configuration of the drive for a motor without load, followed by the Autotuning wizard for optimization of drive parameters for a motor with load.
- **Task Screens:** Use each screen individually to access and define specific parameters and functions.

1.2 Manual Format

This manual describes the user interface menus and options in Flexi SUITE.

For detailed instructions on operating and tuning the drive, refer to the drive's user manual.

For detailed information on setting and using drive parameters, refer to the drive's VarCom documentation.

2 Software Setup

2.1 Computer Requirements

For proper graphic display of Flexi SUITE, 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 Flexi SUITE software from the Motor Power Company website or contact Technical Support
2. Install Flexi SUITE software on the host computer.
3. When installation is complete, start Flexi SUITE from the Windows Start menu or the shortcut on your desktop.

The first time the drive is connected to the host computer's USB port, Windows may display a **Found New Hardware** wizard and prompt you to browse to and select the **Drivers** folder. The path will vary, depending on the computer's operating system, for example:

- C:\Program Files (x86)\Motor Power Company\FlexiSUITE\Drivers
- C:\Program Files\Motor Power Company\FlexiSUITE\Drivers

The wizard automatically selects and installs the driver file.

Note: Some editions of Windows 8 require digitally signed drivers. drive software includes an unsigned USB driver. To install the USB driver, you must first disable driver signature verification ([Example](#)).

2.3 Serial Connection

A serial RS232 or USB connection is required for commissioning the drive through Flexi SUITE. Once the drive is configured, you can then connect it to a PLC or controller over an EtherCAT, CANopen or other fieldbus network.

After drive factory settings are restored (Motor Setup wizard / Step 1), Flexi SUITE may prompt you to confirm or change the command interface mode.

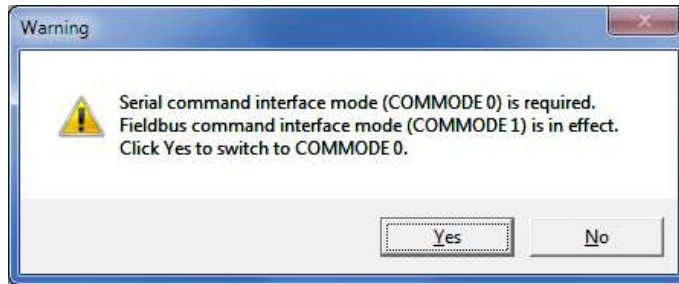


Figure 2-1. Command Interface Mode

To switch to **serial** command interface mode (COMMODE 0), click **Yes**.

2.4 Drive Selection

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



Figure 2-2. Drive Selection

If your system uses a DDHD drive, select the FLEXI PRO option.

Note: If the software detects a DDHD drive, some options will be different than the ones appearing in the screens illustrations in this manual.

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 Flexi SUITE Screen Components

The Flexi SUITE software window has five main function areas:

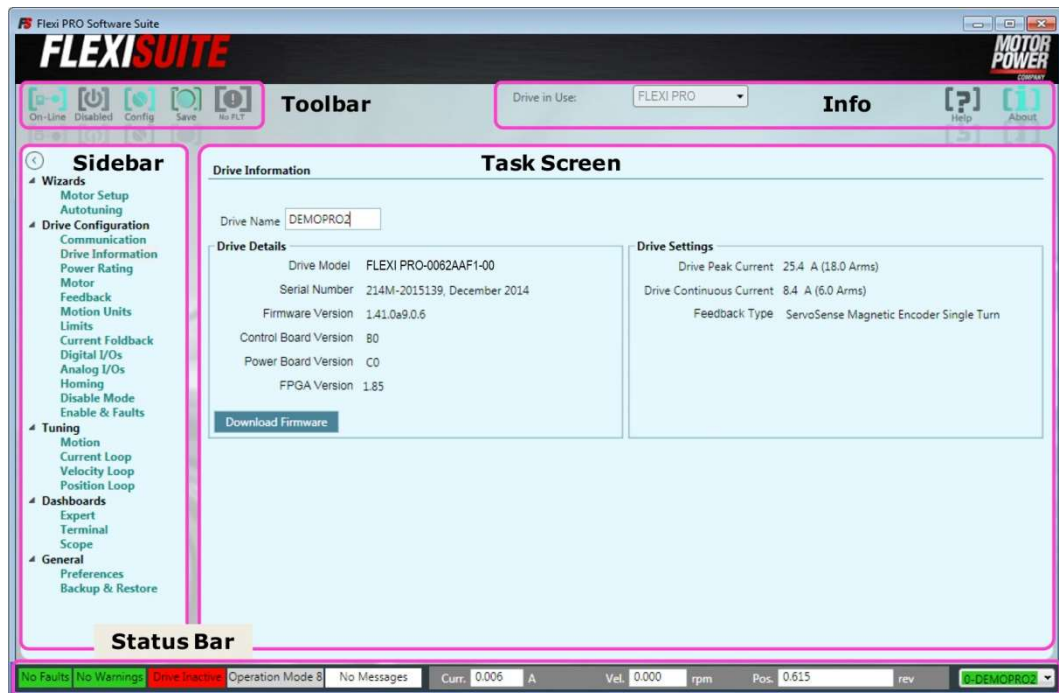







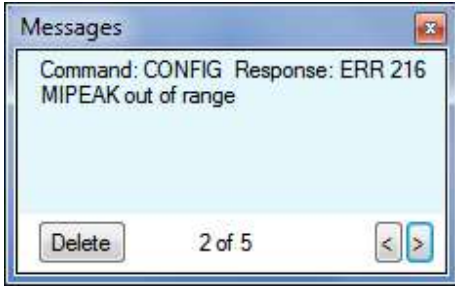


Figure 3-1. Flexi SUITE Software

	Toolbar	Contains quick access buttons for frequently used functions.
	Offline Online	<p>Toggles Flexi SUITE communication with the drive off and on, and indicates the state of the connection.</p> <ul style="list-style-type: none"> ■ Offline mode: Flexi SUITE does not attempt to communicate with the drive. ■ Online mode: Flexi SUITE continually communicates with the drive to read parameters and status. <p>Note: 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 drive, and indicates the state of the drive.

	Config	Triggers the internal drive configuration. VarCom CONFIG . The CONFIG command is required after certain variables are modified. When CONFIG is required, the button is gray, and the 7-segment display shows -1 .
	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. VarCom SAVE . Use Save 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 (CLEARFAULTS) to the drive.
	Info	
	Drive in Use	Shows the drive detected (online), or the drive defined for offline use.
	Help	Online help for Flexi SUITE software. Also includes help for drive hardware and VarCom. In addition, use F1 or the right-click shortcut menu to activate Help for the currently selected field.
	About	Software version information.
	Sidebar	Contains a navigation menu to the various Flexi SUITE screens. The sidebar can be hidden or displayed using the Arrow button.
	Task Screen	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.
	Status Bar	Displays the status of the drive.
	Faults	This segment of the status bar is green as long as no faults exist; it is red whenever a fault exists. Hovering the mouse over Faults displays the fault/s. Click Faults to open the Enable & Faults screen. Right-click to clear faults.
	Warnings	This segment of the status bar is green as long as no warnings exist; it is yellow whenever a warning exists. Click Warnings to open the Enable & Faults screen. Right-click to clear fault/s.

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

3.2 Dashboards

Flexi SUITE dashboard screens contain a combination of function panes and panels, which allow experienced users to work more efficiently.

- [Terminal Dashboard](#)
- [Scope Dashboard](#)
- [Expert Dashboard](#)

3.3 Wizards

Flexi SUITE includes three wizards, or interactive utilities, that guide you through complex tasks.

- **Motor Setup Wizard** guides you through the most basic setup and configuration process. Refer to [Motor Setup Wizard](#).
- **New Motor Wizard** is a series of dialog boxes that allow you to define a motor and its set of parameters. Refer to [New Motor Wizard](#).
- **Autotuning Wizard** allows you to select, and then guides you through, a procedure that will autotune a control loop and optimize application-specific drive parameters for a motor with load. Refer to [Autotuning Wizard](#).

3.4 Help

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

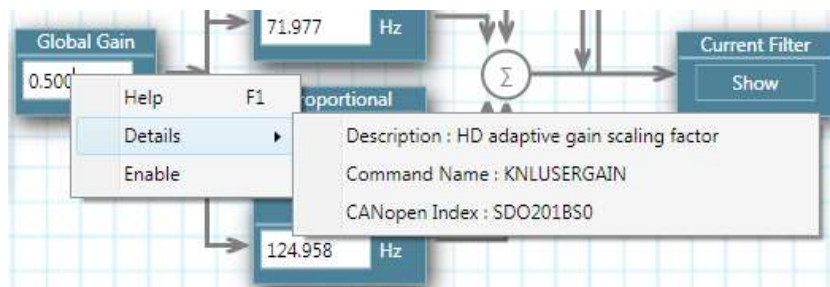


Figure 3-2. Right-Click Help Shortcuts

Help	F1. Activates online help for the currently selected screen element.
Enable Kill	Toggles the Enable/Disable state of the drive. VarCom EN and K .
Clear Faults	Displayed when faults exist. Sends a clear faults command (CLEARFAULTS) to the drive.
Details	<p>Description. A brief description of the parameter.</p> <p>Command Name. The VarCom equivalent.</p> <p>Min/Max Value. Indicates the minimum and maximum values allowed for the parameter.</p> <p>CANopen Index. The comparable CANopen object.</p>

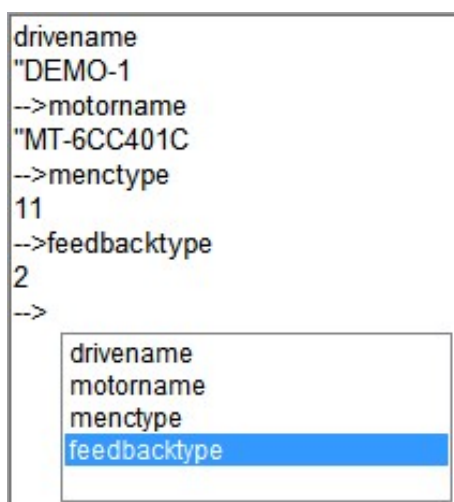
3.5 Command Entry

Flexi SUITE provides two methods that reduce the need for command memorization and keyboard input:

- **Autocompletion.** An autocompletion system (IntelliSense) allows you to access variable and commands, and descriptions of their functions. IntelliSense can be disabled in the Preferences screen or in the Terminal shortcut menu.

When you begin typing a command, a list of available drive parameters is displayed based on the characters typed.

- **History.** Use the **Up** arrow key to show a list of all command strings that have been sent to drive in the current working session; that is, since Flexi SUITE was last opened.



```
drivename
"DEMO-1
-->motorname
"MT-6CC401C
-->menctype
11
-->feedbacktype
2
-->
```

drivename
motorname
menctype
feedbacktype

Figure 3-3. History

When a command in the autocomplete or history list is highlighted:

- Press **Enter** to send the command to drive.
- Press **spacebar** to edit the command.

3.6 Parameters



Disable the drive before manipulating motor and feedback parameters.

Many parameters can be modified while the drive is enabled. Exercise caution, however, as motor behavior will change.

If a parameter cannot be modified while the drive is enabled, Flexi SUITE will prompt you to disable the drive.

3.6.1 Data Entry

Throughout Flexi SUITE, 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 **Enter** to send the value to the drive RAM.

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

The displayed format of the value might be slightly different than what you entered; for example, if you enter 10, the drive might return 10.00.

- If the value entered is invalid, the last valid value is displayed.

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

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

3.6.2 Schematics

Flexi SUITE 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 VarCom mnemonic.

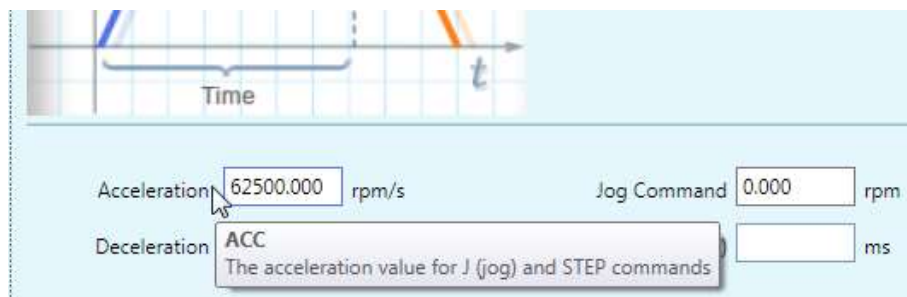


Figure 3-4. Schematic Tooltip

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.

3.6.3 Parameter Tables

A Parameter Table appears in various Flexi SUITE screens, such as Scope and Motor. It displays and allows you to modify parameters relevant to the operation mode in effect.

For each parameter (variable), the Parameter Table presents the following information:

Name	Name of the parameter (variable).
Value	The value currently in the drive working memory. You can modify a parameter value and press Enter to send the new value to the drive RAM. Alternately, use Write to Drive to send all displayed parameters to the drive RAM.
Unit	Unit of the variable.

Hover over the parameter name to view the VarCom mnemonic.

Command	Value	Unit
Tracking Factor	100	%
Velocity Loop Bandwidth for Pole Placement	30	Hz
Load to Motor Inertia Ratio	1.344	
Velocity Loop Output Filter	0	
Velocity Loop Output Filter Parameter 1	200	Hz
Velocity Loop Output Filter Parameter 2	200	Hz
Acceleration	62500.000	rpm/s
Deceleration	62500.000	rpm/s

Figure 3-5. Parameter Table Tooltip

Right-click on a parameter line to view more information and options.

Command	Value	Unit
Tracking Factor	100	%
Velocity Loop Bandwidth for Pole Placement	30	Hz
Load to Motor Inertia Ratio	1.344	
Velocity Loop Output Filter	0	
Velocity Loop Output Filter Parameter 1	200	Hz
Velocity Loop Output Filter Parameter 2	200	Hz
Acceleration	62500.000	rpm/s
Deceleration	62500.000	rpm/s

Help F1

Edit

Save To File

Enable

Details

Description : The ratio of the load inertia to the motor inertia

Command Name : LMJR

Min Value : 0

Max Value : 2000

CANopen Index : SDO207AS0

Figure 3-6. Parameter Table – Right-Click Info

Flexi SUITE provides a blank line at the bottom of the table that lets you add any configurable parameter defined in the firmware (VarCom) and assign a value to it.

To add a parameter to the table, enter the VarCom mnemonic. Flexi SUITE automatically displays the descriptive name, and adds a new blank line at the end of the table.

Depending on the context and changes already made in the parameter value, some or all of the following options will be displayed.

Help	F1. Activates online help for the currently selected screen element.
Enable Kill	Toggles the Enable/Disable state of the drive. VarCom EN and K . This option is displayed when modification of the parameter value requires the drive to be in the disabled state.
Save to File	Saves the entire parameter table to a text file, for reference purposes only. Default location is \Users\owner\Documents\FlexiSUITE
Details	Description. A brief description of the parameter. Command Name. The VarCom equivalent. Min/Max Value. The minimum and maximum values allowed for the parameter. CANopen Index. Where applicable, the equivalent CANopen object code.
Edit	Opens an Edit Parameter dialog box that contains the essential functions provided in the Scope screen to facilitate tuning of motion parameters. Options enable automatic and consistent intervals for adjusting parameter values.



Figure 3-7. Parameter Table – Edit Parameter Dialog Box

< >	Click the left and right arrows to scroll to and access the values for each of the parameters in the table.
Value	The value of the parameter currently in the drive. Click the arrows to increase or decrease the value, according to the define Step percentage.
Step	Defines the percentage for incrementing or decrementing the parameter value.
Down Step	Defines whether the parameter is incremented or decremented in each step.
Initial Value	Restores the value of the parameter that was in effect before the Edit function was activated.
Send Command	Sends the currently displayed value to the drive.

Move Record Plot	Moves, records and plots the motion according to the newly entered value.
Auto Increment	If selected, the value is incremented according to the Step value.
Advanced	Displays two additional options: Show Previous. Displays the previously displayed trace in addition to the currently displayed trace. Show Reference. Displays the trace previously saved as a reference.

The Parameter Table in the Motor screen does not allow modification of parameter values, except for motors defined as User Motors.

Name	Value	Units
Motor Name	"P2-04B23035S3	
Motor Type	0	
Motor Rated Current	1.259	A
Peak Current	3.818	A
Motor Maximum Speed	5000.000	rpm
Torque Constant	0.283	Nm/A
Rotor Inertia	0.007	Kgm ² *10 ⁻³
Motor Resistance	23.400	Ohm
Motor Inductance	20.600	mH
Motor Poles	8	poles
Current BEMF Compensation Gain	1.000	

Figure 3-8. Parameter Table in Motor Screen

4 Motor Setup Wizard



Disable the drive before manipulating motor and feedback parameters.

Many parameters can be modified while the drive is enabled.

Exercise caution, however, as motor behavior will change.

If a parameter cannot be modified while the drive is enabled, Flexi SUITE will prompt you to disable the drive.

The **Motor Setup Wizard** provides the quickest and easiest method for getting the drive up and running. It configures the essential parameters and the current control loop.

It is recommended that you use the Flexi SUITE **Motor Setup Wizard** when connecting the drive for the first time.

Note: If the drive system includes an electronic motor nameplate (e.g., PRO2 motor with sensAR magnetic encoder), certain motor and feedback parameters are transferred directly to the drive after power-up, and cannot be manipulated. The electronic nameplate thus makes commissioning even simpler and more reliable.

Refer to [Motor Setup](#) in User Manual.

Motor Setup – Connection

Typically, the wizard begins at Step 0.

Refer to [Communication](#).

If Flexi SUITE is already communicating with the drive, the wizard will begin at Step 1: Drive Information.

Motor Setup

Step 1: Drive Information

1. Review the drive information.
2. If necessary, click Restore Factory Default to restore the original drive parameters.
3. Optionally, enter a name for the drive. Press Enter after typing the name.

Drive Name

Drive Details		Drive Settings	
Drive Model	FLEXI PRO-0062AAF1-00	Drive Peak Current	25.4 A (18.0 Arms)
Serial Number	214M-2015139, December 2014	Drive Continuous Current	8.4 A (6.0 Arms)
Firmware Version	1.41.0a9.0.6	Feedback Device	Incremental encoder (A/B/I/Halls Tamagawa)
Control Board Version	B0		
Power Board Version	C0		
FPGA Version	1.85		

Interface Mode

Serial / Pulse / Analog

EtherCAT / CANopen

Figure 4-1. Flexi SUITE – Motor Setup Wizard – Step 1

Motor Setup – Drive Information

This step includes an option to restore the drive's factory settings: **Restore Factory Default**. Refer to [Drive Information](#).

This step also contains the settings for the **Command Interface Mode**: Serial/Pulse/Analog (COMMODE 0) or EtherCAT/CANopen (COMMODE 1).

Note: For FLEXI PRO AF, EC, EB models and DDHD AF models, both interface options are available.
For FLEXI PRO AP and DDHD AP models, only the EtherCAT/CANopen option is available.

Motor Setup – Motor Selection

If the drive detects an electronic motor nameplate, the parameters in this screen are set automatically and cannot be manipulated. Select the option **Skip motor setup procedure**, and click **Write** to send the motor parameters to the drive.

If the drive does not detect an electronic nameplate, you can select a motor from the Flexi SUITE database (library).

This step also includes an option to define a new motor if your motor is not listed in the default set of motor libraries.

Motor Setup – Limits

The wizard suggests values for Low, Medium or High current and velocity limits, which are rounded to 25%, 50% and 75%, respectively, of the maximum range.

Refer to [Current Limit](#), [Velocity Limit](#), and [Position Limit](#).

The wizard also allows you to set the the maximum value that will not produce a position error fault.

Refer to VarCom [PEMAX](#).

Motor Setup – Motor Direction

The wizard simplifies the process of defining the rotation direction for a positive command. Otherwise, VarCom instructions are required.

Refer to VarCom [MPHASE](#) and [DIR](#).

Motor Setup – Save

When the Motor Setup is completed, it is recommended that you save parameters to the drive's non-volatile memory and to a file on the host computer for backup.

Do both of the following:

- Click **Save to Drive** to save the parameters to the drive's non-volatile memory.
- Click **Save to File** to save the parameters to a backup file on the computer.

Save to File writes parameters from 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.

5 Autotuning Wizard

The drive design includes a proprietary (**HD**) nonlinear position control algorithm that is designed to minimize position error during motion and to minimize settling time at the end of motion.

The Flexi SUITE Autotuning wizard is used to set the initial HD control parameters. The wizard can also be used to optimize drive parameters to produce the most effective motion for a particular task or application.

Note: Flexi SUITE will activate the wizard for Drive-based Autotuning if an electronic motor nameplate (e.g., PRO2 motor with sensAR magnetic encoder) is detected at power-up, or if the software is operating offline.

Flexi SUITE will activate the wizard for PC-based autotuning if an electronic motor nameplate is not detected at power-up.

5.1 Drive-Based Autotuning

The Flexi SUITE Autotuning wizard is used to perform the Autotuning.

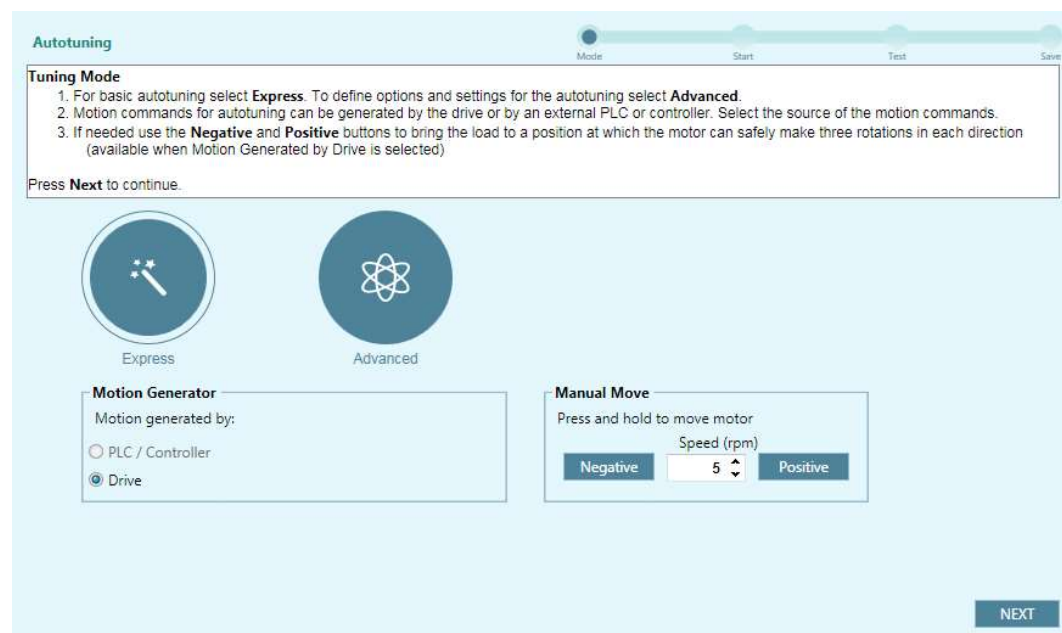


Figure 5-1. Flexi SUITE – Drive-Based Autotuning Wizard

5.1.1 Drive-Based Autotuning – Express

The **Express** autotuning procedure requires no user input except to activate each step.

Express Autotuning consists of the following steps:

1. Set the motion generator: **Drive**
Optional: Manually move the axis to the start position.
2. Run Autotuning.

3. Test the result.
4. Save the parameters.

5.1.2 Drive-Based Autotuning – Advanced

The **Advanced** autotuning procedure consists of the following steps:

1. Set the motion generator: **Drive**
Optional: Manually move the axis to the start position.
2. Run the load to motor inertia ratio estimation.
3. Set the motion profile values.
4. Set the options for parameter optimization.
5. Run autotuning.
6. Test the result.
7. Save the parameters.

For detailed instructions, refer to the following sections in the User Manual:

[Drive-Based Autotuning – Step 1 – Tuning Mode](#)

[Drive-Based Autotuning – Step 2 – Load/Motor Inertia Ratio](#)

[Drive-Based Autotuning – Step 3 – Movement](#)

[Drive-Based Autotuning – Step 4 – Options: Vibration Suppression](#)

[Drive-Based Autotuning – Step 4 – Options: Acceleration Feedforward](#)

[Drive-Based Autotuning – Step 4 – Options: LMJR Values](#)

[Drive-Based Autotuning – Step 5 – Start](#)

[Drive-Based Autotuning – Step 6 – Test](#)

[Drive-Based Autotuning – Step 7 – Save](#)

5.2 PC-Based Autotuning

For detailed instructions, refer to the following sections in the User Manual:

[PC-Based Autotuning – Step 1 – LMJR Estimation](#)

[PC-Based Autotuning – Step 2 – Gain Optimization](#)

[PC-Based Autotuning – Step 3 – Test Quality of Motion](#)

[PC-Based Autotuning – Step 4 – Save](#)

6 Communication

Commissioning the drive through Flexi SUITE requires a serial RS232 or USB connection. Once the drive is configured, you can then connect it to a PLC or controller over an EtherCAT, CANopen or other fieldbus network.

Note: To transmit commands to the drive through serial RS232/USB connections and P&D/analog interfaces, the drive must be set to COMMODE 0.

To transmit commands to the drive over Ethernet or CAN networks, the drive must be set to COMMODE 1. While COMMODE 1 is in effect, the drive cannot be enabled and the motor cannot be moved through Flexi SUITE.

The Flexi SUITE **Communication** screen allows you to establish communication between the host computer and the drive over a serial connection.

Multiple drives can be accessed through the same instance of Flexi SUITE provided they are all daisy-chained to the RS232 port.

To access two drives on different networks (ports), two instances of Flexi SUITE can and should be used.

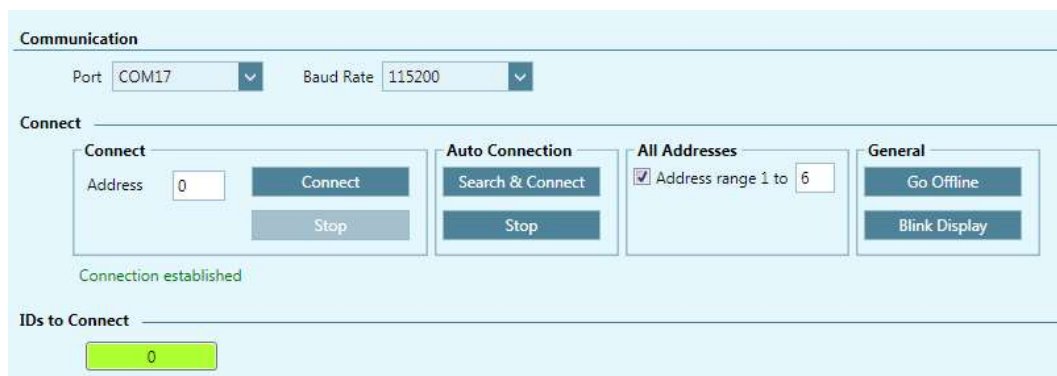


Figure 6-1. Flexi SUITE – Communication Screen – Serial

Communication	
Port	The COM ports on the host computer to which a drive, or daisy-chain of drives, is connected.
Baud Rate	The drive always powers up at baud rate 115200, even if it was changed in a previous working session. To modify baud rate settings, the change must be made both in the drive and in Flexi SUITE software. VarCom BAUDRATE .

Connect	
Address	The drive address can be 0-99 (for FLEXI PRO) or 0-15 (for DDHD). The value you enter must match the drive address defined by the address switch/es on the drive, either the factory default setting or the setting made during the drive setup.
Connect	Attempts (without search) to connect to drive/s according to the address setting/s.
Stop	Halts the attempt to connect to drive/s.
Auto Connection	
Search & Connect	The software searches all COM ports on the host computer to locate the port to which a drive is connected. Once the software identifies the port, it searches for all drives that may be daisy-chained to the port. Since this search can take a long time, the All Addresses range option allows you to limit the number of addresses.
Stop	Halts the Search & Connect process.
All Addresses	
Address range 1 to ...	If selected, allows you to define the number of drive addresses to be searched, from 1-99 (FLEXI PRO) or 1-15 (DDHD). A recommended limit is 6 addresses. If not selected, Flexi SUITE will establish and maintain communication with all drives on the port.
General	
Go Offline	To use Flexi SUITE without connecting to the drive, click Go Offline .
Blink Display	To test communication between Flexi SUITE and the drive, click Blink Display , and observe the 7-segment display on the drive. If communication is established, the display will flash 8 . several times.
Connection Status	A progress bar reflects the search and connect process. When completed, message indicates either Connected established or Connection failed .
IDs to Connect	A list of the names and addresses of all drives found.

7 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.

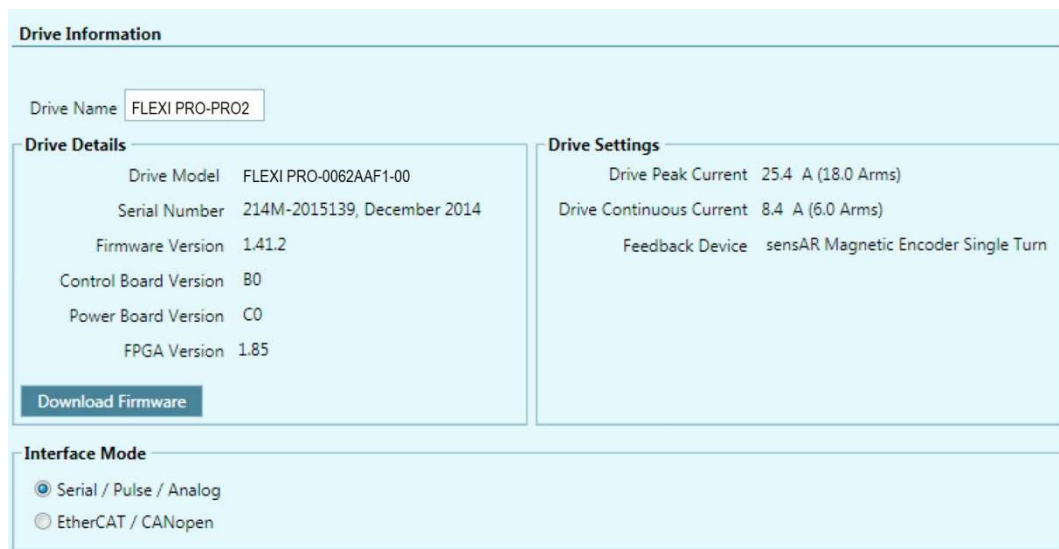


Figure 7-1. Flexi SUITE – Drive Information Screen

Drive Name	Allows you to assign a name to the drive. The name may contain up to 15 alphanumeric characters. Other valid characters are () / - . : This field is optional, but is useful when an application has more than one drive. It is recommended that you provide a name for the drive that reflects the function it performs, such as Axis-1.	DRIVENAME
Drive Details	Hardware-defined. Read only. Shows the drive model and serial number, and version numbers of firmware, control board, power board and FPGA.	INFO
Drive Settings		
Drive Peak Current	Hardware-defined. Read from drive.	DIPEAK
Drive Continuous Current	Hardware-defined. Read from drive.	DICONT
Feedback Type	Factory-defined default settings until configured by user.	FEEDBACKTYPE MENCTYPE

Interface Mode		
Serial/Pulse/Analog	SERVO ON (ACTIVE) and motion commands are transmitted via a serial, pulse or analog interface. Not applicable for FLEXI PRO AP and DDHD AP models,	COMMODE 0
EtherCAT/CANopen	SERVO ON (ACTIVE) and motion commands are transmitted via an EtherCAT/CANopen interface.	COMMODE 1
Download Firmware	Activates the installation procedure for new versions of drive firmware. Refer to the drive user manual for firmware upgrade instructions.	

8 Power Rating

8.1 Drive Power

The **Main** tab in the **Power Rating** screen displays the drive’s continuous and peak current ratings, and allows you to set some bus voltage parameters.

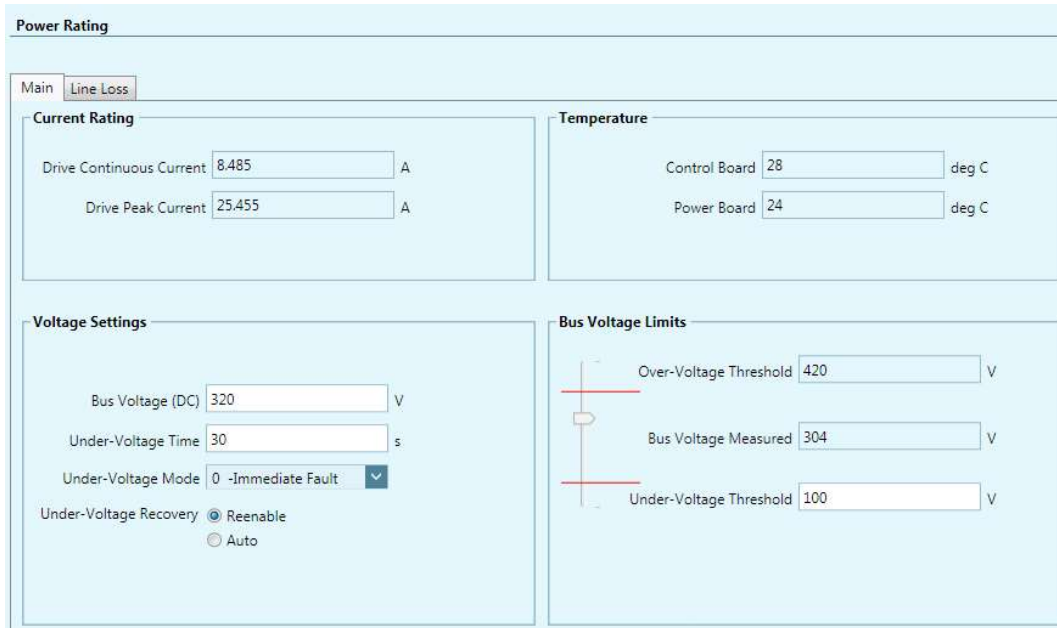


Figure 8-1. Flexi SUITE – Power Rating Screen – Main

Current Rating		
Drive Continuous Current	Defined in hardware. Read only.	DICONT
Drive Peak Current	Defined in hardware. Read only.	DIPEAK
Drive Temperature		
Control Board	The temperature of the control board in the drive. Read only.	DRIVETEMP
Power Board	The temperature of the power board in the drive. Read only.	DRIVETEMP

Voltage Settings		
Bus Voltage (DC)	This setting is required for basic current loop tuning. Although the drive monitors the bus voltage, you must enter the nominal bus voltage here. Enter 320 for a drive powered by 220 VAC per phase. Enter 160 for a drive powered by 110 VAC per phase.	VBUS
	Note: The Motor Setup wizard assumes the Bus Voltage setting is 320V. If the drive is being powered by 220 VAC per phase, you do not need to modify this setting before initiating the Motor Setup. If the drive is being powered by 110 VAC per phase, you must change the Bus Voltage setting to 160V.	
Under-Voltage Time	Specifies the amount of time an under-voltage condition will exist before latching a fault, when working in Delayed Fault Under-Voltage mode.	UVTIME
Under-Voltage Mode	Defines how the drive will respond to an under-voltage fault.	UVMODE
Under-Voltage Recovery	Defines how the drive will recover from an under-voltage fault: by toggling the drive from disable to enable, or by automatically recovering, after the under-voltage condition clears.	UVRECOVER
Bus Voltage Limits		
Over-Voltage Threshold	Shows the level for detection of bus over-voltage. Defined in hardware. Read only.	OVTHRESH
Bus Voltage Measured	Shows the actual bus voltage of the drive. Read only. Defined in hardware. Read only.	VBUSREADOUT
Under-Voltage Threshold	Defines the level for detection of bus under-voltage condition.	UVTHRESH

8.2 Bus AC Power Line Loss

The **Line Loss** tab in the **Power Rating** screen allows you to define drive behavior related to a disconnection of the bus AC supply line.

Note: Applicable only to DDHD and STO-certified FLEXI PRO drives (-ST models).

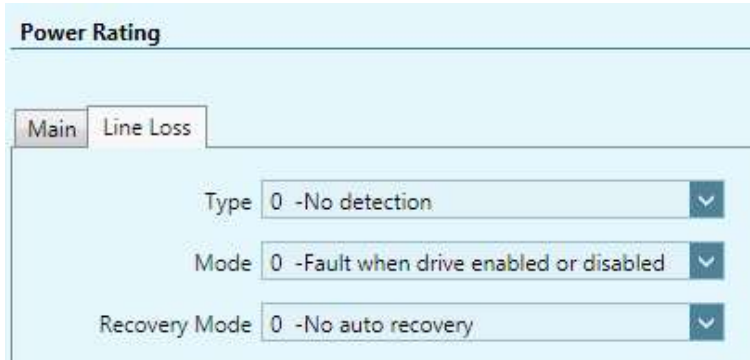


Figure 8-2. Flexi SUITE – Power Rating Screen – Line Loss

Type	Defines the types of bus AC supply line disconnect fault. Programmable only if supported by hardware.	LINELOSSTYPE
Mode	Defines how the drive will respond if phase loss is detected on the bus AC supply line.	LINELOSSMODE
Recovery Mode	Defines how the drive will recover from a bus AC supply line disconnect fault.	LINELOSSRECOVER

9 Motor

9.1 Motor Properties from Electronic Nameplate

An electronic motor nameplate (MTP) is a set of motor parameters that are embedded in the non-volatile memory of the motor feedback device.

As of firmware version 1.40.0, the drive attempts to detect a motor feedback device and an electronic motor nameplate at power-up. If detected, certain motor and feedback parameters are transferred directly to the drive, and cannot be manipulated by the user.

The PRO2 motor is typically equipped with a sensAR encoder, which has an electronic motor nameplate.

Motor		
MTP Motor Information		
Motor Model	P2-10A23025S30A	
Motor Nominal Voltage	230	VAC
Encoder Type	sensAR Encoder	

Figure 9-1. Flexi SUITE – Motor Data from Electronic Motor Nameplate

9.2 Motor Selection

If an electronic motor nameplate is not detected at power-up, the **Motor** screen allows you to select a motor from the Flexi SUITE databases (motor libraries). You can simply select the motor family and motor part number, and Flexi SUITE will prepare the appropriate motor and feedback parameters. The screen allows you to modify and send parameters to the drive, read parameters from the drive, and save parameters.

The Motor screen also includes a wizard for defining a motor whose parameters are not available in the default sets of motor libraries.

Note: In addition to motor parameters, the motor libraries also contain the motor feedback and thermal protection parameters.

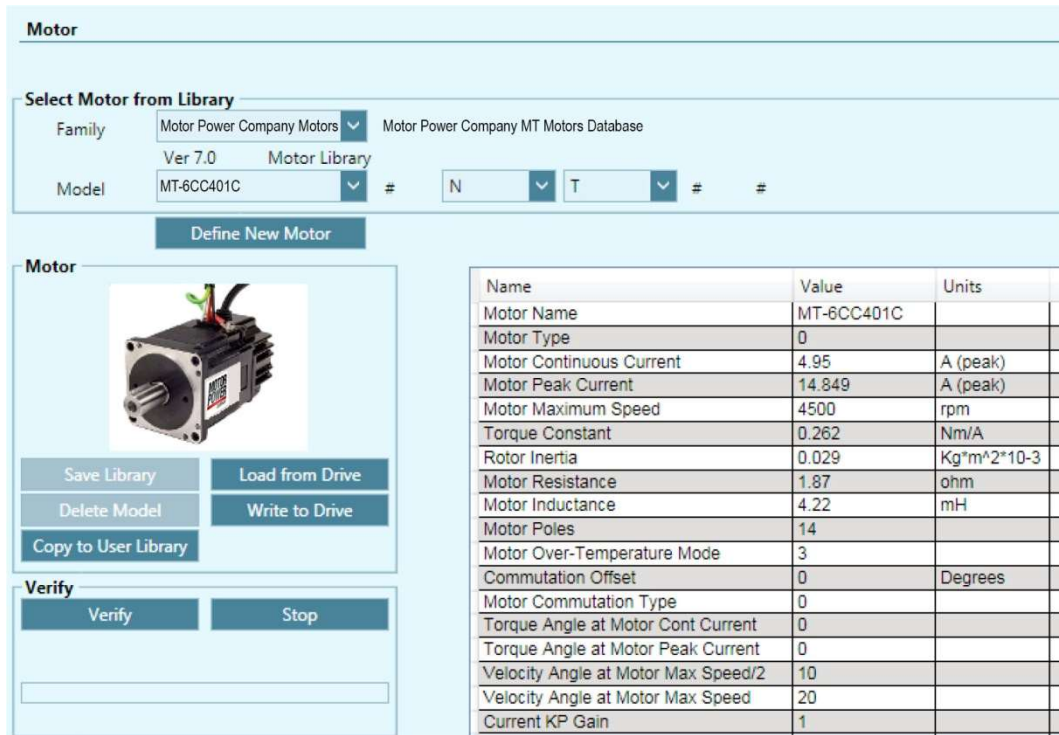


Figure 9-2. Flexi SUITE – Motor Screen

<p>Motor Family</p>	<p>Flexi SUITE has several databases containing predefined sets of parameters for motors.</p> <p>User Motors contains a list of motors whose parameter sets have been created by the user, either by modifying a predefined set, or by defining an entirely new set of parameters for a motor.</p> <p>To add a motor to this list, select Motor Family>User Motors, and then Motor Type>New. The Parameters Table then displays a list of motor properties that need to be defined.</p>
<p>Motor Model</p>	<p>A list of all models in the selected Motor Family that have a predefined set of parameters in Flexi SUITE.</p> <p>For most motors, the motor catalog number is followed by a series of fields, each of which represents a segment in the motor’s complete ID number, as shown on the motor’s label.</p> <p>In each field select the option that matches the information on the motor label. If a field contains a # sign, you do not need to select an option, as the field is not relevant to motion.</p> <p>Different fields represent certain functions or capabilities of the motor, which can be seen in the tooltip for each field.</p> <p>Depending on your selections, you may be prompted to define the output that releases the motor brake.</p> <p>After selecting the motor click Write To Drive to write this parameter to the drive.</p>

New Motor	Refer to New Motor Wizard .
------------------	---

9.3 Motor Parameters

Save Library	Saves the entire contents of the User Motors library to a file.
Delete Model	Deletes the currently displayed motor from the User Motors library.
Load from Drive	Displays the values of the drive's motor parameters.
Write to Drive	Writes all displayed parameters to the drive. You can also modify a parameter value and press Enter to send the new value to the drive.
Copy to User Library	Copies the parameter values currently displayed to the User Motors library, to enable modification.
Verify	<p>Activates an automatic procedure for setting commutation related variables. The procedure involves finding the electrical phase and detecting the direction of motor movement, Hall switches and index crossing.</p> <p>The drive's 7-segment display flashes the character A t 1 during this procedure. When the procedure finishes successfully, the display returns to its normal state. If the procedure fails, the display shows -5.</p> <p>Refer to VarCom MOTORSETUP and Motor Setup Wizard.</p>
Stop	Aborts the Verify process.
Progress bar	Shows the progress of the Verify process (which takes about 30 seconds).
Click for Details	Shows more information about the Verify process.

The **Parameter Table** displays the parameters of the selected motor as currently defined in the database, or as read from the drive. As soon as you change any Motor Model field, the values in the Parameter Table change accordingly.

9.4 New Motor Wizard

The New Motor wizard allows you to define a motor whose parameters are not available in the default sets of motor libraries in Flexi SUITE. Once defined, the new motor is added to the set of **User Motors** in the motor library.

Click on **New Motor** to activate the wizard either from the Motor screen, or during the Motor Selection step in the Motor Setup wizard.

A series of dialog boxes prompts you to provide motor parameters, which you should be able to extract from the motor datasheet.

Refer to [New Motor Wizard](#) in the User Manual.

10 Feedback

10.1 Feedback Properties from Electronic Motor Nameplate

An electronic motor nameplate (MTP) is a set of motor parameters that are embedded in the non-volatile memory of the motor feedback device.

As of firmware version 1.40.0, the drive attempts to detect an electronic motor nameplate at power-up. If detected, certain motor and feedback parameters are transferred directly to the drive, and cannot be manipulated by the user.

The PRO2 motor is typically equipped with a sensAR encoder, which has an electronic motor nameplate.

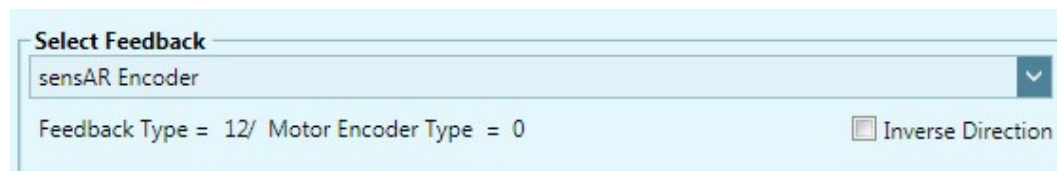


Figure 10-1. Flexi SUITE – Feedback Data from Electronic Motor

10.2 Feedback Device Settings

If an electronic motor nameplate is not detected at power-up, the **Feedback** screen enables you to configure the properties of the motor's feedback device, and to view the motor position. To configure feedback, select the feedback device from the Feedback options. The screen will change accordingly, enabling you to set the relevant feedback properties.

The Feedback screen also allows you to activate the encoder simulation output and set its resolution.

Note: Many motors have a predefined feedback device. Once you select a motor in the Motor screen, some of the fields in the Feedback screen will have values entered automatically.

Note: The Motor Setup wizard assumes that the motor model number indicates a particular type of feedback. If this is not true for your motor, you must define the motor feedback before starting the Motor Setup wizard.

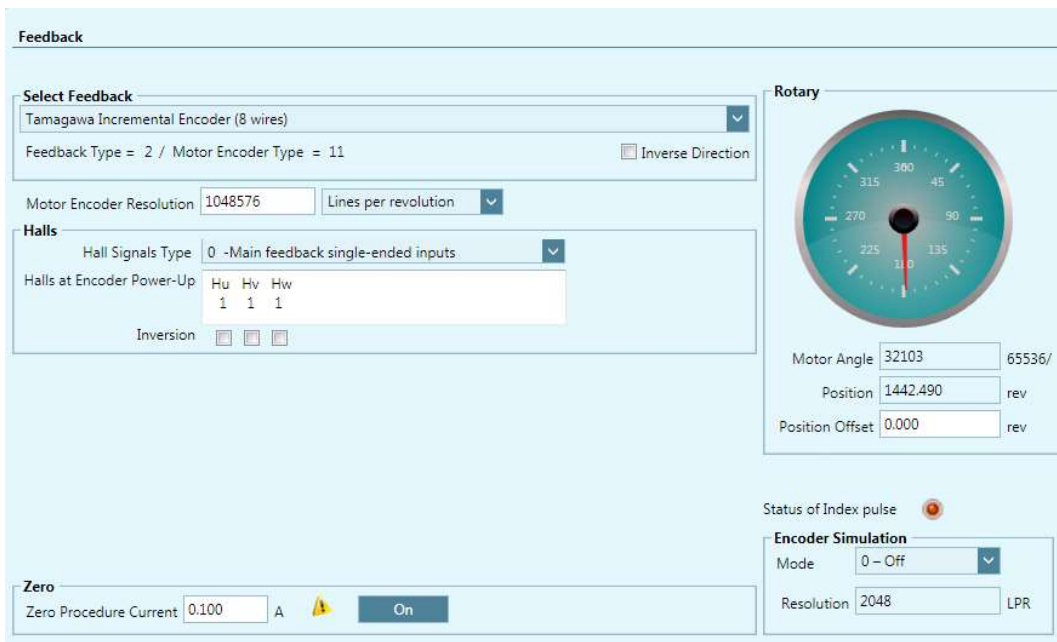


Figure 10-2. Flexi SUITE – Feedback Screen – Example 1

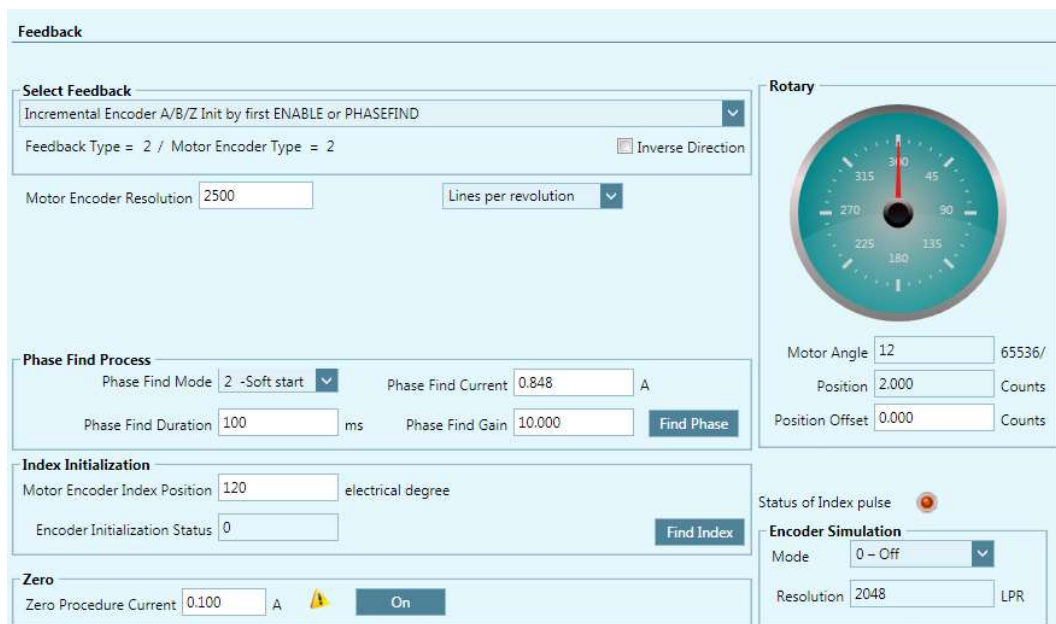


Figure 10-3. Flexi SUITE – Feedback Screen – Example 2

Feedback	<p>From the dropdown list, select the type of feedback being used in the application:</p> <div style="border: 1px solid #ccc; background-color: #e6f2ff; padding: 5px;"> <p>Incremental Encoder A/B/Z + Halls Incremental Encoder A/B/Z Init by PHASEFIND Incremental Encoder A/B/Z Init by first Enable or PHASEFIND Incremental Encoder A/B Init by PHASEFIND Incremental Encoder A/B Init by first Enable or PHASEFIND Incremental Encoder A/B + Halls Halls Only Sine Encoder A/B/Z/ + Halls Sine Encoder A/B/Z Init by PHASEFIND Sine Encoder A/B/Z Init by first Enable or PHASEFIND Sine Encoder A/B Init by PHASEFIND Sine Encoder A/B Init by first Enable or PHASEFIND Sine Encoder A/B + Halls Endat 2.x Protocol Endat 2.x Protocol with Sine Signals HIPERFACE with Sine Signals Nikon Encoder: 17/20-bit Absolute Single/Multi-turn Tamagawa Incremental Encoder (8 wires) Tamagawa Encoder: 17/15-bit Absolute Single turn Tamagawa Encoder: 17/23-bit Absolute Multi-turn sensAR Encoder Resolver BiSS-C Interface Encoder</p> </div> <p>The selection automatically sets both the Feedback type and the Encoder type, as indicated on screen.</p>	
Feedback Type	Indicates the selected feedback type.	FEEDBACKTYPE
Motor Encoder Type	Indicates the selected encoder type.	MENCTYPE
Inverse Direction	When enabled, inverts the values of the motor velocity and actual position determined by the motor feedback. Motor rotation and position do not change.	DIR
Rotary	<p>The graphic shows motor position within one revolution. After setting the feedback resolution, you can turn the motor by hand one revolution and use this graphic to verify that one revolution of position counts has indeed occurred.</p> <p>The graphic also shows motor direction and helps you verify that motion direction is as expected.</p> <p>The graphic also rotates when the motor is moved by the drive, but does not replicate the high speed rotations of the motor.</p>	
Motor Angle	The motor mechanical angle position. Read only.	MECHANGLE
Position	The value of the position feedback. Read only.	PFB
Position Offset	A feedback offset that is added to the internal cumulative position counter, to give the position feedback value.	PFBOFFSET

Zero		
Zero Procedure Current	The current used for the Zero procedure.	IZERO
On	Activates the Zero procedure, which locks the rotor in place by passing current through two phases. This is useful for determining the commutation offset (MPHASE) on motors that have a resolver or absolute encoder.	ZERO
Encoder Simulation	Enables the equivalent encoder output, and sets the resolution.	
Mode	The state of the encoder simulation. 0. Off. Encoder simulation not enabled. 1. Index per revolution. Encoder simulation enabled, with an index signal (zero pulse) on each turn (or pitch, for linear motor). 2. Index per feedback. Encoder simulation enabled, with the index signal routed directly from the motor feedback device (by the FPGA) to the drive, regardless of the value of ENCOUTRES. This mode is intended primarily for linear motors, whose index is once per stroke.	ENCOUTMODE
Resolution	The resolution, in number of lines, of the encoder equivalent output	ENCOUTRES
Status of Index Pulse	An icon represents the state of the encoder index signal: Red. The encoder index signal is inactive, indicating the position is not within the index. Green. The encoder index signal is active, indicating the position is within the index.	

The other options in this screen will change according to the selected **Feedback** type:

Motor Encoder Resolution	The resolution of the motor encoder, defined in lines per revolution. If Counts per Revolution is selected and a value is entered in the Motor Encoder Resolution field, Flexi SUITE will divide the value by 4 to produce the MENCRES setting, and the displayed unit will revert to Lines per Revolution.	MENCRES
Halls		
Hall Signals Type	The source and method used for Hall sensors.	HALLSTYPE

Halls at Encoder Power Up	The current state of the Hall commutation sensors. Read only.	HALLS
Inversion	Inverts the polarity of individual Hall signals associated with motor phases UVW, thereby providing correction for crossed wiring.	HALLSINV
Phase Find Process		
Find Phase	Activates the automatic motor phasing routine.	PHASEFIND
Phase Find Mode	Defines the method to be used for the commutation phase finding.	PHASEFINDMODE
Phase Find Duration	Defines the duration of the phase finding mechanism in a soft start.	PHASEFINDTIME
Phase Find Current	Adjusts the current of the phase finding mechanism.	PHASEFINDI
Phase Find Gain	Adjusts the gain of the phase finding mechanism.	PHASEFINDGAIN
Index Initialization	Note: If the motor has an index but the index is not being used for commutation (for example, if the encoder type is 6 – A/B/Halls), then you do not need to specify or find the index position.	
Find Index	Activates the automatic index location routine.	
Motor Encoder Index Position	The encoder index position, in electrical degrees.	MENCZPOS
Encoder Initialization Status	The state of the index search and initialization procedure. Read only.	
Resolver		
Resolver Conversion Bandwidth	The resolver conversion bandwidth. High bandwidth produces better dynamic tracking and less phase lag in high frequencies. Lower bandwidth results in better noise reduction.	RESBW
Motor Resolver Poles	The number of individual poles (not pairs) in the resolver feedback device.	MRESPOLES
Resolver Amplitude Range	The acceptable range of resolver sine/cosine signals, expressed as a percentage, around their nominal value.	RESAMPLRANGE

Calibration		
Start	Activates a procedure that calibrates the resolver sine/cosine signals. The calibration serves to reduce Harmonic errors in the resolver reading.	SININIT
Sine/Cosine Calibration Parameters	The parameters that are used for calibration of the resolver sine and cosine signals, in hexadecimal representation. Read only.	SINPARAM
Sine/Cosine Calibration Status.	The status of the resolver calibration procedure. Read only.	SININITST
Multi-turn		
Bit Count	Multi-turn data length value; must be equal to or greater than Resolution value.	BISSCFIELDS
Resolution	Multi-turn data resolution value. Must be equal to or less than Bit Count value.	BISSCFIELDS
Single Turn		
Bit Count	Single turn data length value; must be equal to or greater than Resolution value.	BISSCFIELDS
Resolution	Single turn data resolution value. Must be equal to or less than Bit Count value.	BISSCFIELDS

11 Motion Units

The **Motion Units** screen lets you select the unit definitions for specifying position, velocity, and acceleration/deceleration.

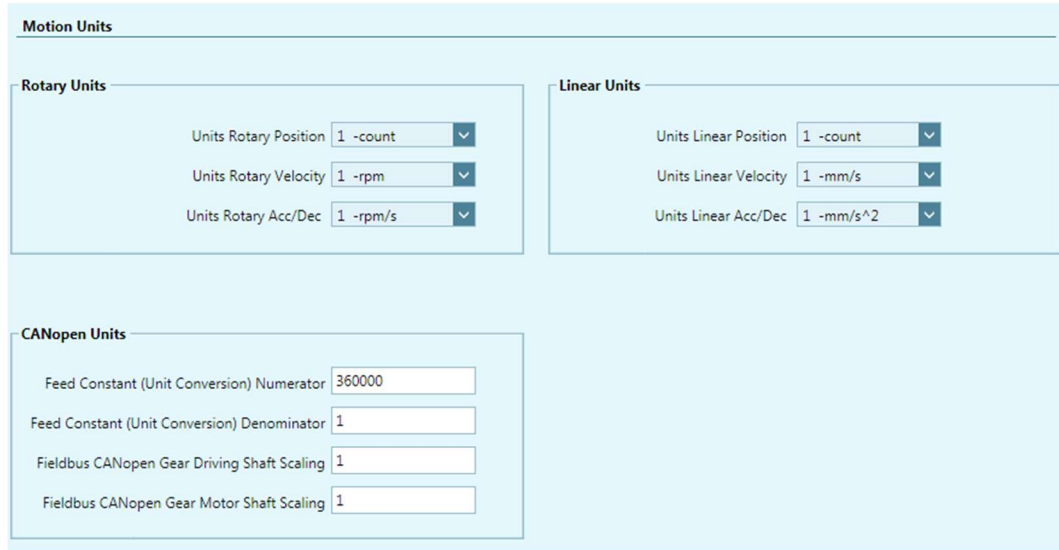


Figure 11-1. Flexi SUITE – Motion Units Screen

Rotary Units		
Position	Defines the units of position variables in a rotary system.	UNITSROTPOS
Velocity	Defines the units of velocity variables in a rotary system.	UNITSROTVEL
Acc/Dec	Defines the units of acceleration and deceleration variables in a rotary system.	UNITSROTACC
Linear Units		
Position	Defines the units of position variables in a linear system	UNITSLINPOS
Velocity	Defines the units of velocity variables in a linear system.	UNITSLINVEL
Acc/Dec	Defines the units of acceleration and deceleration variables in a linear system.	UNITSLINACC

CANopen Units	<p>CANopen has two objects, each with two sub-indices, for setting the gear ratio and the feed constant values. These objects have four equivalent drive parameters, which appear in this pane. By defining the gear ratio and feed constant values in Flexi SUITE, they will be converted into values correctly recognized by a drive operating in a CANopen network.</p> <p>The relationship is as follows:</p> $\frac{PNUM}{PDEN} \times \frac{FBGMS}{FBGDS} = \text{Resolution}$ <p>Note: Flexi SUITE uses standard CANopen units of motion, as selected by the user. However, in instances of CANopen units, the Flexi SUITE screens display only the values, and do not include the type of unit.</p>	
Unit Conversion Numerator and Unit Conversion Denominator	Conversion factors of the user-defined unit. They are used to multiply the motor revolution (rotary motors) or the motor pitch (linear motors), according to the type of motor (MOTORTYPE).	PNUM PDEN
Fieldbus CANopen Gear Driving Shaft Scaling	The conversion factor of the fieldbus device's drive shaft revolution.	FBGDS
Fieldbus CANopen Gear Motor Shaft Scaling	The conversion factor of the fieldbus device's gear shaft revolution.	FBGMS

12 Limits

The **Limits** screen has three tabs:

- Current Limit
- Velocity Limit
- Position Limit

12.1 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.

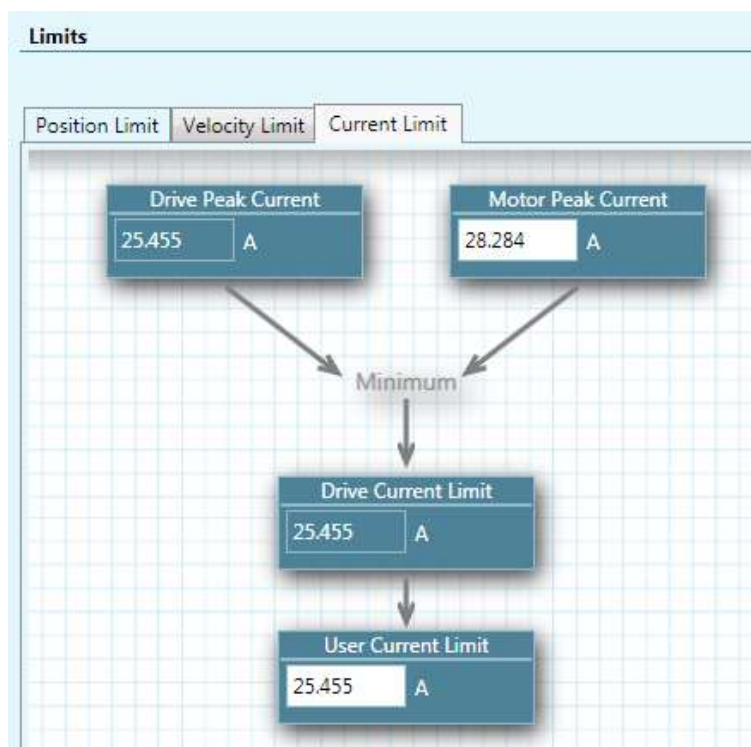


Figure 12-1. Flexi SUITE – Current Limit Screen

Drive Peak Current	The peak rated current of the drive. Defined in hardware. Read only.	DIPEAK
Motor Peak Current	The peak current of the motor. This value is obtained from the motor datasheet/electronic nameplate.	MIPEAK
Drive Current Limit	The maximum current for the drive and motor combination. This value is calculated by the software. Read only.	IMAX
Maximum Current	A user-definable maximum current for the application. You can set a value that is lower than the Drive Current Limit.	ILIM

12.2 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.

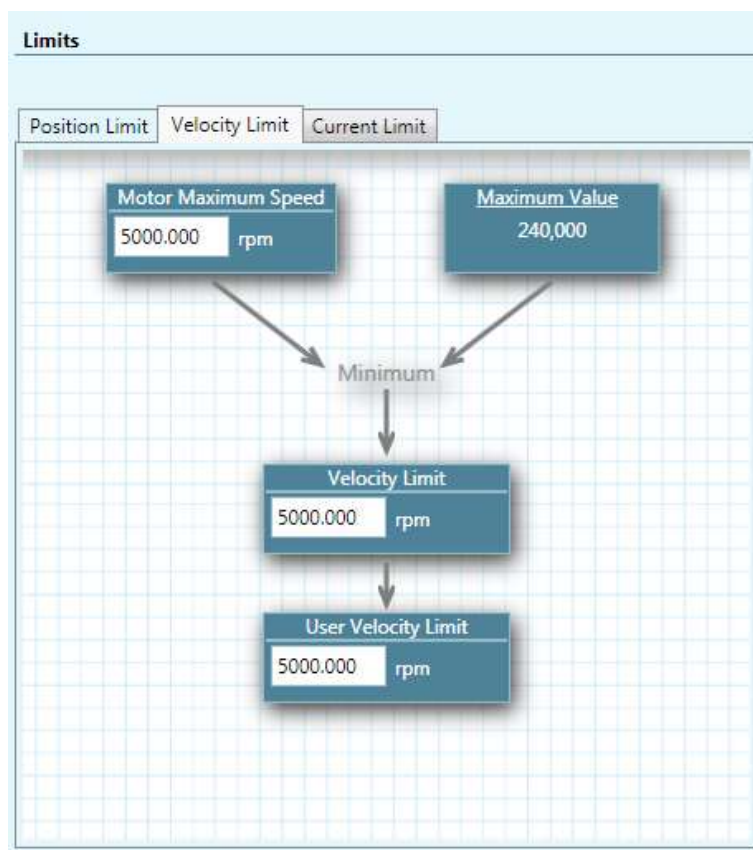


Figure 12-2. Flexi SUITE – Velocity Limit Screen

Motor Maximum Speed	The maximum motor speed. This value is obtained from the motor datasheet/electronic nameplate.	MSPEED
Maximum Value	The maximum speed that the drive can compute. Defined in hardware. Read only.	

Velocity Limit	The maximum allowed motor velocity is computed according to the values of the two preceding parameters. Read only.	VMAX
User Velocity Limit	A user-definable maximum velocity for the application. You set a value up to the value defined by VMAX.	VLIM

12.3 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.

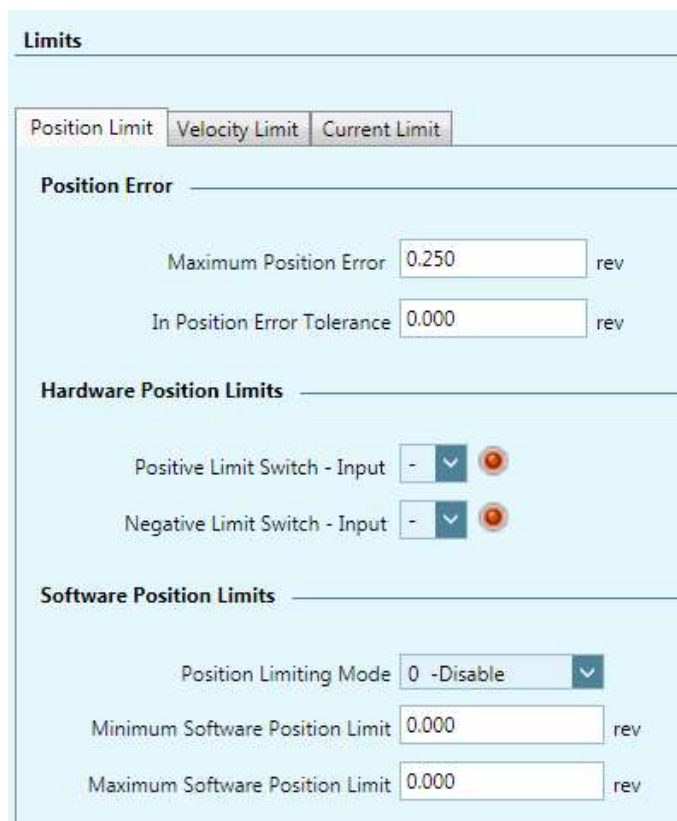


Figure 12-3. Flexi SUITE – Position Limit Screen

Position Error		
Maximum Position Error	The maximum position error allowed without producing a fault; in counts.	PEMAX
In Position Error Tolerance	The error tolerance for declaring an “in position” state.	PEINPOS
Hardware Position Limits Error	The inputs that indicate whether position limits have been reached in the positive and negative direction.	INMODE 5 INMODE 6

Software Position Limits		
Position Limiting Mode	Enables and disables the use of software position limits. 0 = Software position limits disabled. 1 = Software position limits enabled.	POSLIMMODE bit 0
Minimum/Maximum Software Position Limit	The maximum and minimum values, in counts, for the software position limits.	POSLIMPOS POSLIMNEG

13 Current Foldback

The **Foldback** screen allows you to set current foldback properties of the drive and motor. Some motor foldback parameters may not be displayed, or may be read only, depending on the motor currently in use.

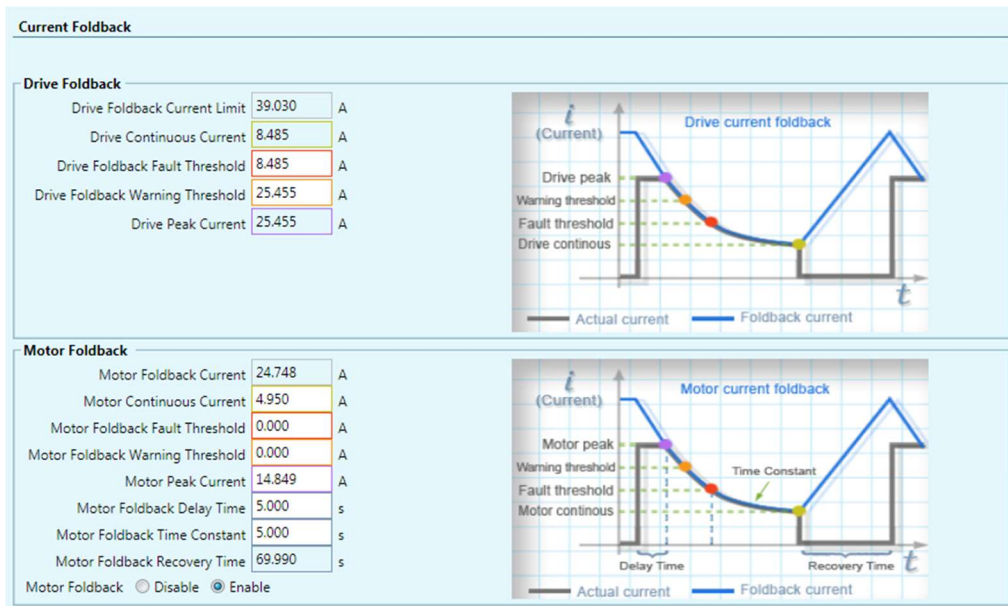


Figure 13-1. Flexi SUITE – Current Foldback Screen

Drive Foldback	
Drive Foldback Current	IFOLD
Drive Continuous Current	DICONT
Drive Foldback Fault Threshold	IFOLDFTHRESH
Drive Foldback Warning Threshold	IFOLDWTHRESH
Drive Peak Current	DIPEAK
Motor Foldback	
Motor Foldback Current	MIFOLD
Motor Continuous Current	MICONT
Motor Foldback Fault Threshold	MIFOLDFTHRESH
Motor Foldback Warning Threshold	MIFOLDWTHRESH
Motor Peak Current	MIPEAK
Motor Foldback Delay Time	MFOLDD
Motor Foldback Time Constant	MFOLDT
Motor Foldback Recovery Time	MFOLDR
Motor Foldback	MFOLDDIS

14 Digital Inputs

The **Digital 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.

The **Digital I/Os** screen has two tabs:

- Digital I/Os
- Drive Script

14.1 Digital Inputs Configuration

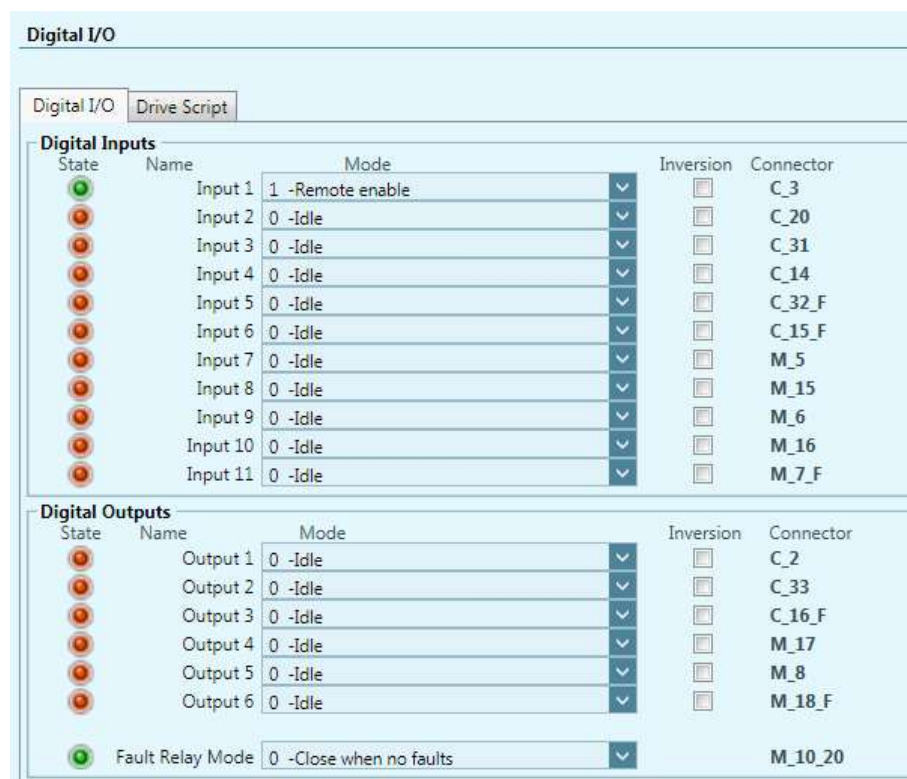
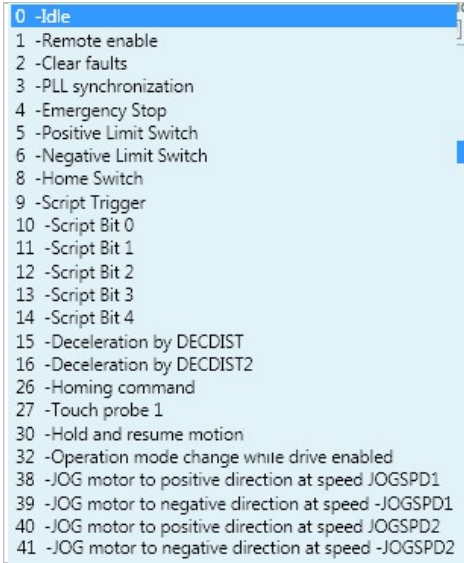


Figure 14-1. Flexi SUITE – Digital I/Os Screen

The **Digital Inputs** pane enables you to configure functionality and polarity of the digital inputs, and to monitor the state of all digital inputs.

State	A graphic element that toggles between green and red to reflect the on or off state of the actual input.	IN INPUTS
Name	Identifies the specific input.	

<p>Mode</p>	<p>Defines the functionality of the digital input.</p>  <p>Digital input 5 includes INMODE 17-Pulse signal. Digital input 6 includes INMODE 18-Direction signal.</p> <p>Note: Some INMODE values are not supported in Flexi SUITE.</p>	<p>INMODE</p>
<p>Inversion</p>	<p>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.</p>	<p>ININV</p>
<p>Connector</p>	<p>Indicates the pin number of the input on either the Controller (C) interface or the Machine (M) interface. It also indicates whether it is a fast (F) input.</p>	

14.2 Digital Input Activation of Drive Scripts

Note: Drive (internal) scripts are not to be confused with software (external) scripts that can be written and executed in Flexi SUITE. Refer to Software Scripts.

Flexi SUITE includes a **Drive Script** tool for programming instructions for digital inputs. These scripts can modify drive behavior while a machine is in operation, such as increasing or reducing acceleration, initiating a movement, setting a variable, or switching operation modes.

The Drive Script panel in the Flexi SUITE Digital I/Os screen is used to define these runtime instructions.

The drive scripts are controlled by up to five digital inputs that are defined for this purpose. Up to 32 drive scripts can be defined.

Any VarCom variable or command can be used in a drive script. A drive script is limited to 128 characters.

Drive scripts are saved in the drive, and can be viewed by means of the VarCom command DUMP.

Note: Flexi SUITE software script commands – which start with #, such as #if, #while, #delay – cannot be used in a drive script.

Drive Script Inputs

To use drive scripts, set the functionality (INMODE) of the required inputs in the Digital I/Os screen > **Digital I/Os** panel.

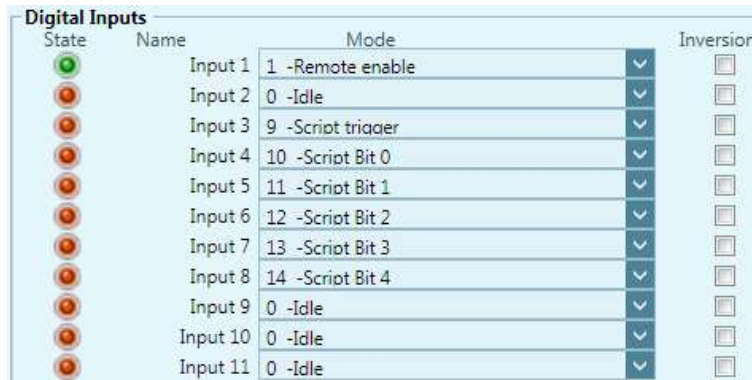


Figure 14-2. Flexi SUITE – Digital Inputs for Scripts

- Select one input as the trigger that activates drive scripts: INMODE 9-Script trigger
- Select up to 5 inputs that will be used to define and activate various drive scripts:
 - INMODE 10-Script Bit 0
 - INMODE 11-Script Bit 1
 - INMODE 12-Script Bit 2
 - INMODE 13-Script Bit 3
 - INMODE 14-Script Bit 4

Each input and state has a binary bit value, which is used to generate the drive script ID number.

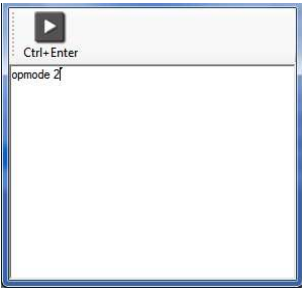
Drive Script Settings

Use the Digital I/Os screen > **Drive Scripts** tab to define the bits whose values determine which script will run when trigger occurs.

Drive Script Number	4	5	6	7	8	Input Trigger 3	Script Commands	Send All
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Rising	"opmode 2~	<input type="button" value="Send"/>
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Falling	"opmode 4~	<input type="button" value="Send"/>
2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Rising	"opmode 8~	<input type="button" value="Send"/>
3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Falling		<input type="button" value="Send"/>
21	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Falling		<input type="button" value="Send"/>
								<input type="button" value="Send"/>

Figure 14-3. Flexi SUITE – Digital I/Os Screen – Drive Scripts

The Drive Scripts panel opens with only one row displayed. Once data is entered in the last row, a new row is added to the table.

<p>Drive Script Number</p>	<p>The Script ID number is generated by the system according to the states defined for the physical inputs associated with the logical bits.</p> <p>For example (refer to Figure 14-2 and Figure 14-3): when input 3 (script trigger) changes status from 0 to 1 (rises), AND input 4 is on and inputs 5, 6, 7 and 8 are off, the drive will switch to serial current mode (OPMODE 2).</p> <p>Similarly, when the bit inputs remain as defined, but input 3 changes status from 1 to 0 (falls), the drive will switch to position gear mode (OPMODE 4).</p> <p>Script ID "1" is generated by the binary value of the bits. In this example, input 4 represents bit 0, which is on and thus has a value of 1 ($2^0=1$).</p> <p>Script ID "21" is generated by the binary value of bit 0 (input 4), bit 2 (input 6) and bit 4 (input 8); in other words: $2^0+2^2+2^4 = 1+4+16=21$</p>
<p>[Bit Input state]</p>	<p>The color of the cell represents the state of the physical input/logical bit (IN).</p> <ul style="list-style-type: none"> ■ Red cell: input must be off for script to run. ■ Green cell: input must be on for script to run. ■ White cell: the input is not defined as a Script ID bit. ■ Blue cell is simply the currently selected cell. <p>Click repeatedly on a Bit Input cell to toggle the states on/off/not defined.</p>
<p>Input Trigger</p>	<p>Each Script ID can have one or two associated scripts. One script is executed when the trigger signal rises (input state changes from off to on); the other is executed when the trigger signals falls (input state changes from on to off). Thus, up to 64 drive scripts can be defined and executed.</p> <p>Only one drive script is triggered and executed at a time. A drive script is executed when both of the following conditions exist:</p> <ul style="list-style-type: none"> ■ The inputs associated with the bits are either on or off, as defined for the specific script. ■ The trigger signal rises or falls, as defined for the specific script.
<p>Script Command</p>	<p>Double-click in the Script Commands cell.</p> <p>A Drive Script dialog box opens.</p>  <p>Enter a command or a set of commands.</p> <p>Use Ctrl+Enter to write to the table and close the dialog box.</p>

Send All	Sends all scripts currently displayed on the screen to the drive.
Delete All	Deletes all scripts from the drive.
Clear Screen	Clears all drive scripts from the screen.
Load Script	Loads all scripts from the drive to the screen.

Creating Drive Scripts – Example

1. In the **Digital I/O** screen select the **Digital I/O** tab.
2. Define the inputs to be used for the drive script functionality:
 - Input 2 as the trigger
 - Input 3 as bit 0
 - Input 4 as bit 1

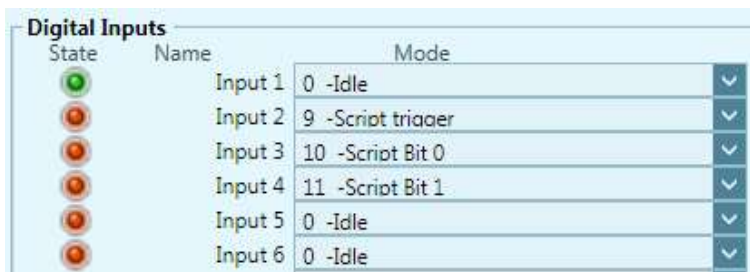


Figure 14-4. Flexi SUITE – Drive Scripts Example (1)

3. In the the **Digital I/O** screen select the **Drive Script** tab.

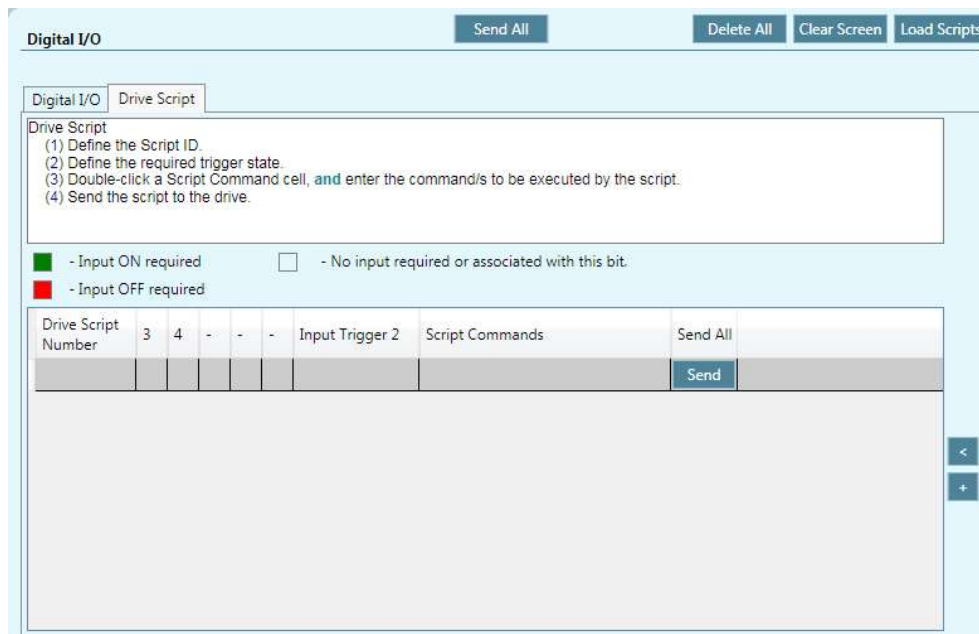


Figure 14-5. Flexi SUITE – Drive Scripts Example (2)

The **Drive Script Number** (Script ID) is defined by the state of the physical inputs associated with the logical bits.

Since you defined two inputs as bit 0 and bit 1, four scripts are possible:

Bit 0	Bit 1	
0	0	$0 + 0 = 0$
1	0	$2^0 + 0 = 1$
0	1	$0 + 2^1 = 2$
1	1	$2^0 + 2^1 = 3$

- In the first row of the table, click in the Drive Script Number cell. Enter the value **0**, and press **Enter**.

The bit values will be updated, and a new row will be displayed.

In the second row, enter **0**, and press **Enter**.

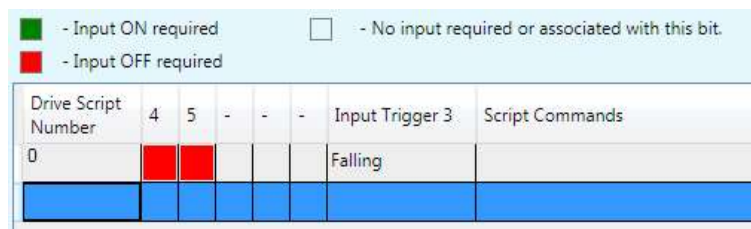


Figure 14-6. Flexi SUITE – Drive Scripts Example (3)

The **Input Trigger** defines when a specific script will be activated. The specified change in the trigger signal (rising/falling) will activate the script.

Since you defined one input as a trigger and two inputs as bit 0 and bit 1, eight possible scripts can be activated:

Script number	Trigger	
	Rising	Falling
0	Rising	Falling
1	Rising	Falling
2	Rising	Falling
3	Rising	Falling

- In the first row, double-click in the Input Trigger cell, and set the trigger to **Rising**.

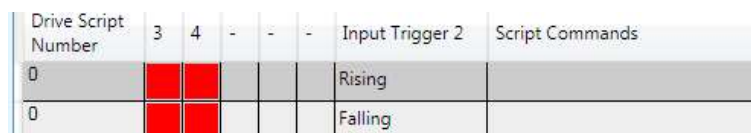


Figure 14-7. Flexi SUITE – Drive Scripts Example (4)

- In the first row, double-click in the Script Commands cell. A Drive Script window opens.

7. In the Drive Script window, enter the commands that will be executed by the script:

```
K
DELAY 100
OPMODE 0
EN
```

8. When finished, press **Ctrl+Enter**. The Drive Script windows closes.

9. Click **Send** to send the script to the drive.

Drive Script Number	3	4	-	-	-	Input Trigger 2	Script Commands	Send All
0						Rising	"K ~DELAY 100 ~OPMODE 0 ~EN~	Send

Figure 14-8. Flexi SUITE – Drive Scripts Example (5)

Note: Alternately, you can define all the scripts for all bit combinations, and then click **Send All** to send all scripts to the drive.

Continue adding drive scripts for the following actions:

- Drive script **0** when trigger is **rising**: disable the drive (K), wait 100 [ms] (DELAY 100), change the operation mode to 0-serial velocity (OPMODE 0) and enable the drive (EN).
- Drive script **0** when trigger is **falling**: motor will jog in positive direction at 100 [rpm] (J 100).
- Drive script **1** when trigger is **rising**: motor will jog in negative direction at 1000 [rpm] (J -1000).
- Drive script **1** when trigger is **falling**: motor will jog in positive direction at 1000 [rpm] (J 1000).
- Drive script **3** when trigger is **falling**: motor will stop (STOP), drive will remain enabled.

<input checked="" type="checkbox"/> - Input ON required <input type="checkbox"/> - No input required or associated with this bit <input checked="" type="checkbox"/> - Input OFF required		Drive Script Number	4	5	-	-	-	Input Trigger 3	Script Commands	Send All
0							Falling	"K ~DELAY 100 ~OPMODE 0 ~EN~	Send	
0							Falling	"J 100~	Send	
1							Rising	"J -1000~	Send	
1							Falling	"J 1000~	Send	
3							Falling	"STOP~	Send	
									Send	

Figure 14-9. Flexi SUITE – Drive Scripts Example (6)

15 Digital Outputs

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

State	A graphic element that toggles between green and red to reflect the on or off state of the actual output.	OUT OUTPUTS
Name	Identifies the specific output.	
Mode	<p>Defines the condition that will activate a specified digital output.</p> <ul style="list-style-type: none"> 0 -Idle 1 -Active 2 -Brake Release Signal 3 -Alarm Any Fault 4 -In-Position 5 -Stopped 6 -Foldback 7 -Current Level 8 -Current Range 9 -Velocity Level 10 -Velocity Range 11 -Position Level 12 -Position Range 13 -Battery Low V Fault 14 -Warning On 15 -Faults or Disabled 16 -Battery Low V Warning or Fault 17 -Phase Find Succeeded 18 -Over-Current Fault 19 -Over-Voltage Fault 20 -Under-Voltage Fault 21 -Phase Find Required 22 -Alarm Excl. Phase Find Failure 23 -Homing Complete 24 -Encoder Simulation Index 25 -Zero Position After Homing 	OUTMODE
Connector	Indicates the pin number of the input on either the Controller (C) interface or the Machine (M) interface. It also indicates whether it is a fast (F) output.	

16 Analog Inputs

The **Analog Input 1** and **Input 2** panes in the **Analog I/Os** screen allows you to set the analog input properties and to monitor the input state.

Analog Input 2 appears in the **Analog I/Os** screen only when the connected drive has a second analog input. Some drives do not have a second analog input.

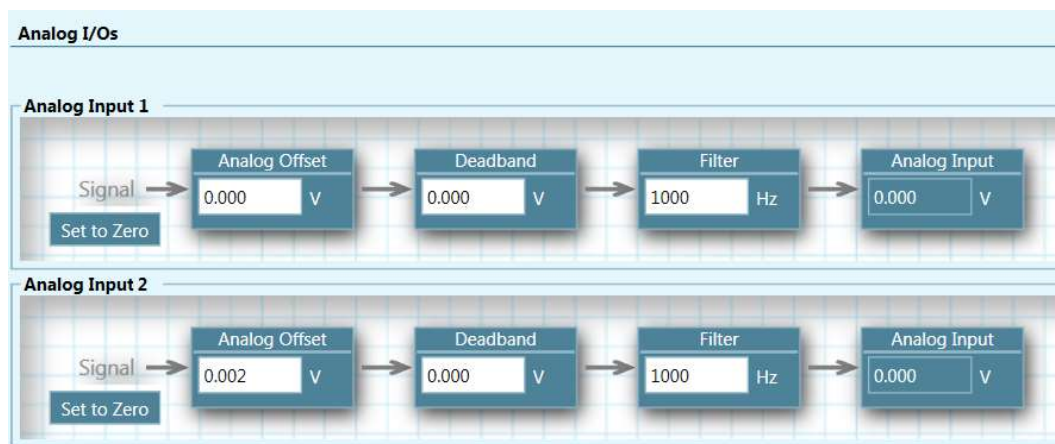


Figure 16-1. Flexi SUITE – Analog I/Os Screen

		Analog Input 1	Analog Input 2
Analog Offset	The DC voltage offset on the analog input.	ANIN1OFFSET	ANIN2OFFSET
Deadband	The deadband range of the analog input. Useful for preventing the drive from responding to voltage noise near the zero point of the analog input.	ANIN1DB	ANIN2DB
Filter	A low-pass filter applied to the analog input. Useful for filtering high frequency noise from the input, or for limiting the rate of change of that signal.	ANIN1LPFHZ	ANIN2LPFHZ
Analog Input	The voltage at the analog input. Read only.	ANIN1	ANIN2
Set to Zero	Causes the value of the analog input signal to become 0 by modifying the analog offset value.	ANIN1ZERO	ANIN2ZERO

17 Analog Output

The **Analog Output** pane in the **Analog I/Os** screen enables you to configure the analog output.

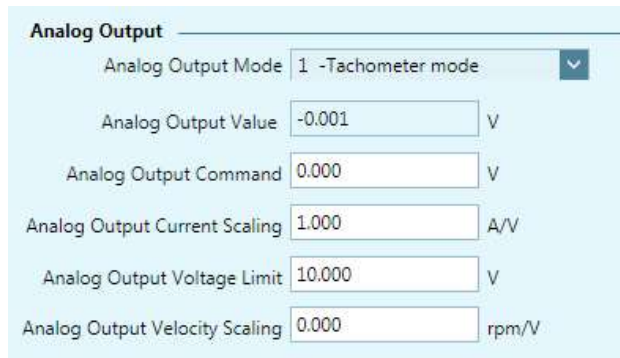


Figure 17-1. Flexi SUITE – Analog I/Os Screen – Analog Output

The drive’s analog output can be set to output a voltage equivalent to the value of certain parameters.

Analog Output Mode	Defines the function of the analog output. 0 -User command 1 -Tachometer mode 2 -Equivalent current monitoring 3 -Velocity error monitoring 4 -Current command monitoring 5 -Triangle wave at low frequency 6 -Current in-phase (IQ) monitoring 7 -Reserved (output 0) 8 -Reserved (output 0) 9 -Reserved 10 -Reserved 11 -Triangle wave (10 Hz) 12 -Rectangular wave (10 Hz) 13 -Velocity command (VCMD) 14 -Reserved	ANOUTMODE
Analog Output Value	Displays the analog output value (in volts), as set by ANOUTMODE. Read only.	ANOUT
Analog Output Command	The analog output command (in volts) set by user in ANOUTMODE 0.	ANOUTCMD
Analog Output Current Scaling	The scaling of the analog output voltage that represents the motor current (I) or the current command (ICMD).	ANOUTISCALE
Analog Output Voltage Limit	The analog output command voltage limit for all modes.	ANOUTLIM

Analog Output Velocity Scaling	The scaling of the analog output voltage that represents the actual velocity (V) or the velocity error (VE)	ANOUTVSCALE
---------------------------------------	---	-----------------------------

18 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.

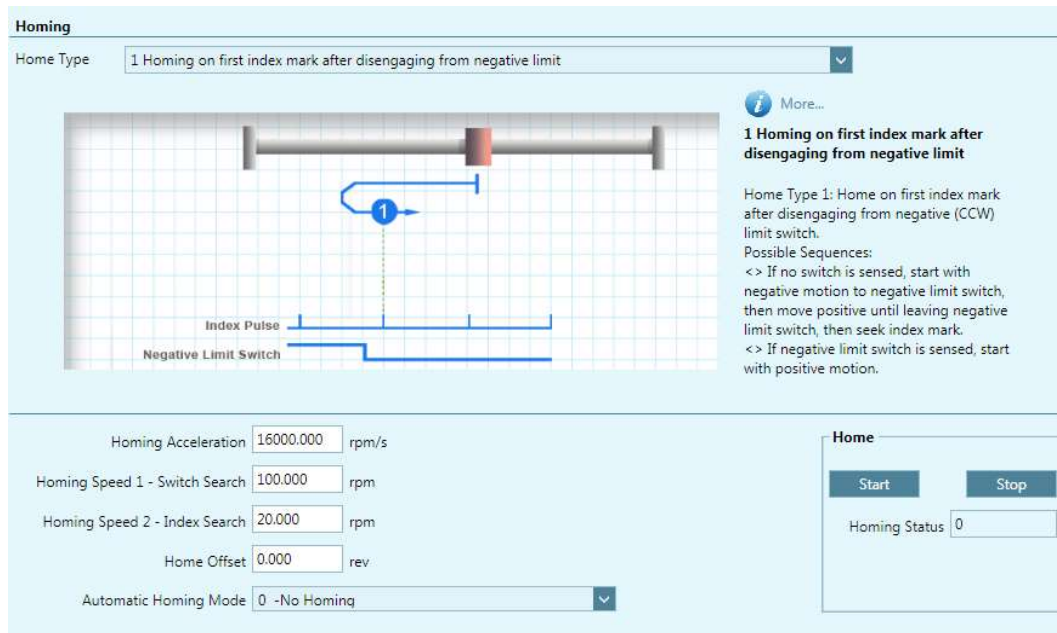


Figure 18-1. Flexi SUITE – Homing Screen

Home Type	Allows you to select any one of 35 homing methods. Homing types 1 through 14, 17 through 30, and 33 through 35 are according to CiA 402. Additional homing types have been defined per customer requests, and can be selected through VarCom HOMETYPE in the Terminal screen. Home Type defines when direction of motion is reversed during homing, the homing trigger (e.g., switch, index), and other conditions.	HOMETYPE
[graphic]	A graphic display representing the method selected for the homing process.	
[description]	A description of the selected homing method.	
Homing Acceleration	The value of acceleration and deceleration during the homing process.	HOMEACC
Homing Speed 1 – Switch Search	The initial velocity used in the homing process during the search for limit switches, home switches, and hard stops.	HOMESPEED1

Homing Speed 2 – Index Search	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 (as defined by HOMETYPE).	HOMESPEED2
Home Offset	Sets an offset, in counts, for the Home position.	HOMEOFFSET
Home	Start. Starts the homing process. Stop. Stops the homing process.	HOMECMD HOMECMD 0
Homing Status	Displays the current state of system homing. 0 = Homing idle 19 = Homing completed 20 = Homing failed <i>All other values</i> = homing in progress, or stalled	HOMESTATE
Automatic Homing Mode	The type of automatic homing to be performed at power-up. 0 = No Action. User must initiate homing manually. Default. 1 = Homing to be attempted after power up if conditions allow (that is, drive is enabled by means of a serial or hardware command, and no faults exist).	AUTOHOME

19 Disable Mode

The Disable mode function consists of two mechanisms:

- **Active Disabling** brings the motor to a stop by means of a controlled deceleration to zero velocity, and then disables the drive. Active Disable cannot be applied when the drive is operating in a current control mode (OPMODE 2 or OPMODE 3).
- **Dynamic Braking** holds the motor while the drive is disabled by applying only the motor’s back-EMF to the stopping current; it can therefore be used even in the event of feedback loss.

The **Disable Mode** screen allows you to select the methods and parameters to be used for stopping the motor when the drive becomes disabled.



Figure 19-1. Flexi SUITE – Disable Stop

Active Disable	Dynamic Braking on Fault	Dynamic Braking on Any Disable	
No	No	No	DISMODE 0
No	Yes	No	DISMODE 1
No	Yes	Yes	DISMODE 2
Yes	No	No	DISMODE 3
Yes	Yes	No	DISMODE 4
Yes	Yes	Yes	DISMODE 5

DISMODE 0 = No active disabling; no dynamic braking.

DISMODE 1 = No active disabling; dynamic braking on fault only.

DISMODE 2 = No active disabling; dynamic braking on any disable.

DISMODE 3 = Active disabling on fault*; no dynamic braking.

DISMODE 4 = Active disabling on fault*; dynamic braking on fault only.

DISMODE 5 = Active disabling on fault*; dynamic braking on any disable.

***Note:** Faults that require immediate disable (to prevent drive damage) and feedback faults that might cause a runaway motor cannot issue Active Disabling.

Active Disable Speed Threshold	The speed threshold for the Active Disable function.	DISSPEED
Active Disable Time	The time to wait after motor speed goes below the threshold (DISSPEED) until the drive is disabled by the Active Disable function.	DISTIME
Active Disable Deceleration	The deceleration speed value for the Active Disable function.	DECSTOP
Active Disable Deceleration Time	The deceleration time for the Active Disable function. This value is ignored if it exceeds the deceleration speed value.	DECSTOPTIME
Dynamic Brake Current	The maximum current allowed during the dynamic braking process.	ISTOP
Current Limit During Emergency	The current limit used during the Active Disable process. Defined as a value from 0 to 1, as a factor of the application current limit.	ILIM ESTOPI LIM

20 Enable | Faults

20.1 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.

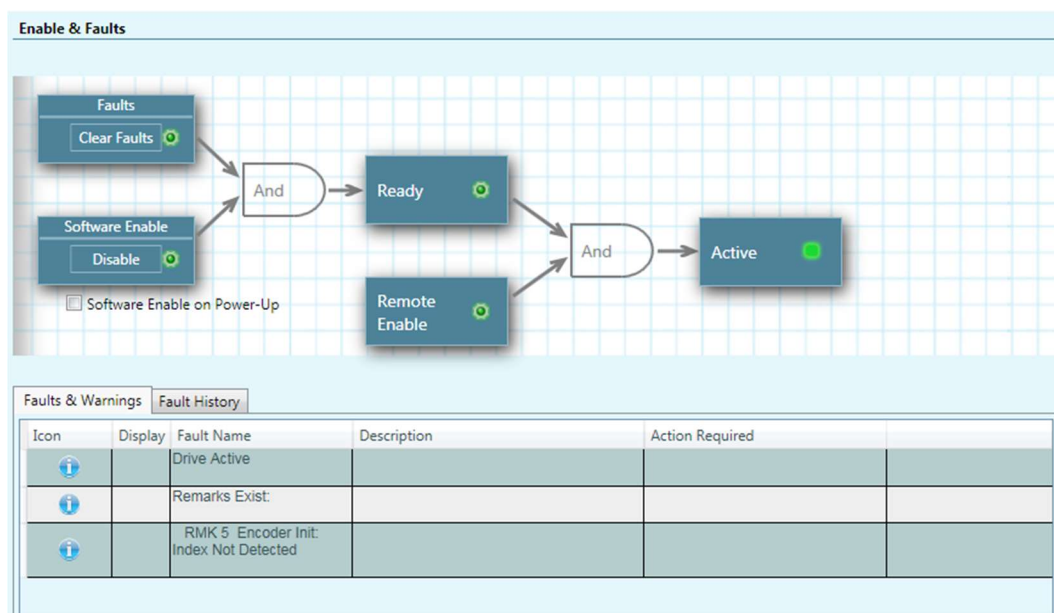


Figure 20-1. Flexi SUITE – Enable & Faults Screen

Software Enable on Power-up

This option is available only in serial command interface mode (COMMODE=0).

The Software Enable at Power-Up switch determines whether the drive powers up in a Disabled or Enabled state.

- By default, the Software Enable switch is **off** (SWENMODE=0), and the drive powers up in the Disabled state.
- If the Software Enable switch is **on** (SWENMODE=1), the drive powers up in the Enabled state, provided there are no faults and the Remote Enable signal is on.

Three conditions are required for enabling the drive:

1. No Faults.

The drive can be enabled only when no faults exist. Once all faults are cleared, the drive is ready for activation (READY).

2. Software Enable switch must be ON.

The Software Enable switch can be controlled in two ways:

- VarCom commands **EN** (Enable) and **K** (Disable) toggle the switch.
- Flexi SUITE **Enable|Disable** button toggles the switch.

By default, the drive powers up with the Software Enable switch **off** (SWENMODE=0), meaning the drive powers up in the Disabled state.

If the drive powers up with the Software Enable switch **on** (SWENMODE=1), the drive will power up in the Enabled state, provided the other two conditions are met.

3. Remote Enable switch must be ON.

Input 1 is factory-defined as a Remote Enable switch (INMODE 1 = 1).

Remote Enable is a signal in the range of 12–24 VDC that is applied to one of the opto-isolated digital inputs in the Controller I/F connector.

By default the drive powers up with the Remote Enable signal **on** (REMOTE=1) even if no input is configured for this function.

Note: The Flexi SUITE Motor Setup procedure includes an option to restore the drive's factory settings (**Restore Factory Default**). When the Factory Restore command is issued, Flexi SUITE may display a prompt to confirm or modify the Remote Enable switch setting.

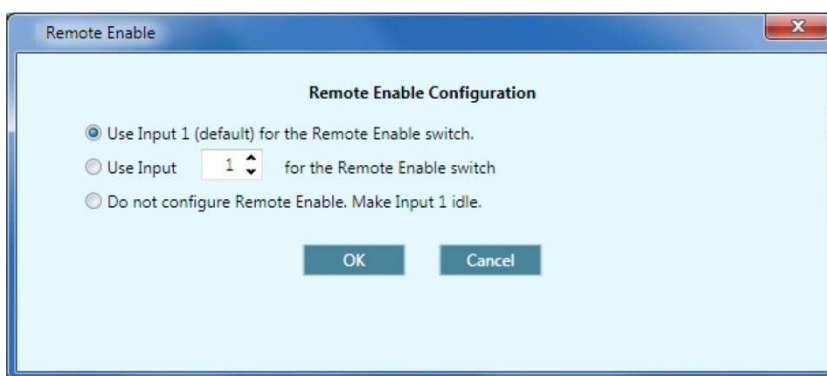


Figure 20-2. Flexi SUITE – Remote Enable Configuration

20.2 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.

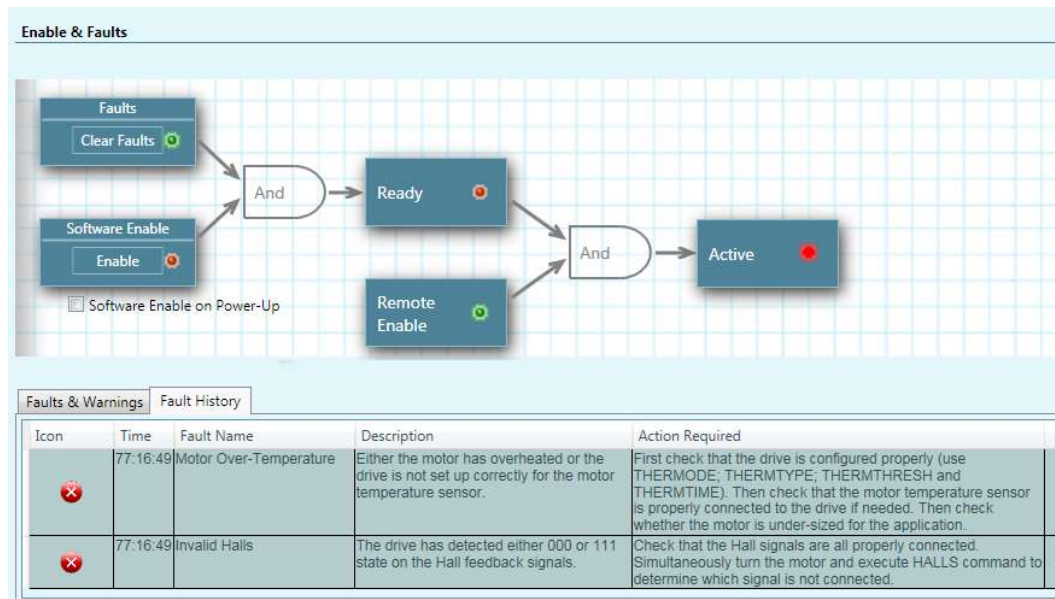


Figure 20-3. Flexi SUITE – Fault History

The Faults panel has two tabs:

- Faults & Warnings
- Faults History

Icon	A graphic image that indicates the type of fault: Warning, Fault, Fatal Fault.
Display	In Faults & Warnings tab only. A graphic replica of the code that appears on the drive's 7-segment display.
Time	In Fault History tab only. The internal runtime at which the fault occurred.
Fault Name	The system name of the fault.
Description	Describes the status or fault indicated by the code.
Action Required	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** (VarCom [ST](#)).
- Displays a list of **faults** that are preventing the drive from being enabled (VarCom [FLT](#)).

Warnings remain displayed until cleared by **Clear Faults** button or [CLEARFAULTS](#) command, 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 or [CLEARFAULTS](#) command.
- **Software Enable** button or [EN](#) command.

Once all faults are cleared, the drive is ready for activation (VarCom [READY](#)).

Fault History

The **Fault History** tab displays a list of faults that have occurred since the fault buffer was last cleared. (VarCom [FLTHIST](#))

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

21 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.

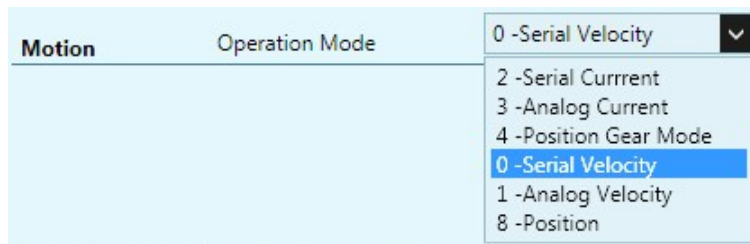


Figure 21-1. Flexi SUITE – Motion Screen – Serial Operation Modes

21.1 Serial Current Operation Mode (OPMODE 2)

In the Motion screen select Operation Mode **2 – Serial Current** to display the schematic and variables that affect the Serial Current command.

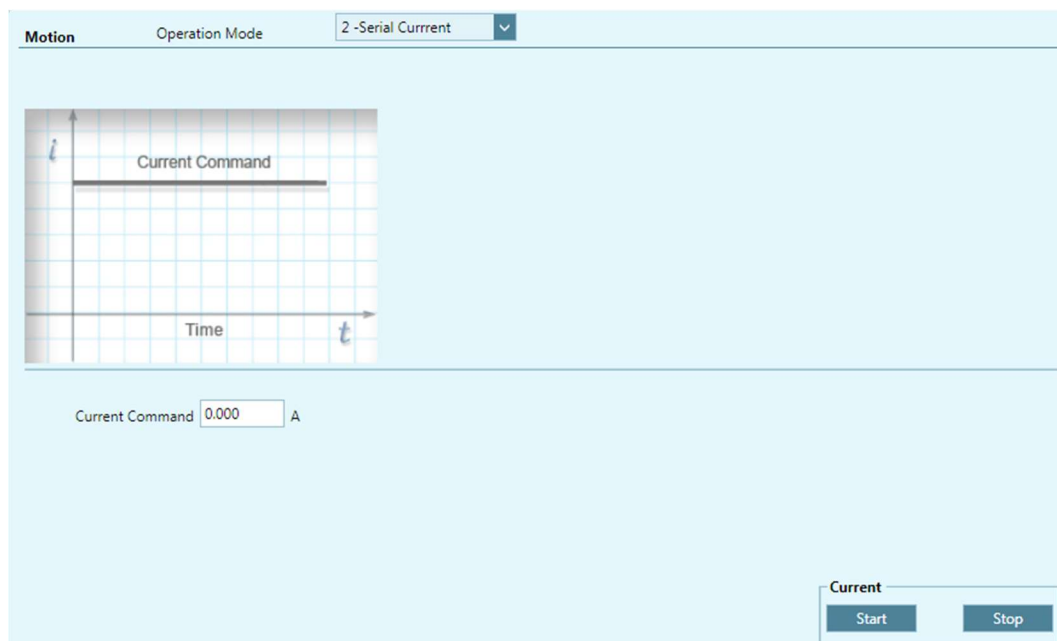


Figure 21-2. Flexi SUITE – Motion Screen – Serial Current Mode

Current Command	Sets the value of the current.	T
Start	Sends the Current command to the motor.	
Stop	Stops the Current command.	

21.2 Analog Current Operation Mode (OPMODE 3)

In the Motion screen select Operation Mode **3 – Analog Current** to display the schematic and variables that affect the Analog Current command.

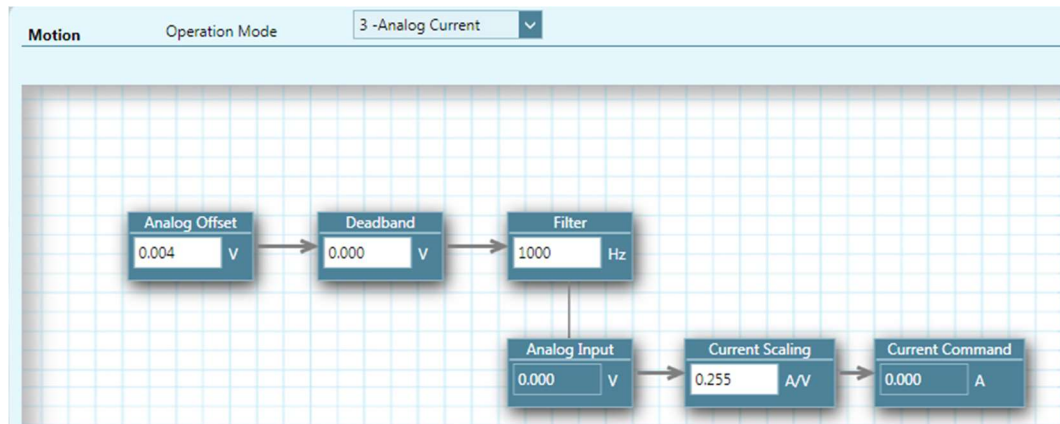


Figure 21-3. Flexi SUITE – Motion Screen – Analog Current Mode

Analog Offset	The DC voltage offset on the analog input.	ANIN1OFFSET
Deadband	The deadband range of analog input 1.	ANIN1DB
Filter	A low-pass filter applied to the analog input.	ANIN1LPFHZ
Analog Input	The voltage at the analog input. Read only.	ANIN1
Current Scaling	Current scaling affects how the motor current varies relative to any change in voltage at the analog input command.	ANIN1ISCALE
Current Command	The resulting Current command. Read only.	ICMD

21.3 Gearing Control Operation Mode (OPMODE 4)

In the Motion screen, select Operation Mode **4 – Position Gear Mode** to display the schematic and variables that affect the Gearing command.

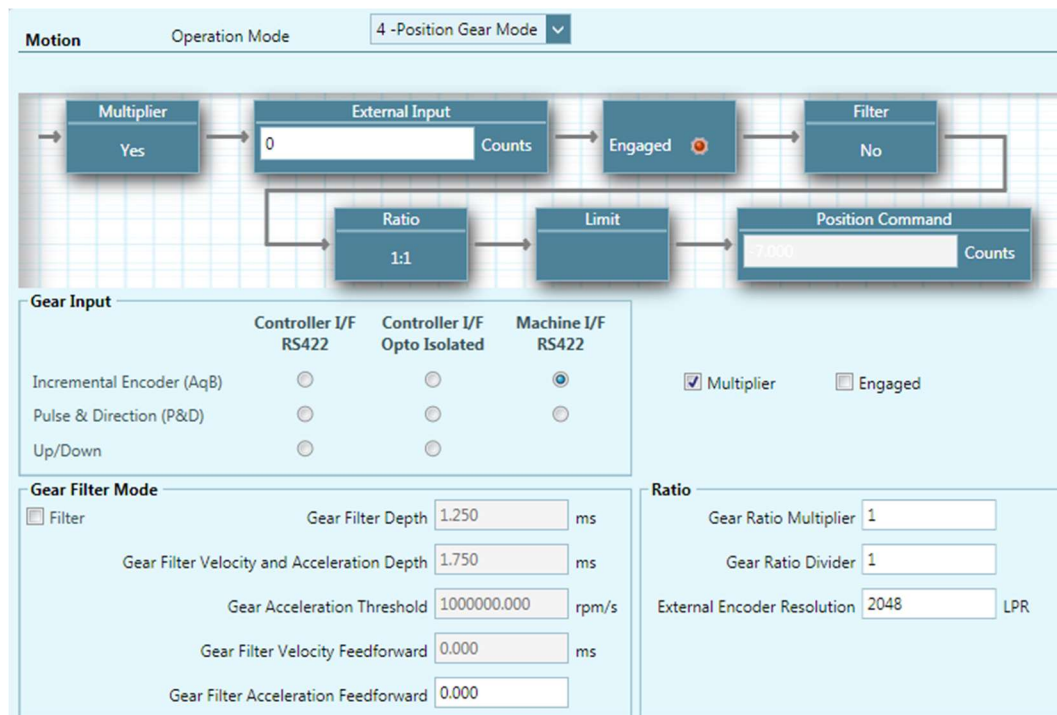


Figure 21-4. Flexi SUITE – Motion Screen – Position Gear Mode

The drive supports a number of gearing modes.

The drive user manual has detailed instructions for configuring the various modes.

Gear Input		
Incremental Encoder (AqB)	Quadrature A and B signals are received on the Controller interface.	GEARMODE 0
Pulse and Direction (P&D)	Pulse and Control signals are received on the Controller interface.	GEARMODE 1
Up/Down	Up and Down signals are received on the Controller interface.	GEARMODE 2
Encoder Follower (secondary encoder)	Quadrature A and B signals are received on the Machine interface.	GEARMODE 3
Pulse and Direction (secondary encoder)	Pulse and Control signals are received on the Machine interface.	GEARMODE 4
Multiplier	Internal drive function used to improve pulse and direction reading.	
Engaged	Gearing function is activated.	GEAR

Gear Filter Mode		
Filter	Option to activate the gearing filter.	GEARFILTMODE
Gear Filter Depth		GEARFILTT1
Gear Filter Vel and Acc Depth	Gear filter velocity and acceleration depth	GEARFILTT2
Gear Acceleration Threshold		GEARACCTHRESH
Gear Filter Velocity Feedforward		GEARFILTVELFF
Gear Filter Acceleration FF	Gear filter acceleration feedforward	GEARFILTAFF
Ratio		
Gear Ratio Numerator		GEARIN
Gear Ratio Divider		GEAROUT
External Encoder Resolution		XENCRES

21.4 Serial Velocity Operation Mode (OPMODE 0)

In the Motion screen, select Operation Mode **0 – Serial Velocity** to display the schematic and variables that affect the Serial Velocity command.

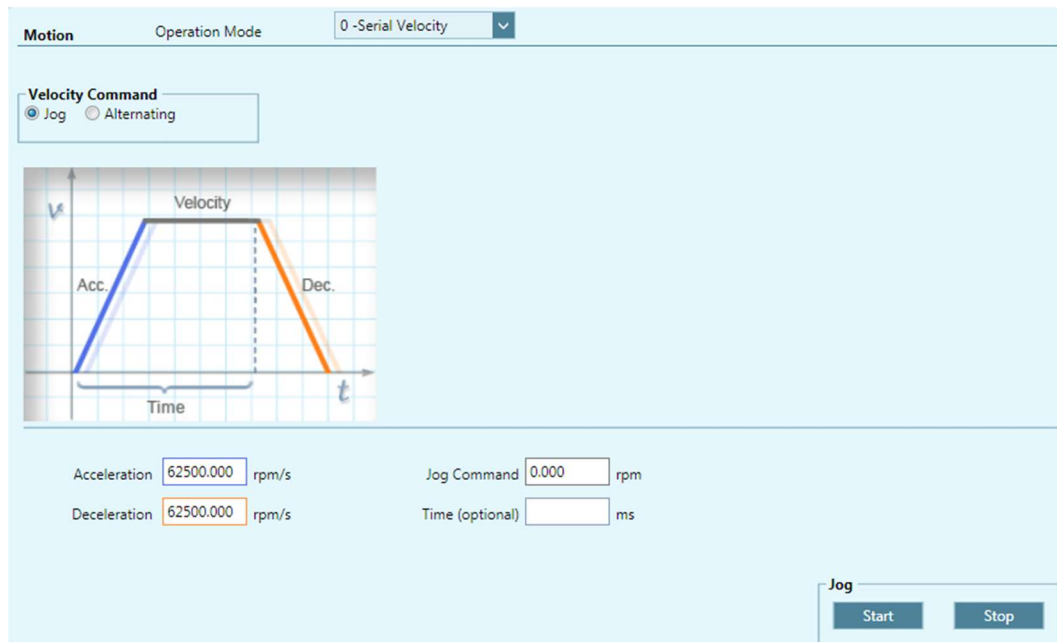


Figure 21-5. Flexi SUITE – Motion Screen – Serial Velocity Mode

Velocity Command		
Jog	Moves the motor at a constant velocity.	J

Alternating	Moves the motor at two alternating velocities by issuing two independent velocity command values, with each running for a specified time.	STEP
Motion Profile		
Acceleration	Acceleration value.	ACC
Deceleration	Deceleration value.	DEC
Jog Command	If Jog is selected, the velocity of the motion.	
Time (optional)	If Jog is selected, the duration of the motion.	
Velocity/1/2	If Alternating is selected, the command requires values for two velocity variables.	
Time/1/2	If Alternating is selected, the command requires values for two time variables.	
Start	Sends the Velocity command to the motor.	
Stop	Stops the Velocity command	

21.5 Analog Velocity Operation Mode (OPMODE 1)

In the Motion screen select Operation Mode **1. Analog Velocity** to display the schematic and variables that affect the Analog Velocity command.

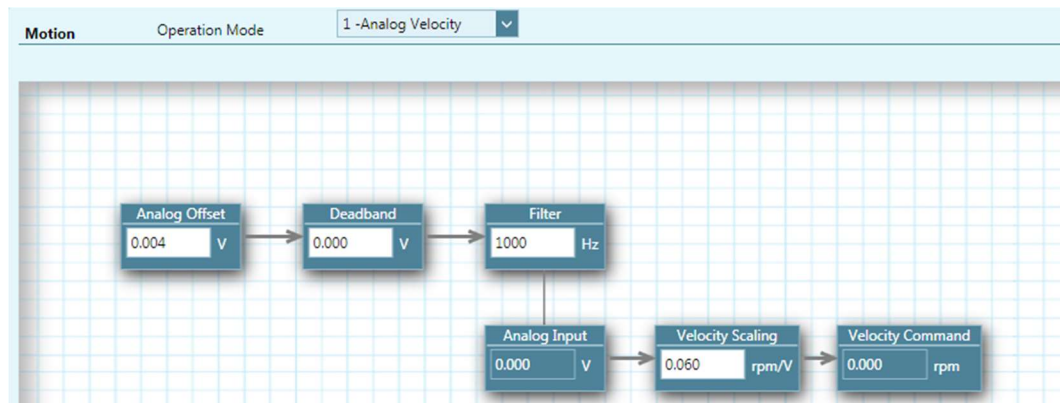


Figure 21-6. Flexi SUITE – Motion Screen – Analog Velocity Mode

Analog Offset	The DC voltage offset on the analog input.	ANIN1OFFSET
Deadband	The deadband range of analog input 1.	ANIN1DB
Filter	A low-pass filter applied to the analog input.	ANIN1LPFHZ
Analog Input	The voltage at the analog input. Read only.	ANIN1
Velocity Scaling	Velocity scaling affects how the motor speed will vary as a result of any change in voltage at the analog velocity command.	ANIN1VSCALE

Velocity Command	The resulting Velocity command.	VCMD
-------------------------	---------------------------------	------

21.6 Positioning Control Operation Mode (OPMODE 8)

In the Motion screen, select Operation Mode 8 – **Position** to display the schematic and variables that affect the Position mode motion setup.

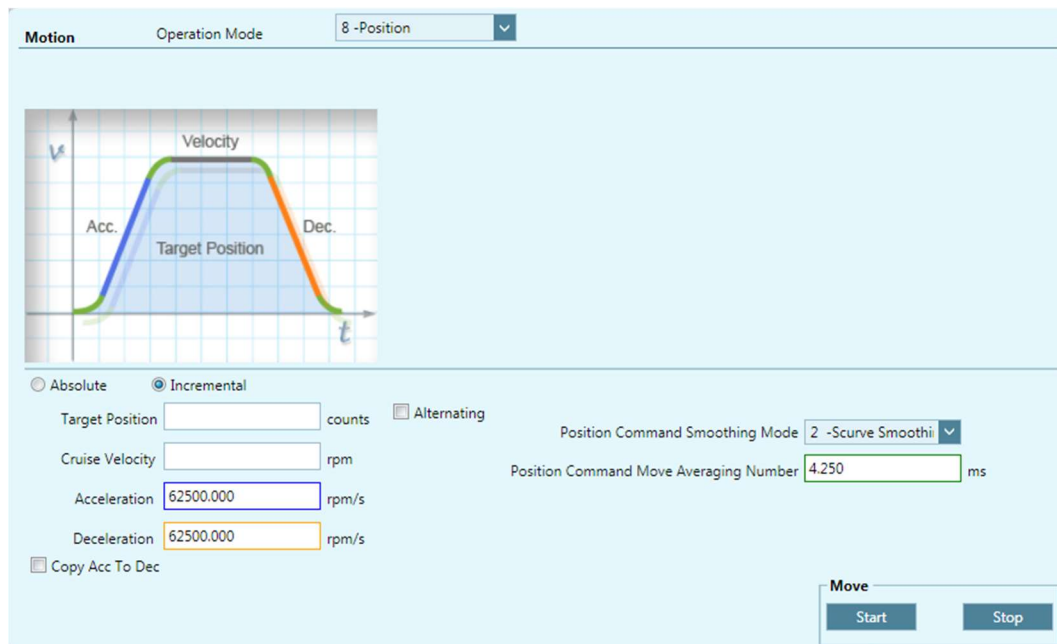


Figure 21-7. Flexi SUITE – Motion Screen – Serial Position Mode

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.	MOVEABS
Incremental	Moves the motor the specified number of counts from its current location. Executes an incremental position movement according to the acceleration/deceleration settings.	MOVEINC
Alternating	Automatically reverses the direction of motion each time Start is pressed.	
Target Position	The destination of the movement command.	
Cruise Velocity	The velocity of the movement command.	
Acceleration	Acceleration value.	ACC

Deceleration	Deceleration value.	DEC
Copy Acceleration to Deceleration	Copies the acceleration value to the deceleration value field.	
Position Command Smoothing Mode	Point-to-point move smoothing mode: 0 = No smoothing. 1 = LPF smoothing. 2 = S-curve smoothing.	MOVESMOOTHMODE
Position Command Move LoPass Filter	For (1) LPF smoothing. The low pass filter for the point-to-point move.	MOVESMOOTHLPFHZ
Position Command Avg Filter	For (2) S-Curve smoothing. The averaging number for the point-to-point move.	MOVESMOOTHAVG
Start	Sends the movement command to the motor.	
Stop	Stops the movement.	

22 Tuning – Control Loops

22.1 Position Control Loop

Two position control loop options are available for the drive -- linear and HD control.

In the **Position Loop** screen, select the controller method from the list at the top of the screen.

22.1.1 HD (Nonlinear Position) Controller

The HD (nonlinear position) control algorithm is designed to minimize position error during motion and to minimize settling time at the end of motion.

The HD controller parameters should be initially set using the Autotuning wizard. The parameters are shown in the Position Loop HD Controller screen, and can be modified as required by the application.

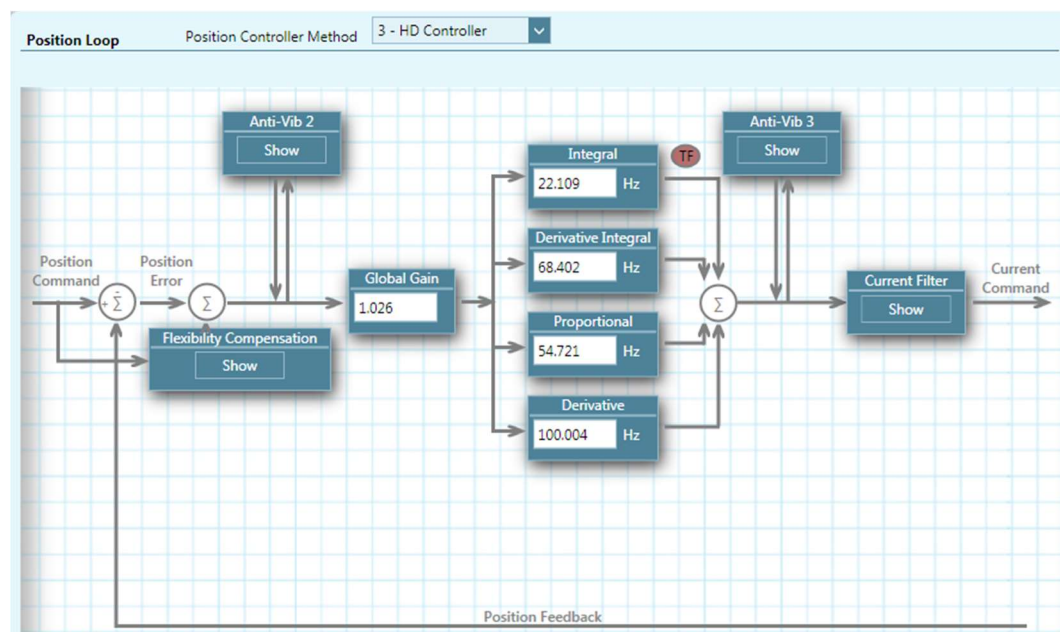


Figure 22-1. Flexi SUITE – Position Loop – HD Controller Screen

22.1.2 Linear Position Controller

The Linear Position controller is a PID controller with feedforward and an option to limit the integral saturation (anti-windup).

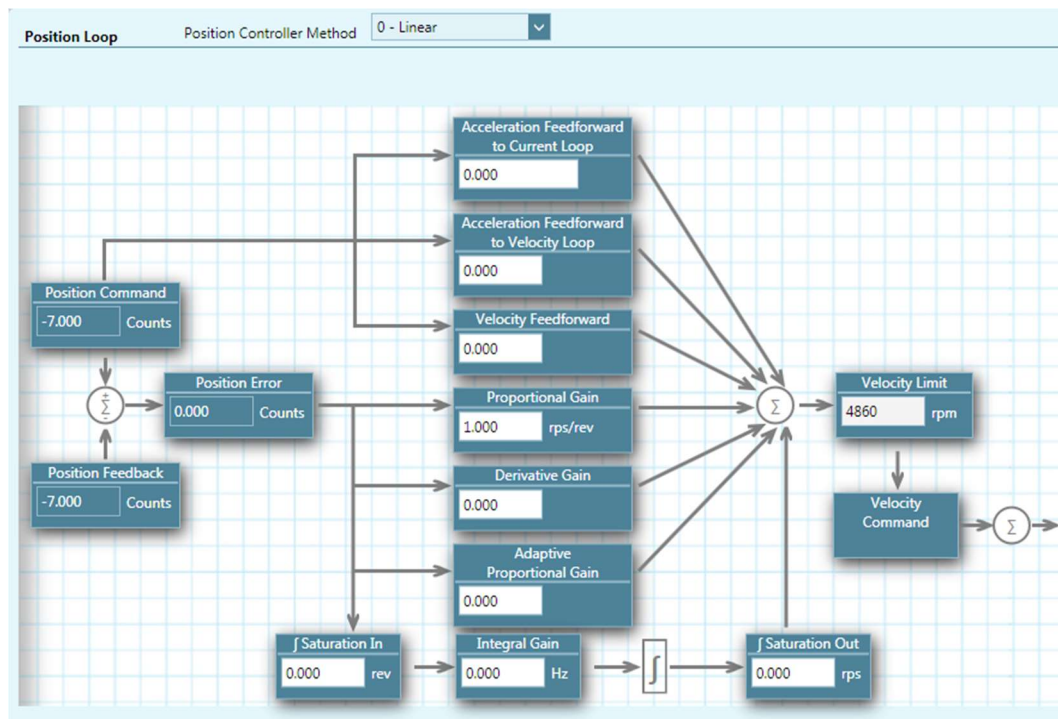


Figure 22-2. Flexi SUITE – Position Loop – Linear Screen

22.2 Velocity Control Loop

The **Velocity Loop** screen provides four options for velocity tuning.

Select the controller method from the list at the top of the screen:

- 0** – PI controller
- 1** – PDFF controller
- 2** – Standard pole placement controller
- 7** – HD velocity control with integrator (recommended)

The light blue backgrounds in some of the schematics shows the actual velocity loop. The other elements show pre- and post-processing options.

A filter can be applied to the output of the velocity loop. You can choose various options of low-pass, band-pass, high-pass, notch and user-defined filters.

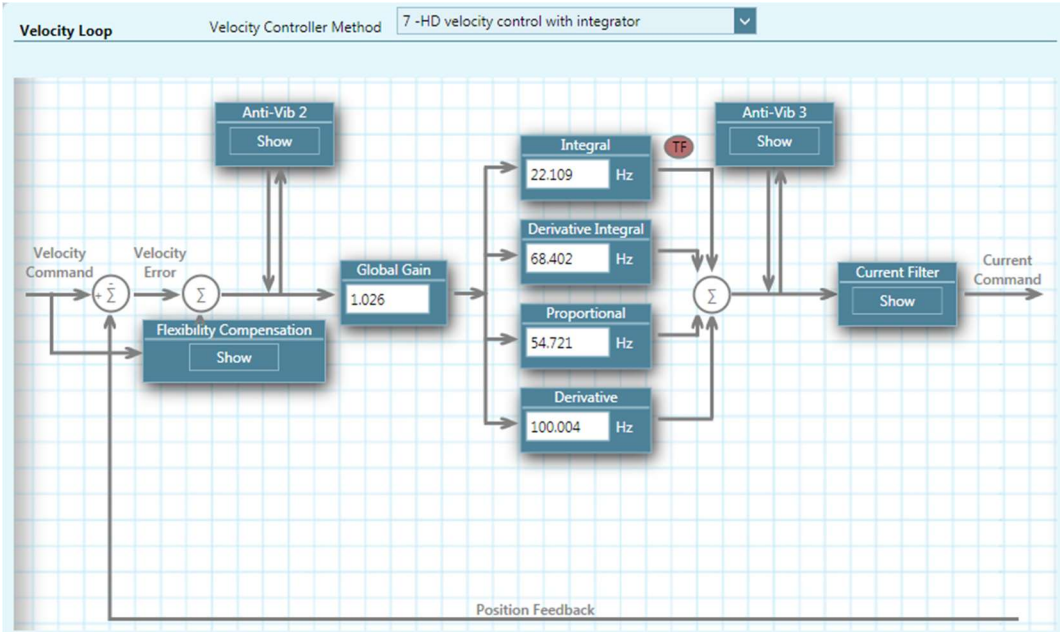


Figure 22-3. Flexi SUITE – Velocity Loop – HD velocity control with integrator

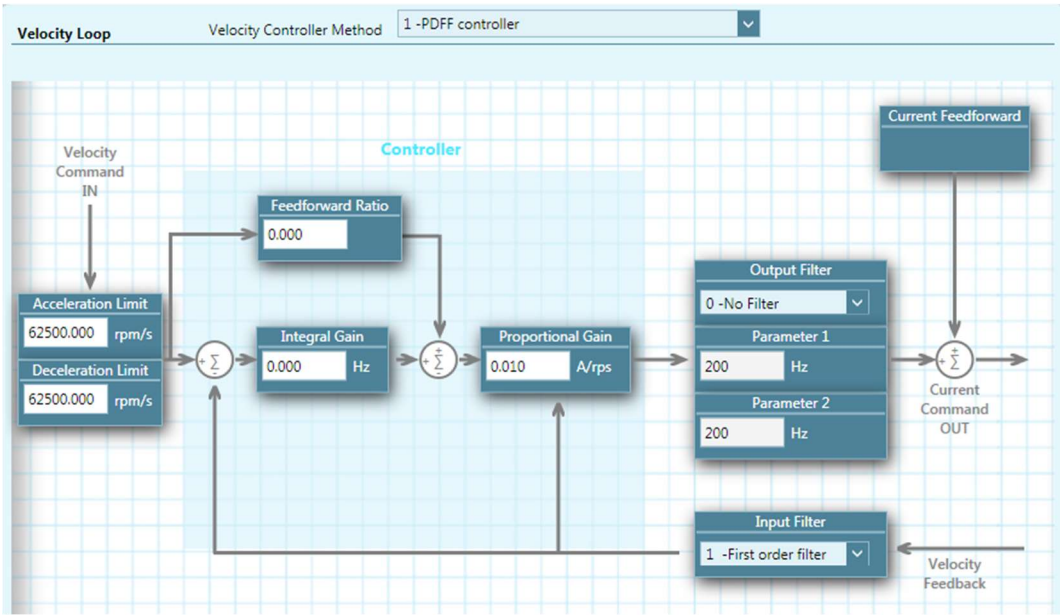


Figure 22-4. Flexi SUITE – Velocity Loop – PDFF controller

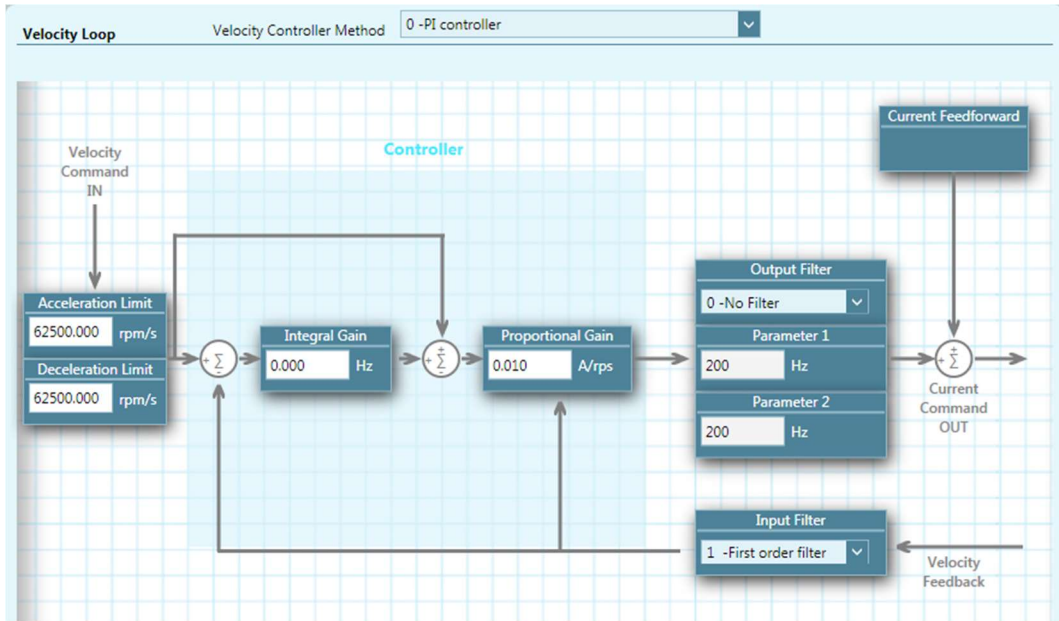


Figure 22-5. Flexi SUITE – Velocity Loop – PI controller

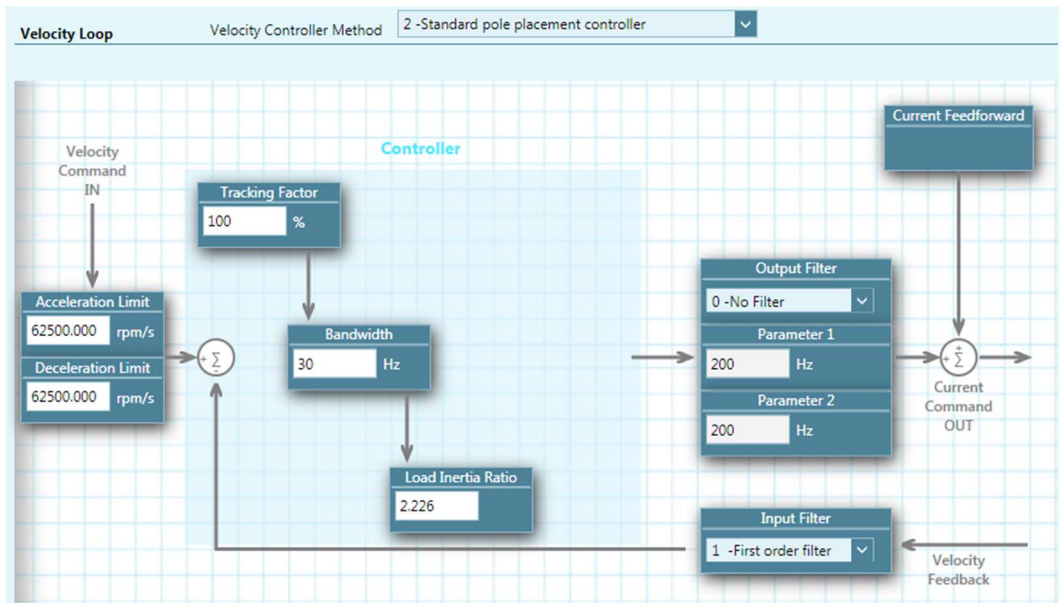


Figure 22-6. Flexi SUITE – Velocity Loop - Standard pole placement controller

22.3 Current Control Loop

Current control loop tuning is derived from the motor properties and the bus voltage. The Flexi SUITE Motor Setup wizard tunes the current control loop.

There is no need to manipulate values in the Current Loop screen, unless instructed to do so by Technical Support.

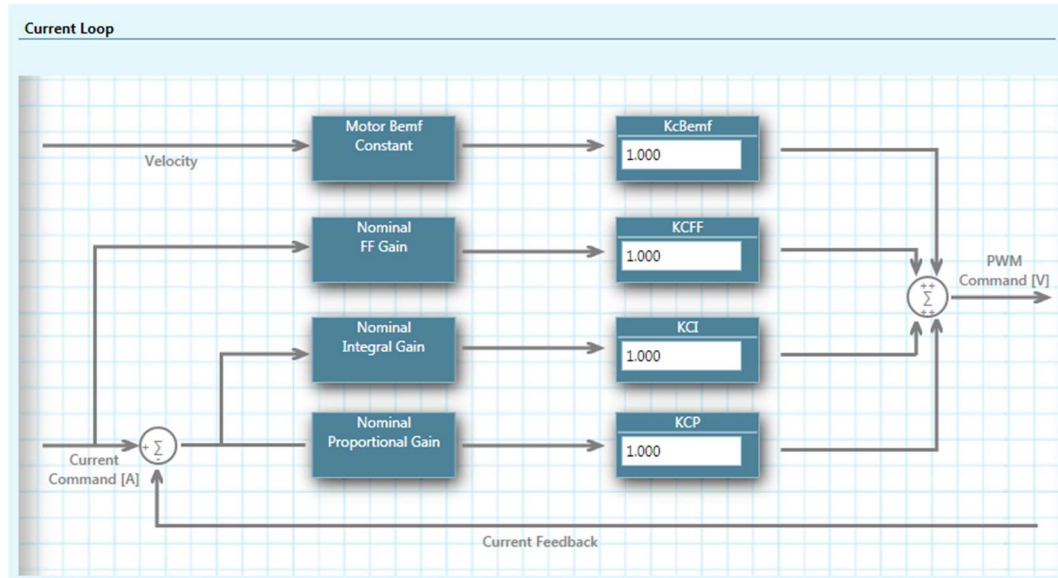


Figure 22-7. Flexi SUITE – Current Loop Screen

23 Terminal Dashboard

The **Terminal** screen allows you to send VarCom instructions to the drive, and read the drive's responses.

It also includes a **Watch** panel that allows experienced users to monitor parameters.

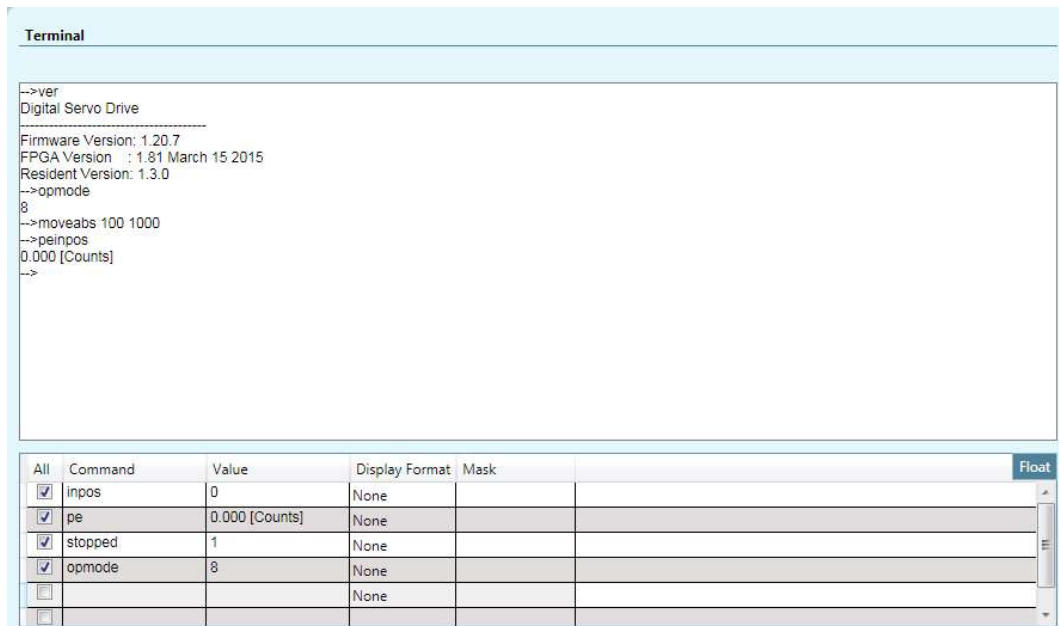


Figure 23-1. Flexi SUITE – Terminal Dashboard

23.1 Terminal

Right-click anywhere in the Terminal panel to access additional functions:

Copy/Paste	Standard Windows editing functions: Ctrl+C , Ctrl+V
Undo	Ctrl+Z . Opens a dialog box showing all parameters whose values you manually changed in current working session, and allows you to reapply a previously used setting. See Help .
Clear Terminal	Deletes the contents of the Terminal.
Clear History	Deletes from memory all the commands that have been entered in the Terminal in the current working session.
Save to File	Prompts you to save the contents of the Terminal as a text file.
Font Size	Defines the size of the text displayed in the Terminal screen or panel.
Find	Standard Windows search function: <Ctrl+F>)
IntelliSense	Enable/disables autocompletion (IntelliSense) function.
Copy History to Script	In Expert screen. Copies the entire list of commands in the Terminal history to the currently active script.

23.2 Watch Variables

The **Watch** panel is used to monitor drive variables. The rate at which variables are updated is dependent on the load on the serial communications link and on the Refresh Rate of Data From Drive setting in the Preferences screen.

All	Select or clear an individual checkbox to start or stop monitoring a specific variable. Click the header All to select or clear all variables listed.
Command	Use this field to enter the name of the drive variable whose value you want to monitor. Click the header Command to sort the list alphabetically. Once alphabetized, click the header to reverse ascending/descending order.
Value	The value of the watched variable is displayed in this field.
Display Format	Select the format that is used for displaying the value: default, Binary Decimal or Hexadecimal.
Mask	Use this field to enter a value that will be logically ANDed with the parameter value.

24 Scope Dashboard

Flexi SUITE 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, Flexi SUITE enables continuous data recording or a one-time recording. Flexi SUITE also allows execution of a motion command during recording. This is useful, and even necessary, as a tuning tool.

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

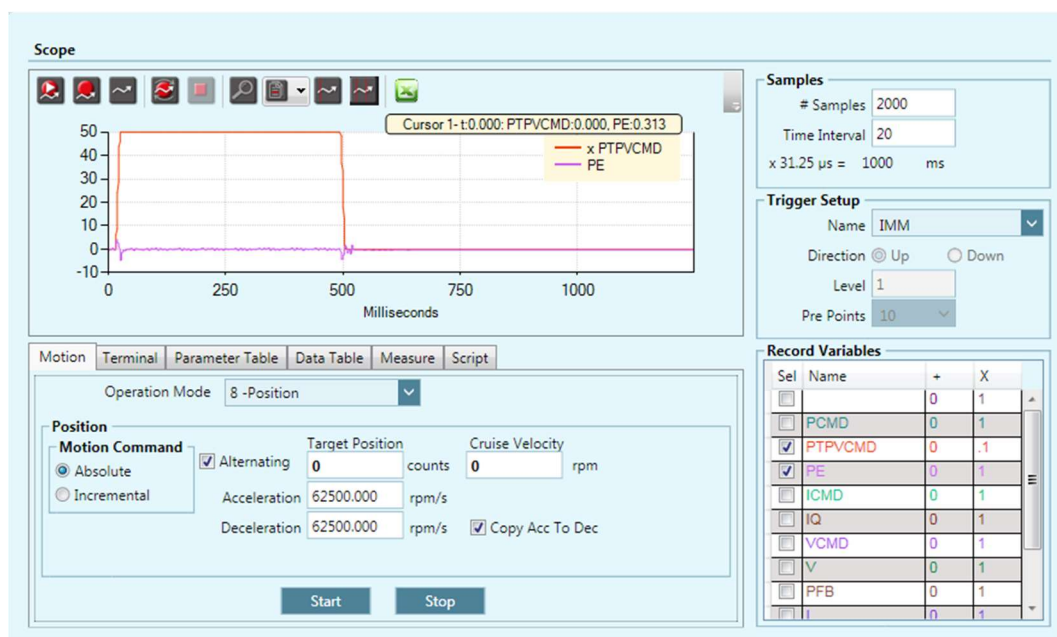


Figure 24-1. Flexi SUITE – Scope Dashboard

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, or via the **Terminal** tab.
- Program and run scripts using the **Script** panel.

24.1 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

# Samples	<p>The total number of points to be recorded.</p> <p>Up to 2000 data points for up to six 32-bit (non-position) variables, or three 64-bit (position) variables, can be recorded simultaneously.</p> <p>Continuously reads and records data from the drive, and displays on screen. Does not have a trigger. Does not have a defined number of sampling points.</p>
Time Interval	<p>The rate at which data is recorded. The interval value is specified in multiples of the drive's basic sampling rate, which is 31.25 μs. For example, an interval of 5 means data is recorded once every 5 samples, that is, every 156.25 μs ($5 \times 31.25 = 156.25$).</p>











Record Variables

Name	<p>Name of a variable that can be recorded. (VarCom RECLIST)</p> <p>To add a variable to the list, type the name of the variable in the blank cell in the first row, and press Enter.</p> <p>To define the variables that will actually be recorded, select or clear the checkboxes.</p> <p>Up to six 32-bit (non-position) variables, or three 64-bit (position) variables, can be recorded simultaneously.</p>
+	<p>Offset. 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.</p> <p>Whenever an offset is in effect, a plus sign + is displayed next to the variable name in the legend.</p>
X	<p>Multiply. Enlarges a trace that may be too small to view properly because the chart is scaled to the largest value of another variable.</p> <p>Whenever an enlarged trace is in effect, an asterisk * is displayed next to the variable name in the legend.</p>

Trigger Setup

Name	<p>Name of a variable that will trigger the recording. (VarCom RECTRIGLIST)</p> <p>The following variables can also trigger the recording:</p> <p>IMM. Starts the recording immediately</p> <p>CMD. Starts the recording as soon as the next command is sent to the drive</p>
Direction	<p>Defines whether the trigger occurs when value of the variable goes above the threshold (Up) or below the threshold (Down).</p>
Level	<p>The threshold value for the trigger.</p>
Pre-Points	<p>The number of points to be recorded prior to the trigger point.</p>

24.2 Scope Toolbar

	Move Record and Plot	Executes the command defined in the Motion screen, triggers (and stops) the recording, plots the response and stops the motion.
	Record and Plot	Triggers the recording and plots the response. Does not start or stop the drive.
	Plot	Reads the data last recorded (in the drive), and displays a trace on screen.
	Continuous Record and Plot	Continuously records and displays a trace of the currently defined record data. Does not have a trigger. Does not have a defined number of sampling points. The number of data points and variables that can be recorded depends on several factors.
	Stop Recording	Stops a recording. Aborts the command.
	Toggle Cursor to Zoom	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.
	Toggle Zoom to Cursor	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 Measure tab to view additional variable values at the point marked by the cursor.
	Select Cursor	Displays a second cursor line. Click on the graph to position the second cursor.
	View in Excel	Copies recorded data to a temporary CSV file and opens Microsoft Excel to display it.
	Chart Options	Refer to Chart Options .

24.3 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.

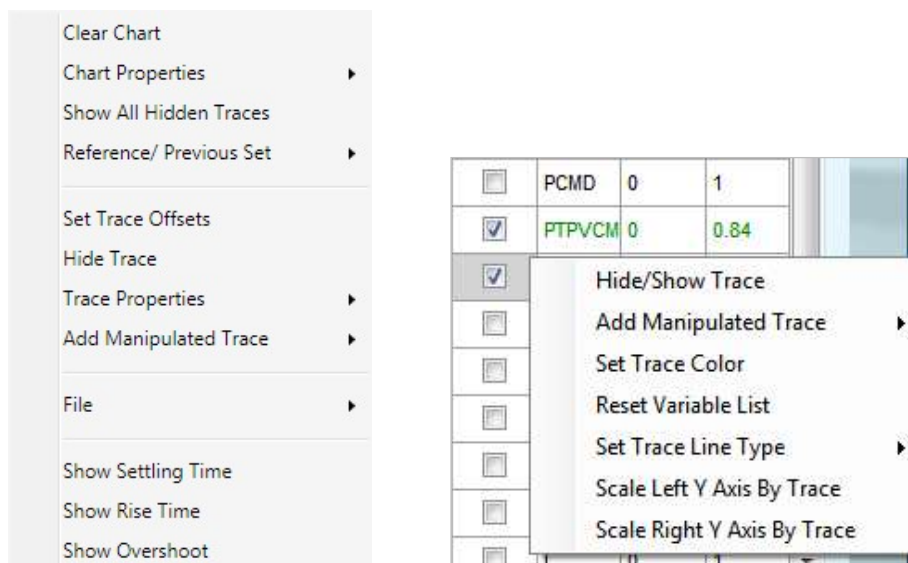


Figure 24-2. Flexi SUITE – Chart Options menu / Trace Options menu

Clear Chart

Clears the displayed chart.

Chart Properties

Set Background Color	Opens the Colors dialog box, and allows you to modify the background color of the chart.
Grid	Toggles the grid display on and off. Also allows you to modify the grid: X Axis. Toggles the X-axis grid line on/off. Y Axis. Toggles the Y-axis grid line on/off. Dot Line. Uses either dotted lines or solid lines for the grid.
Show Legend	Toggles the legend display on and off.
Legend Position	Top right or bottom left
Freeze Scale	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 F is displayed next to the Chart Options button on the toolbar. When Scale is frozen, the letter O is also displayed if part of the trace is out of view.
Reset All Trace Offsets	Resets the value of all offset (+) values in the Record Variables list to 1. Whenever an offset is in effect, a plus sign + is displayed next to the variable name in the legend.

Grid Color by Trace	If two grids are used (right and left axis), different colors can be defined to improve the readability of the chart.
Hide Right Y Scale	Hides the Y-axis scale on the right side of the chart, if displayed.
Copy Image to Clipboard	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

Show Reference Set	Displays the trace previously saved as a reference.
Show Previous Set	Displays the previously displayed trace in addition to the currently displayed trace.
Save as Reference Set	Saves the trace currently displayed on screen as a reference.
Keep Previous as Background	Displays the previously recorded trace as a background.
Keep Reference as Background	Keeps the reference trace displayed on screen as a background.
Shift Set Position	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.

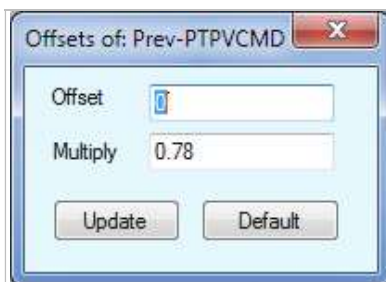


Figure 24-3. Set Trace Offsets Dialog Box

Hide Trace

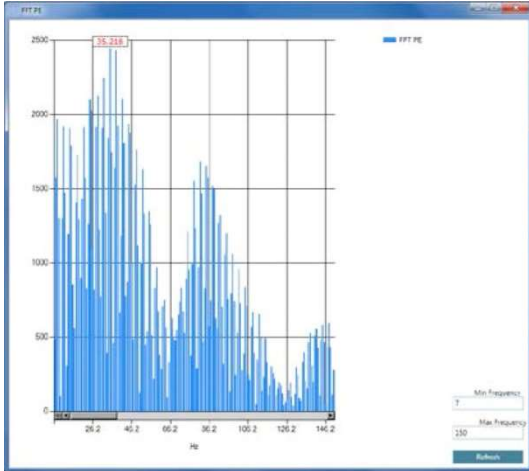
Right-click on a specific trace, and select **Hide Trace** to hide just one trace.

Trace Properties

Set Trace Color	In Chart Options/Trace Options. Allows you to define the color of the trace.
Set Trace Line Type	In Chart Options/Trace Options. Allows you to define how the trace line is displayed: Line , Spline or Points .
Scale Left Y-Axis by Trace	In Chart Options/Trace Options. Displays a Y-axis on the left side of the chart, scaled to the values of the selected variable.
Scale Right Y-Axis by Trace	In Chart Options/Trace Options. Displays a Y-axis on the right side of the chart, scaled to the values of the selected variable.
Scale All	In Chart Options only. Adjusts and displays all traces on a scale of 0—100%, for better viewing.
As Percentage of MICONT	In Chart Options/Trace Options. Displays current as a percentage of motor continuous current, rather than amperage.

Add Manipulated Trace

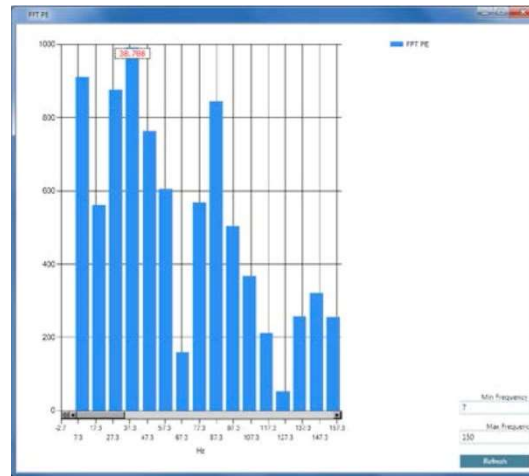
These options define how a fast Fourier transform (FFT) algorithm is performed on the selected trace.

Add Derivative Trace	In Chart Options/Trace Options. Calculates and displays the derivative of the function.
FFT Trace	In Chart Options/Trace Options. The FFT is performed on the selected trace, and displays a graph that represents the frequency domain. 

FFT Between Cursors

In Chart Options only.

The FFT is performed on the selected trace between the two cursors, and ignores the data outside the cursors.



File

Save As	Exports a recording to a CSV file, so that it can be viewed and analyzed in Microsoft Excel.
Load From	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 (e.g., PTPVCMD) to the time at which the output has entered and remained within a specified error window (e.g., PE less than a specified value).

Settling time is indicated by two vertical red lines in the chart.

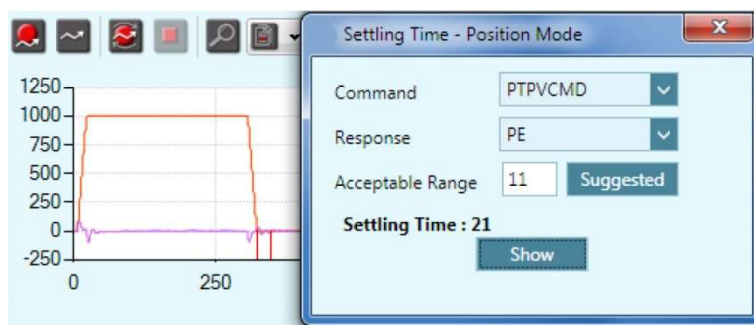


Figure 24-4. Show Settling Time

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 (e.g., PTPVCMD as input, and V as OUTPUT).

Rise time is indicated by two vertical black lines in the chart.

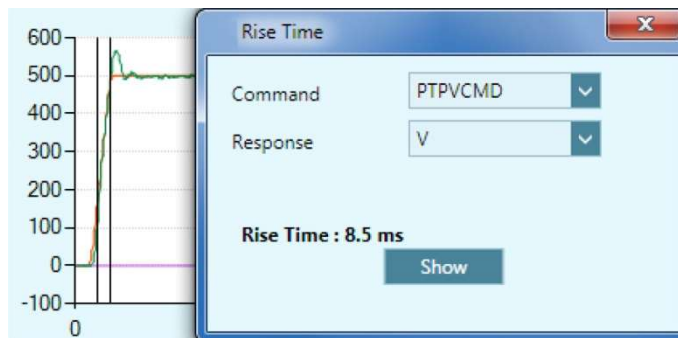


Figure 24-5. Show Rise Time

Show Overshoot

Overshoot is when a signal exceeds its target, as for example, the maximum value of V when it exceeds PTPVCMD.

Rise time is indicated by a single vertical black line in the chart.

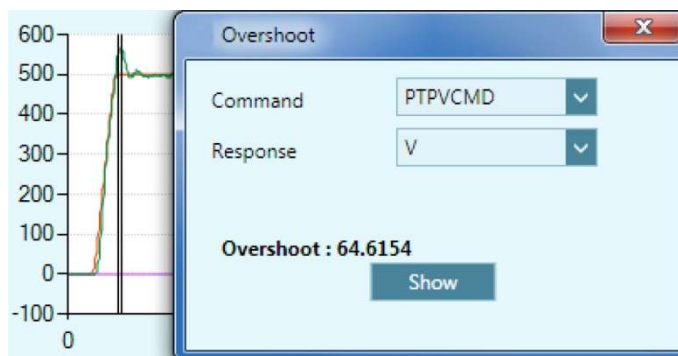


Figure 24-6. Show Overshoot

24.4 Scope Tabs/Panels

Motion	Change operation mode and initiate motion using the Motion panel. Refer to Motion – Operating Modes .
Terminal	Send commands to the drive. Refer to Terminal Dashboard .
Parameter Table	View and manipulate parameter values. Refer to Parameter Tables .
Data Table	A tabular view of the data generated by the recording. Refer to Data Table
Measure	View measurements from the plot of a recording. Refer to Measurements .
Script	Program and run scripts. Refer to Software Scripts .

Data Table

A tabular view of the data generated by the recording.

Motion	Terminal	Parameter Table	Data Table	Measure	Script
#	Time(ms)	PTVCMD	PE	V	
24	24	-499.844	-0.002	-546.594	
25	25	-500	-0.001	-562.418	
26	26	-500	0	-563.956	
27	27	-500	0.001	-558.901	
28	28	-500	0.002	-545.934	
29	29	-500	0.003	-531.868	
30	30	-500	0.003	-517.143	
31	31	-500	0.003	-498.022	
32	32	-500	0.003	-489.451	
33	33	-500	0.003	-493.187	
34	34	-500	0.003	-499.121	
35	35	-500	0.003	-499.561	

Figure 24-7. Flexi SUITE – Scope Data Table

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

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 24-8. Flexi SUITE – Scope Measurement Tab

Cursor No.1	X-axis = time (in ms); value of trace at the point crossed by cursor.
Cursor No.2	X-axis = time (in ms); value of trace at the point crossed by cursor.
Cursor Difference	Time difference between the two cursors. (Cursor 2 – Cursor 1)
RMS/RMS Between Cursors	The root mean square for the entire recording; or the root mean square for the recording between the two cursors.
Average/Average Between Cursors	The average value for the entire recording; or the average value for the recording between the two cursors.
Min	Lowest recorded value in the trace.
Max	Highest recorded value in the trace.
Pk-Pk	The total span, between the highest and lowest recorded values in the trace.
STD	The standard deviation of the trace.

25 Expert Dashboard

The **Expert** dashboard allows experienced users to perform a number of tasks from one screen.

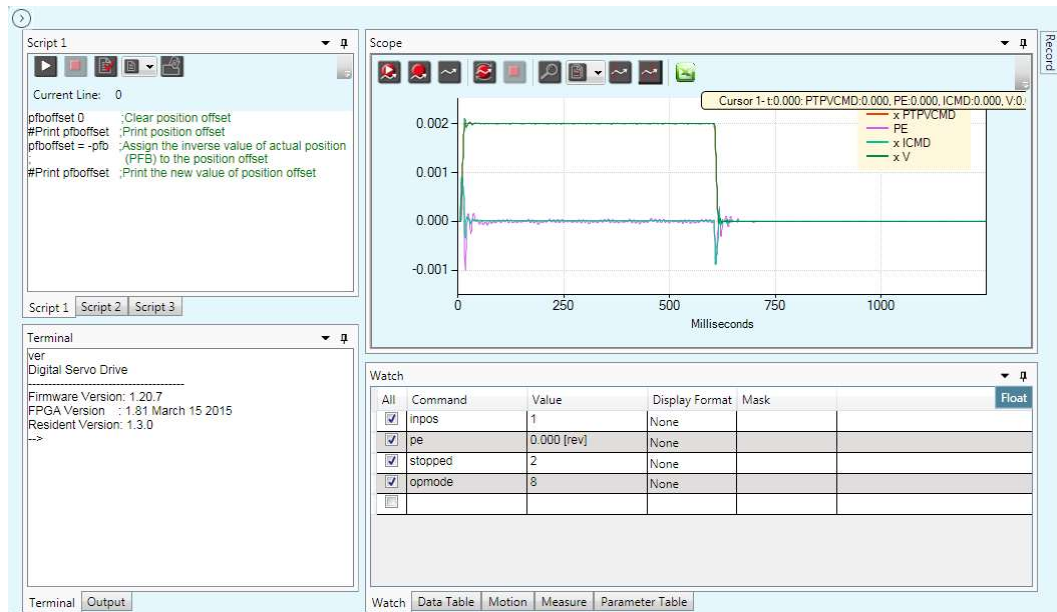


Figure 25-1. Flexi SUITE – Expert Dashboard

25.1 Expert Screen Layout

When the Expert screen is open, the menu navigation sidebar is hidden.

To navigate to another screen, use the arrow button to reopen the sidebar.

The Expert screen has dockable panels, which can be visible, hidden or floating.

	<p>Click to autohide the panel to the edge of the screen. Small tab/s remain visible.</p> <p>Hover over the tab to open the panel.</p> <p>Click the pin icon to redock the panel.</p>
--	---

To float a panel, click the top border of the panel and drag it to any location on the desktop. If a panel has been dragged to a floating position, it must be dragged back into position.

To restore the default layout of panels in Expert Studio, right-click on an outer edge of the screen, and select **Restore Layout**.

25.2 Expert Tabs/Panels

The Expert screen contains the following panels and tabs:

Script	Program and run scripts. Refer to Software Scripts .
Terminal	Send commands to the drive. Refer to Terminal Dashboard .
Output	View data generated by the #Print command in a script.
Watch	Monitor changes in variable values. Refer to Watch Variables .
Data Table	A tabular view of the data generated by the recording.
Motion	Change operation mode and initiate motion using the Motion panel. Refer to Motion – Operating Modes .
Measure	View measurements from the plot of a recording. Refer to Measurements .
Parameter Table	View and manipulate parameter values. Refer to Parameter Tables .
Scope	View the plot of a recording. Refer to Scope Dashboard .
Record	Opens the Recording Setup panel. Refer to Recording Setup .

26 Preferences

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

The Preferences screen has two tabs: Basic and Advanced.

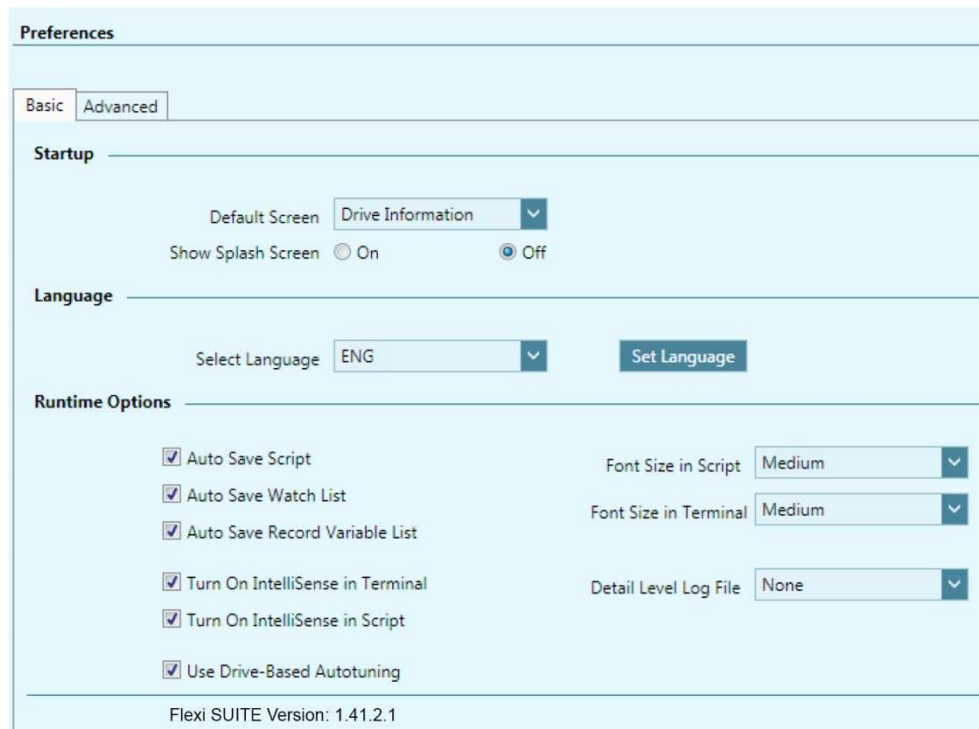


Figure 26-1. Flexi SUITE – Preferences Screen – Basic Settings

Startup	
Default Screen	The task screen that is displayed when Flexi SUITE 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 Flexi SUITE splash screen is displayed when Flexi SUITE is activated.
Language	
Select Language	Defines the interface language (options: English, Chinese Simplified/Traditional, Korean).
Set Language	Activates the interface in the selected language.
Runtime Options	
Auto Save options	For Expert users. Selected elements will be automatically saved and restored the next time Flexi SUITE is opened, even if they were not explicitly saved before closing Flexi SUITE.

IntelliSense options	Activates auto-selection and auto-complete when working in Terminal and/or Script panel. Opens and displays list of available drive commands that can be selected based on the characters entered.
Font options	Defines the size of the text displayed in the in Terminal and/or Script panel.
Detail Level Log File	Determines the type and amount of information to be included in log files.
Flexi SUITE Version	The version of the Flexi SUITE software.

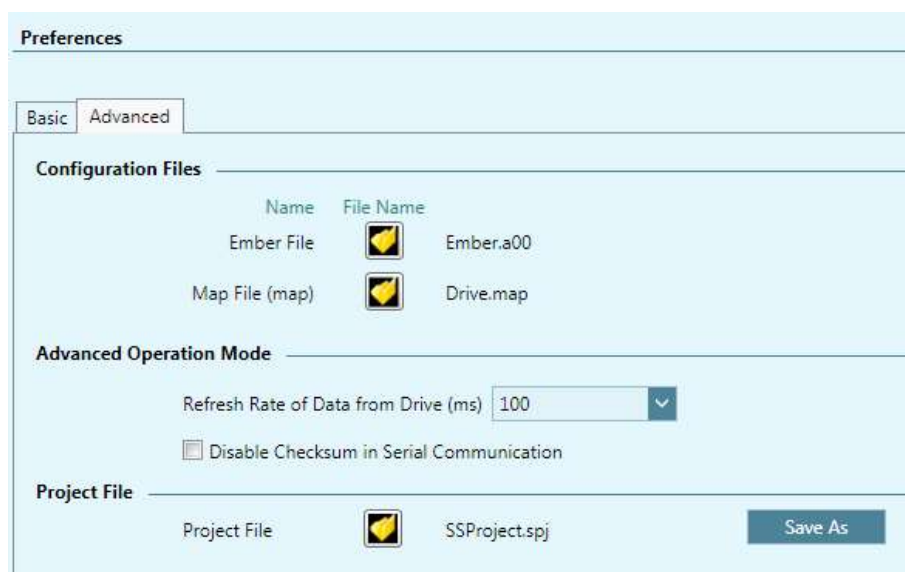


Figure 26-2. Flexi SUITE – Preferences Screen – Advanced Settings

Configuration Files	The names and locations of files used by Flexi SUITE. For Expert users only.
Advanced Operation Mode	
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.
Disable Checksum in Serial Communication	Flexi SUITE functions properly with or without CHECKSUM enabled in the drive. By default, it is enabled (recommended).
Tuning Setting File	Not in use.
Project File	A project file contains all settings currently defined in Flexi SUITE, and any autosaved data.

27 Backup & Restore

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



Figure 27-1. Flexi SUITE – Backup & Restore Screen

Backup	<p>Opens a Save as 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>
Restore	<p>Opens an Open dialog box.</p> <p>Loads parameters and values from a file on the host computer to the drive RAM.</p>
Generate Report	<p>Opens the Report Generator 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>
All Drives	<p>If Flexi SUITE 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>

28 Report Generator

The **Report Generator** is a Flexi SUITE 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.

The Report Generator option is available in two locations:

- Backup and Restore screen
- Autotuning Wizard (final step)

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

Figure 28-1. 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\FlexiSUITE\Reports\History

Send report by email	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.
-----------------------------	--

29 Software Scripts

29.1 Software Scripts Overview

Note: Software (external) scripts are not to be confused with drive (internal) scripts, which are controlled by digital inputs. Refer to *Drive Scripts*.

Flexi SUITE includes a **scripting language** for programming logical and control tasks that can run independently and simultaneously, such as:

- Sending commands to the drive.
- Reading and setting values in the drive.
- Defining variables and performing simple operations on their values.
- Issuing commands according to status or conditions.
- Controlling program flow.
- Plotting recorded data
- Saving and restoring drive parameters.

Flexi SUITE **scripts** may contain any number of commands. A command may be either a VarCom instruction or any of the script commands described in this chapter.

Scripts are executed and controlled in the Flexi SUITE **Script** panels.




Multiple scripts can be executed concurrently. Each script is executed in its own thread, so that other program functions, such as Terminal, Scope and Watch, can be simultaneously active for any number of scripts.

Script files are **saved on the host computer** as text files, which can also be edited in Notepad or any other text editor.

29.2 Software Script Panel

Each script opens in its own tab within the Script panel. Any number of scripts can be open and in use.

The Script tab includes a toolbar with a number of buttons:

	Run. Validates and then runs a script.
	Stop. Halts a running script.
	Validate. Checks the syntax of a script to make sure all script commands are valid. Highlights any errors. It does not check the validity of VarCom instructions.



Script file options can also be accessed by right-clicking anywhere in a Script tab.

File. Click the arrow to access the file options:

Open. Opens a saved script file. Also Ctrl+O

Save. Saves the script to a file. Also Ctrl+S

Save As. Saves the script under a different filename.

Dump. Retrieves all parameters from drive memory. Can be used for viewing and modifying parameter values, followed by Run to send new values to drive. Refer to VarCom [DUMP](#).

Copy. Ctrl+C

Paste. Same as Ctrl+V

Clean Script. Selects and deletes all contents of script tab.

Close Script. Closes script without saving contents.

Font Size. Gives you a choice of four sizes for displaying the script text.

IntelliSense. Toggles the autocompletion system.

Run Selection. Executes only the lines currently selected in the script.

Firmware Upgrade. Refer to the user manual.



New Script. Opens a new tab for a new script.

29.3 Software Script Syntax and Special Characters

#	Defines the start of a script command.
\$	Prefix for all variable names. A variable name begins with the character \$ followed by any combination of letters and digits.
+ - * /	Operators. add, subtract, multiply, divide.
< > == !=	Condition operators. less than, greater than, equal to, not equal to.
=	Assigns a value to a variable; for example: #Var \$Pos = 3 \$Pos = \$Pos + 1
;	Marks the beginning of a comment. Can be inserted anywhere in the line. All text after the ; until the end of the line is ignored. Comment text is displayed in green.
{ }	Brackets delineate a string of two or more arguments (tokens), which are thus sent to the drive as a single entity. The script engine can handle only 3 variables.
@	Replaces name of a variable with an address from a map file (<i>drive.map</i>)

29.4 Software Script Variables

A variable is defined by an **assignment statement**:

```
<VarName> = <Value> <Operator> <Value>
```

Where <Value> is a variable name, drive command, or decimal number.

Variable values can be the output of drive command or the result of a calculation. These values can be compared in a **condition statement**:

```
<Condition> = <Value> <Condition Operator> <Value>
```

Where <Condition> is **if** or **while**

29.5 Software Script Commands

The following commands are recognized by the Flexi SUITE script engine.

29.5.1 Software Script Program Flow

Label

Syntax	#Label <LabelName>
Variables	<LabelName> = the label name Note: The name of a drive command or variable (that is, any mnemonic returned by the VarCom command LIST) cannot be used as a script label.
Operation	Sets a label to be referred to by #If and #Goto commands.

Goto

Syntax	#Goto <LabelName>
Variables	<LabelName> = the name of the label for the #Goto
Operation	Jumps to the label name

If

Syntax	#If <Condition> <LabelName>
Variables	<Condition> = can be < > == != <LabelName> = the name of the label for the #Goto
Operation	Evaluates a condition; if true, jumps to the label name.

While

Syntax	#While <Condition> ... #End_While
Variables	<Condition> = can be < > == !=
Operation	Repeats all commands between #While and #End_While, as long as the condition is true. The #While block may include any script commands, including any number of nested #While blocks.

Delay

Syntax	#Delay \$<VarName>
Variables	\$<VarName> = a number or a variable
Operation	Pauses execution of the script for the specified number of milliseconds.

29.5.2 Software Script Data

Var

Syntax	#Var \$<VarName> #Var \$<VarName> = <Value>
Variables	\$<VarName> = variable name <Value> = number or drive parameter name
Operation	Declares the variable. Declares the variable and sets its initial value.

Print

Syntax	#Print <Var_1> [<Var_2>]
Variables	<Var_1> <Var_2> = can be a script variable, drive command or text string
Operation	Prints the value of the variable/s to the Output panel.

Print Parameters

Syntax	#PrintParameters <CommandName_prefix>
Variables	<CommandName_prefix> = first few characters of a VarCom name
Operation	Outputs all VarCom commands that start with the specified prefix. Useful for saving a partial list of VarCom parameters. Example: #PrintParameters kc* Outputs all current loop parameters

ClearOutput

Syntax	#ClearOutput
Operation	Clears the contents of the Output panel

Message

Syntax	#Message <VarName_1> [<VarName_2>]
Variables	<VarName_1> <VarName_2> = can be a script variable, drive command or text string
Operation	Opens message box to display the value of the variables, and pauses execution of the script until user clicks OK.

Round

Syntax	#Round \$<VarName>
Variables	\$<VarName> = a script variable

Operation	Gets the variable and the number of digits after the point. For example: <code>#Round \$var 0</code>
------------------	--

SysValue

Syntax	<code># SysValue</code>
Variables	<code>\$<VarName></code> = a script variable
Operation	<p>Gets Flexi SUITE internal values.</p> <p>A script can get a value from any of the following:</p> <ul style="list-style-type: none"> ■ Any cell in the Measurement table in the Scope screen, such as Min, Max, Pk-Pk of each of the recorded variables. ■ Any cell in the Motor parameter table in the motor screen. ■ A value calculated from data in the Scope chart. <ul style="list-style-type: none"> Settling time (SLT) Overshoot (OS) Rise time (RT) <p>Examples:</p> <pre>#SysValue \$var MT 2 3 Gets value from Measurement table, column 2 row 3 and assigns to variable var.</pre> <pre>#SysValue \$st SLT PTPVCMD PE Gets the settling time value and assigns to variable st.</pre> <pre>#SysValue \$var OV VCMD V Gets overshoot and assigns to variable var.</pre> <pre>#SysValue \$var RT VCMD V Gets rise time and assigns to variable var.</pre>

29.5.3 Software Script Operation

Plot

Syntax	<code>#Plot</code>
Operation	Plots a graph using recorded data from the drive. This is the same as pressing the Plot button on Scope screen toolbar.

SavePlotFile

Syntax	<code>#SavePlotFile [<Filename>]</code> <code>#SavePlotFile [\$<Name>]</code>
Variables	<code><Filename></code> = name of a file; if not specified, a default name is used <code>\$<VarName></code> = a script variable; enables saving multiple files in the same script

Operation	Saves data from the currently displayed Scope screen to a CVS file.
------------------	---

DownloadFirmware

Syntax	#DownloadFirmware
Operation	Starts the firmware upgrade. The command can get the path of the firmware or use the default path, if one exists. When used with #Connect, firmware can be downloaded to more than one drive from a single script.

BroadcastingOn | BroadcastingOff

Syntax	#BroadcastingOn #BroadcastingOff
Operation	Starts and ends the broadcasting session.

Connect

Syntax	#Connect <ComPortNum> <DriveID>
Variables	<ComPortNum> = ID number of communication port <Drive ID> = ID number of drive
Operation	Establishes communication, switches from offline to online, and connects Flexi SUITE to the specified drive through a specified communication port. Example: #Connect 33 1 Connects to drive ID 1 through port COM33

ScaleYTrace

Syntax	#ScaleYTrace <Name>
Variables	<TraceName> = name of a trace
Operation	Sets the units of axis Y in the scope chart to the units of the specified trace.

29.6 Software Script Examples

Software Script Example – Record a Motion

```

k
opmode 0
velcontrolmode 7
acc 2000
dec 2000
kvp 1
kvi 0
en
record 16 1000 "vcmd "v "iq
rectrig "imm
j 500
#Delay 200

```

```
j 0
#Delay 200
k
#Plot
```

Software Script Example – Set Outputs According to Input

```
; Toggle_out.txt script
; First, the script checks state of digital input 7
; if digital input 7 equal to 1 then
; the script will toggle one by one
; digital outputs from output 4 to 6

; Digital outputs setup
#Print .....Digital_outputs_init
outmode 4 0
outmode 5 0
outmode 6 0
outinv 4 0
outinv 5 0
outinv 6 0

; Digital input setup
#Print .....Digital_input_7_init
inmode 7 0
ininv 7 0

; Initialize output number counter
#Var $out_n
$out_n=4

; Infinite loop
#While 1>0

#If {in 7} <1 end_loop
out $out_n 1
#Print outputs
#Delay 500
out $out_n 0

$out_n= $out_n + 1
#round $out_n 0
#If $out_n> 6 reset_out_n

#Goto end_loop

#Label reset_out_n
$out_n = 4

#Label end_loop
#End_While
```

Software Script Example – Set Speed According to Inputs

```
; Toggle_velocity.txt script
;
; The script checks state of digital inputs 7,8
; and sets drive speed accordingly
; IN 7 | IN 8 | V
; 0 | 0 | 0
; 1 | 0 | 200
; 0 | 1 | -200
; 1 | 1 | 0

; Digital input setup
#Print .....Digital_Inputs_Setup
inmode 7 0
inmode 8 0
inin 7 0
inin 8 0

; Variable for digital input 7,8 state
#var $in_state
#var $in_7
#var $in_8

; Put the drive in serial velocity loop
k
opmode 0
en

; Infinite loop
#While 1>0

; Read state of in 7 and in 8
$in_7 = {in 7}
$in_8 = {in 8}*2
$in_state = $in_7+$in_8

#If $in_state == 0 jog_zero
#If $in_state == 1 jog_positive
#If $in_state == 2 jog_negative

#Label jog_zero
#Print JOG_zero
j 0
#Goto end_loop

#Label jog_positive
#Print JOG_plus_200
j 200
#Goto end_loop

#Label jog_negative
#Print JOG_minus_200
j -200
```

```
#Label end_loop  
#Delay 500  
#End_While
```

Software Script Example – Set Position Feedback to Zero (Forced Homing)

```
pfboffset 0 ;Clear position offset  
#Print pfboffset ;Print position offset  
pfboffset = -pfb ;Assign the inverse value of actual position  
; (PFB) to the position offset  
#Print pfboffset ;Print the new value of position offset
```


**Flexi SUITE Reference Manual
for FLEXI PRO and DDHD**