ANORAD

Using Logix™ Motor Database with Anorad Linear Motors

START-UP MANUAL

March 2005
Revision 2
Item Number 814039

Anorad

Rockwell Automation

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this motor assembly must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Rockwell Automation/Anorad does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Throughout this manual we use notes to make you aware of safety considerations:

ATTENTION

Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss

Attention statements help you to:

- identify a hazard
- avoid a hazard
- recognize the consequences

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

Table of Contents

Introduction

Using This Application Note

This application note is designed to help you install, integrate and start-up your Anorad Linear Motor with Logix. You do not have to be an expert in motion control. However, this note does assume you have a fundamental understanding of basic electronics, mechanics, as well as motion control concepts and applicable safety procedures.

The intent of this note is to assist the user in the hardware configuration of the Anorad Linear Motor with Logix Controller.

Read this entire note before you attempt to installation. Doing so will familiarize you with the Logic components effected and their relationship to each other and the system

After installation, check all system parameters to insure you have configured your linear motor into your motion system properly.

Be sure to follow all instructions carefully and lastly but foremost pay special attention to safety concerns.

Requirements

1. RSLogix Version 13 or later.
2. Firmware for you ControlLogix Components and your Ultra3000 or Kinetix6000 drives must be compatible with your RSLogix Version. Note: To update Ultra3000 firmware, Ultraware is required.
3. The latest version of the LOGIX Motor Data Base. The data base can be found at **http://www.rockwellautomation.com/anorad/products/linearmotors/index.html**

Reference Documents

LC Series Linear Motor User Manual, Item Number 814036

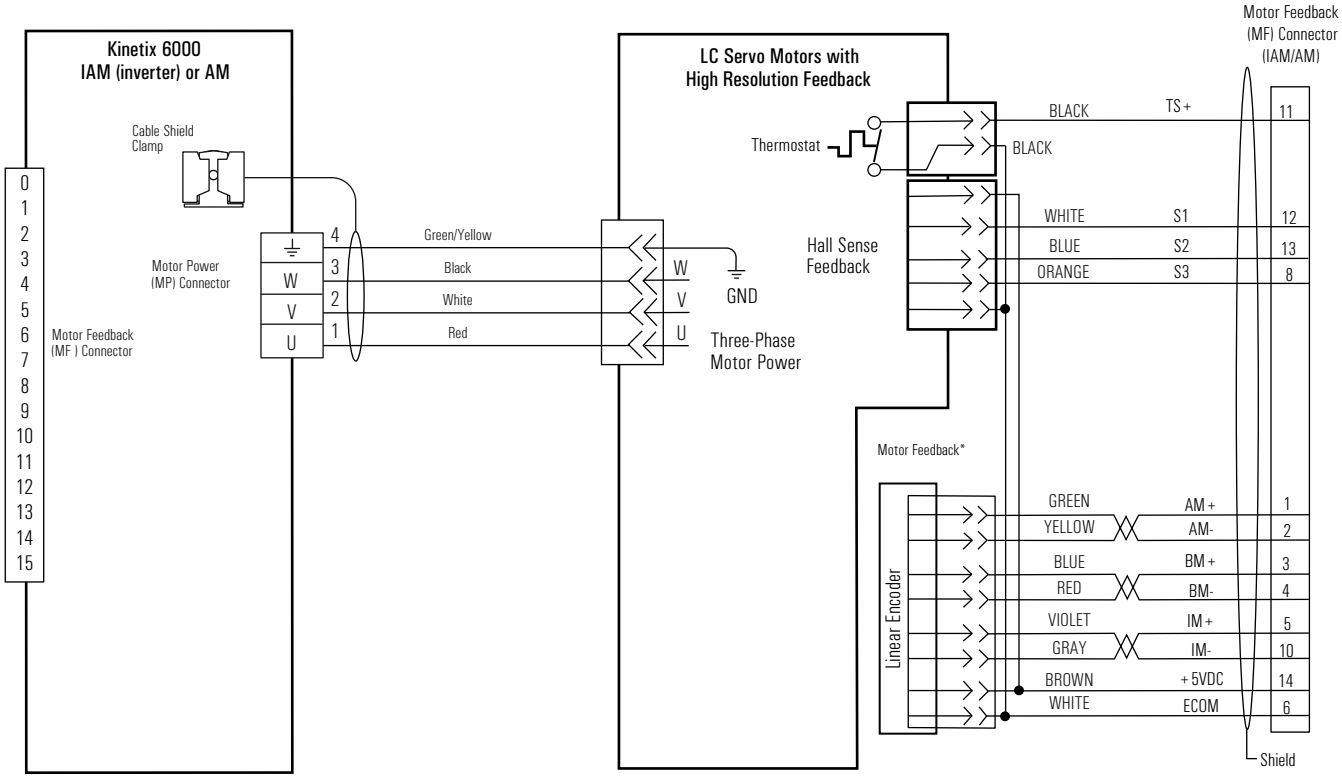
Control Logix Motion Module
Setup and Configuration Manual User Manual 1756-UM006F-EN-P

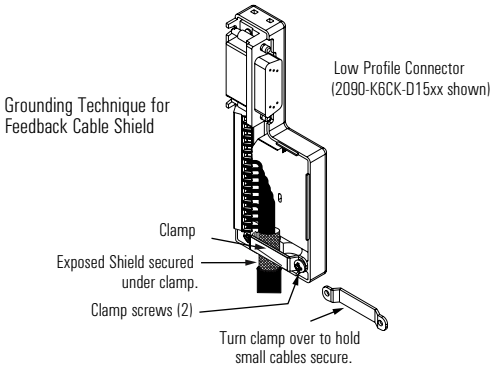
Using Logix Motor Database with Anorad Linear Motors

Electrical Connections for Anorad Linear Motor

The following figures are the motor cable electrical connection for the Anorad Linear Motors

Figure 1 Anorad Linear Motor to Kinetix 6000 Interconnect Diagram



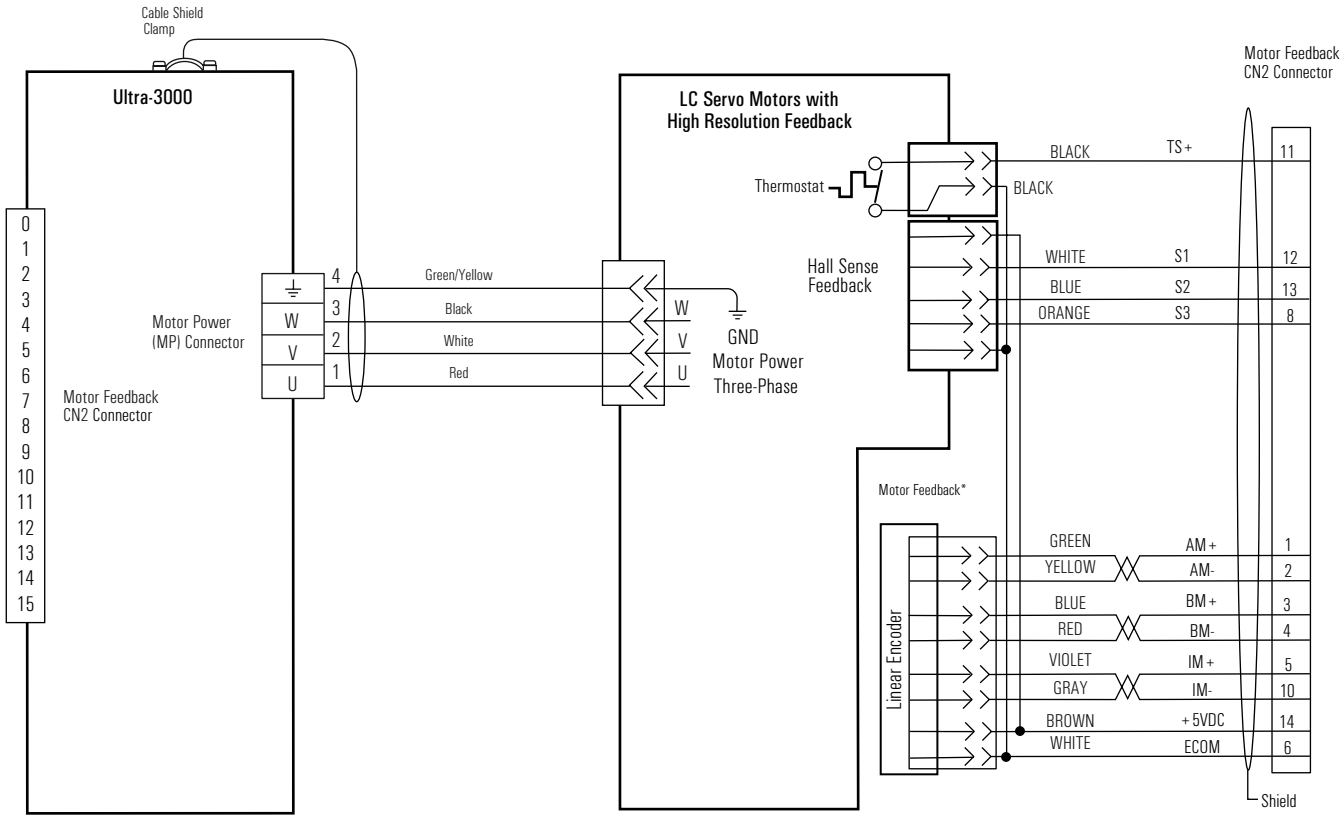


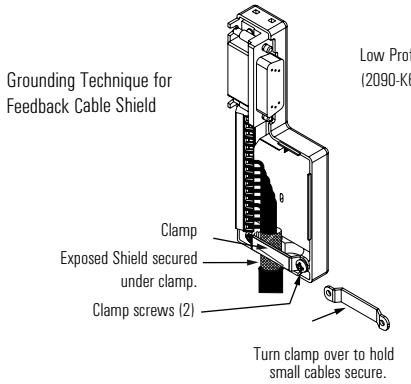
Refer to Low Profile Connector illustration (lower left). for proper grounding techniques.

* Wire color shown for Renishaw RGH22 Linear Incremental Encoder with its Reference MARK actuator installed

This diagram is for LC-xxx-xxx-0TTRx motors
See Appendix A for Anorad LEA, LEB, LEC, LEM, LEU, LF, LCK Motor wiring.

Figure 2 Anorad Linear Motor to Ultra3000 Models 2098-DSD-030x-xx, -075x-xx, -150x-xx, 2098-DSD-HVxxx-xx Interconnect Diagram





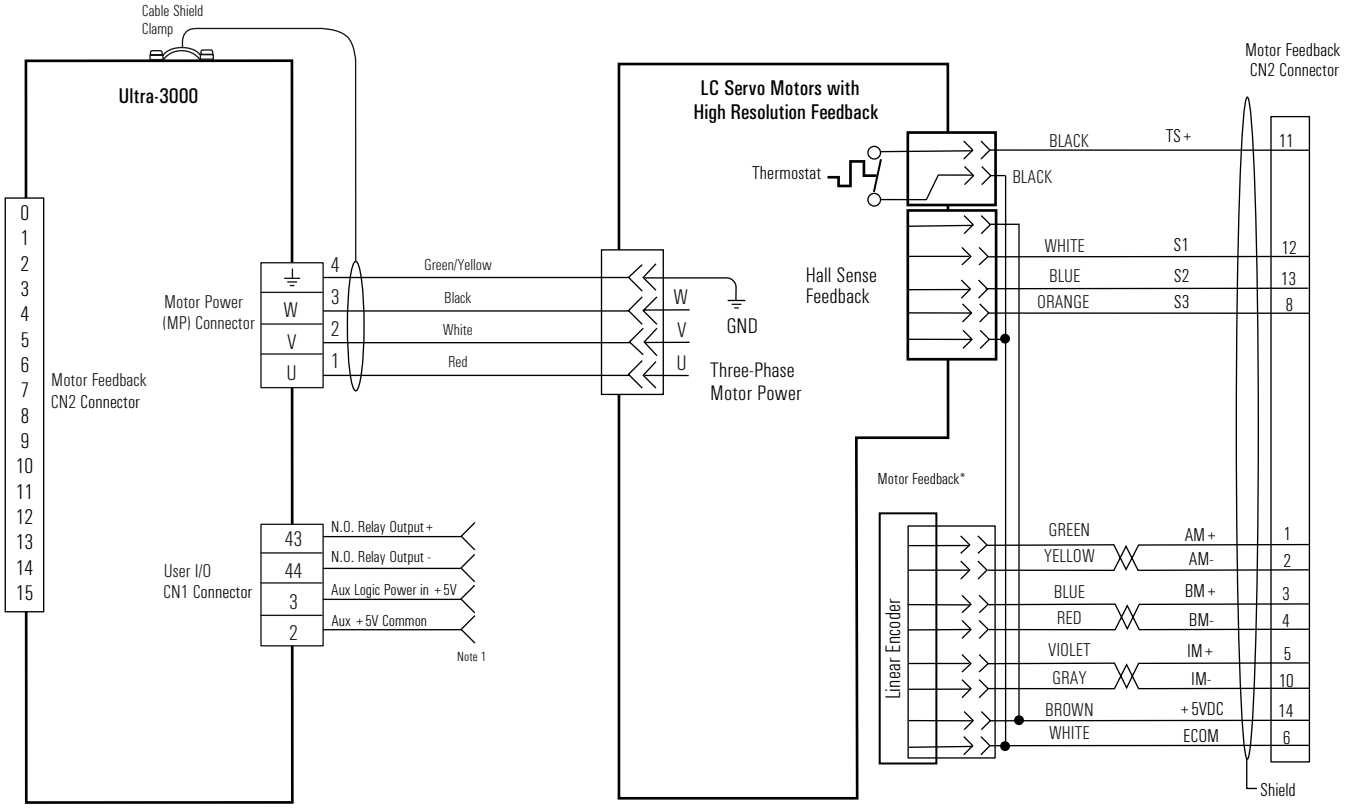
Refer to Low Profile Connector illustration (lower left) for proper grounding techniques.

* Wire color shown for Renishaw RGH22 Linear Incremental Encoder with its Reference MARK actuator installed

This diagram is for LC-xxx-xxx-0TTRx motors

See Appendix A for Anorad LEA, LEB, LEC, LEM, LEU, LF, LCK Motor wiring.

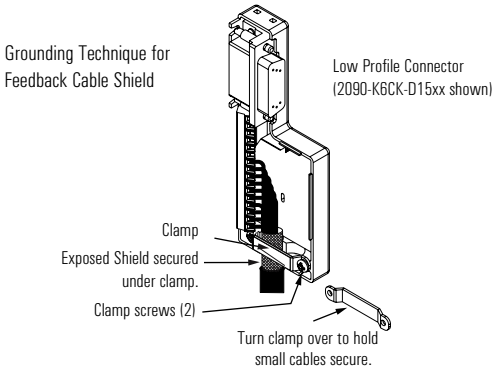
Figure 3 Anorad Linear Motor to Ultra-3000 Models 2098-DSD-005x-xx, -010x-xx, -020x-xx Interconnect Diagram



Note 1 - Auxiliary +5V power is required to maintain encoder position when the main AC power is disconnected. To avoid a separate 5V dc auxiliary logic power supply, the 24V to 5V converter breakout board (2090-U3CBB-DMxx) is used to wire the control interface (CN1) connector.

Refer to Low Profile Connect illustration (lower left) for proper grounding techniques.

* Wire color shown for Renishaw RGH22 Linear Incremental Encoder with its Reference MARK actuator installed



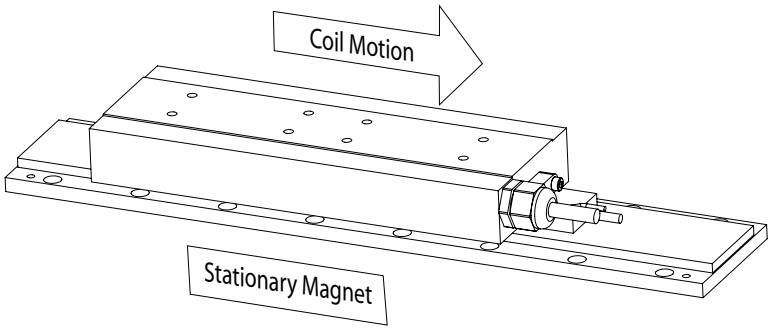
This diagram is for LC-xxx-xxx-0TTRx motors
See Appendix A for Anorad LEA, LEB, LEC, LEM, LEU, LF, LCK Motor wiring.

Motor Phasing

When the motor power and Hall sensor wiring is connected as shown one of the previous figures, the positive direction of motion is when the motor coil is moving toward its power cable as shown in Figure 4 .

The feedback incremental linear encoder should be wired such that the position feedback is positive (Phase A+ leads Phase B+) when the motor is moving in the positive direction.

Figure 4 Positive Motor Direction
When properly wired this is considered the positive direction of motion



Installation

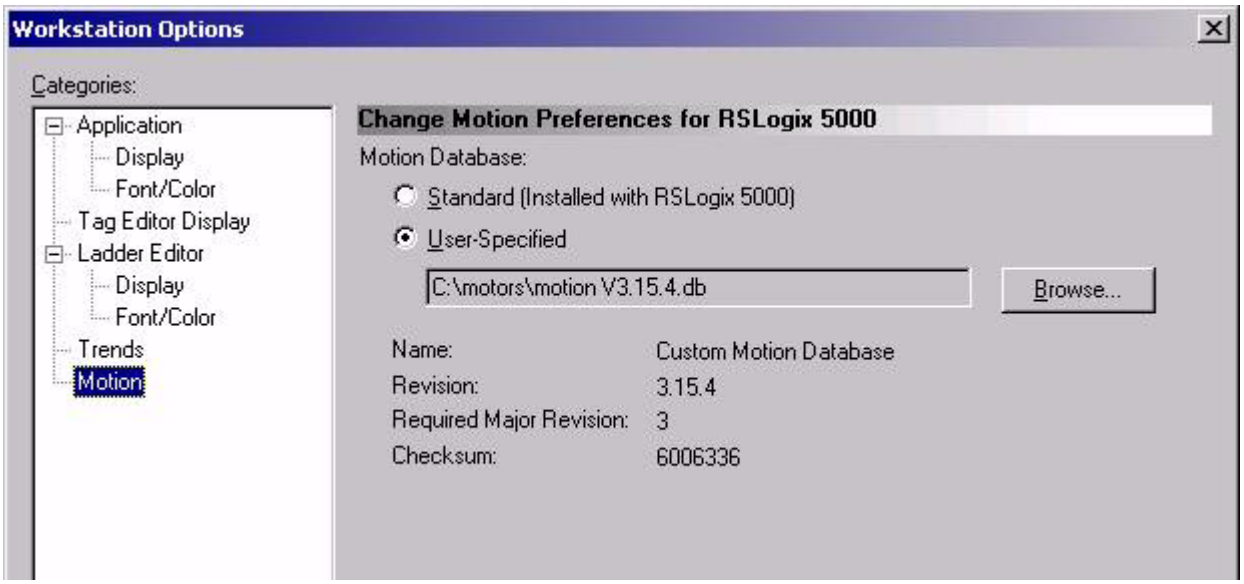
1. Create a directory in your RSLogix computer named **c:\motors**

2. Download the LOGIX Motor Database (**motion V3.18.1.db or later**) from the Rockwell Automation/Anorad website and Save to the directory created in step one.

3. Install the LOGIX Motor Database, go to the RSLogix Menu bar click on Tools/Options and then select Motion on the left hand window "tree" the Options window shown in Figure 5 will be displayed.

4. Select User Specified and Browse to point to the Logix Motor Data Base file, and press OK.

Figure 5 Options Window



Commission the Linear Motor connection.

Using the following menus apply the settings as shown in the tables and text following

Axis Properties: Drive/Motor Tab

1. On Driver/Motor Tab Figure 6 Click on Change Catalog.. button and select the Motor Catalogue Number that corresponds to the motor you are commissioning.

   Note that each Anorad Linear Motor Catalogue Number represents a motor coil frame, length, and winding type that can be used with the following motor options:

   - Motor OverTemperature Sensor options:
     – Thermal Switch
     – PTC (positive temperature coefficient) thermistor
   - Motor Cooling options:
     – No cooling
     – AC, air cooled
     – WC, water cooled

   Motor coils must have "Trapeziodal" Hall Effect Feedback Sensors.

   When using a 460VAC drive (e.g. 2098-DSD-xxx-HV020, 2094-BM01, etc) the Linear Motor Catalogue number will be shown with an "H" suffix.

   When using a 230VAC drive (e.g. 2098-DSD-xxx-020, 2094-AM01, etc) the Linear Motor Catalogue number will be shown with an "L" suffix.

2. Configure parameters as shown in Setting column in Table C and click OK.

Figure 6 Drive Motor Tab

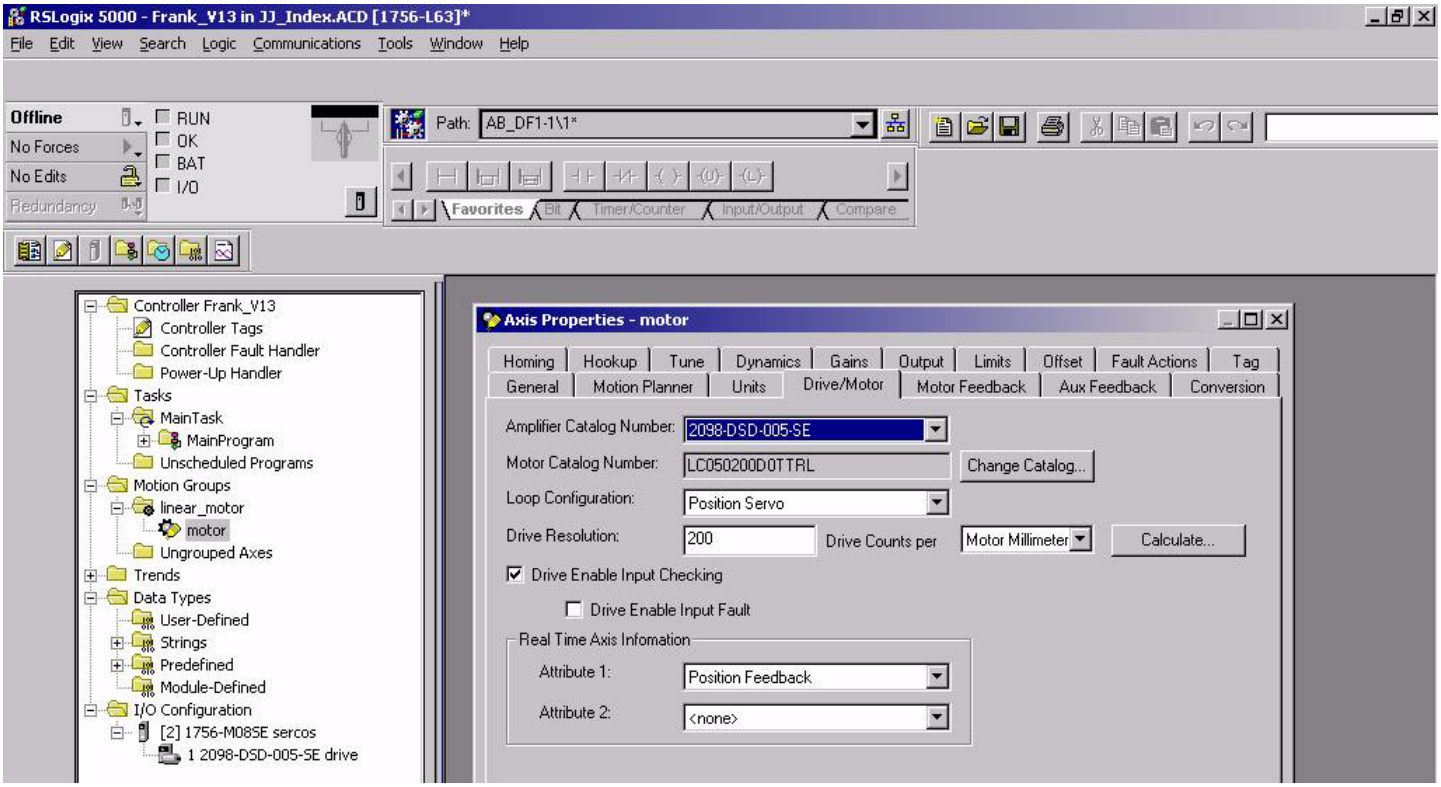


Table C Settings for the Drive/Motor Tab

Parameter	Setting	Comment
Loop Configuration	Position Servo	
Drive Resolution	**200**	**5µ Encoder**
	1000	1µ Encoder
	2000	0.5µ Encoder
Drive Counts per*	Motor Millimeter	
Real Time Axis Information		
Attribute 1	Position Feedback	

Axis Properties: Motor Feedback Tab

Configure parameters in Figure 7 as shown in Setting column in Table D and click OK.

Figure 7 Motor Feedback Tab

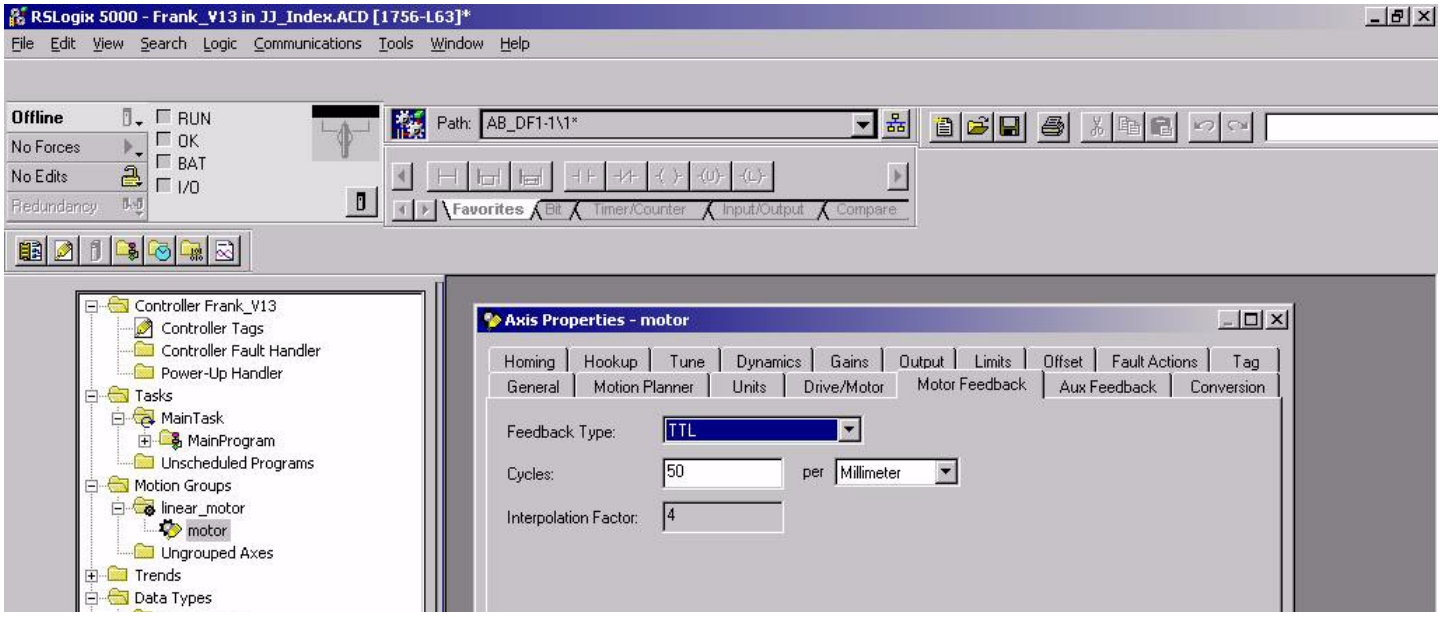


Table D Settings for the Motor Feedback Tab

Parameter	Setting	Comment
Feedback Type	TTL	
Cycles	**50**	**5µ Encoder**
	250	1µ Encoder
	500	0.5µ Encoder
per	Millimeters	
Interpolation Factor	4	

Axis Properties: Conversion Tab

Configure parameters as shown in Setting column in Table E and click OK.

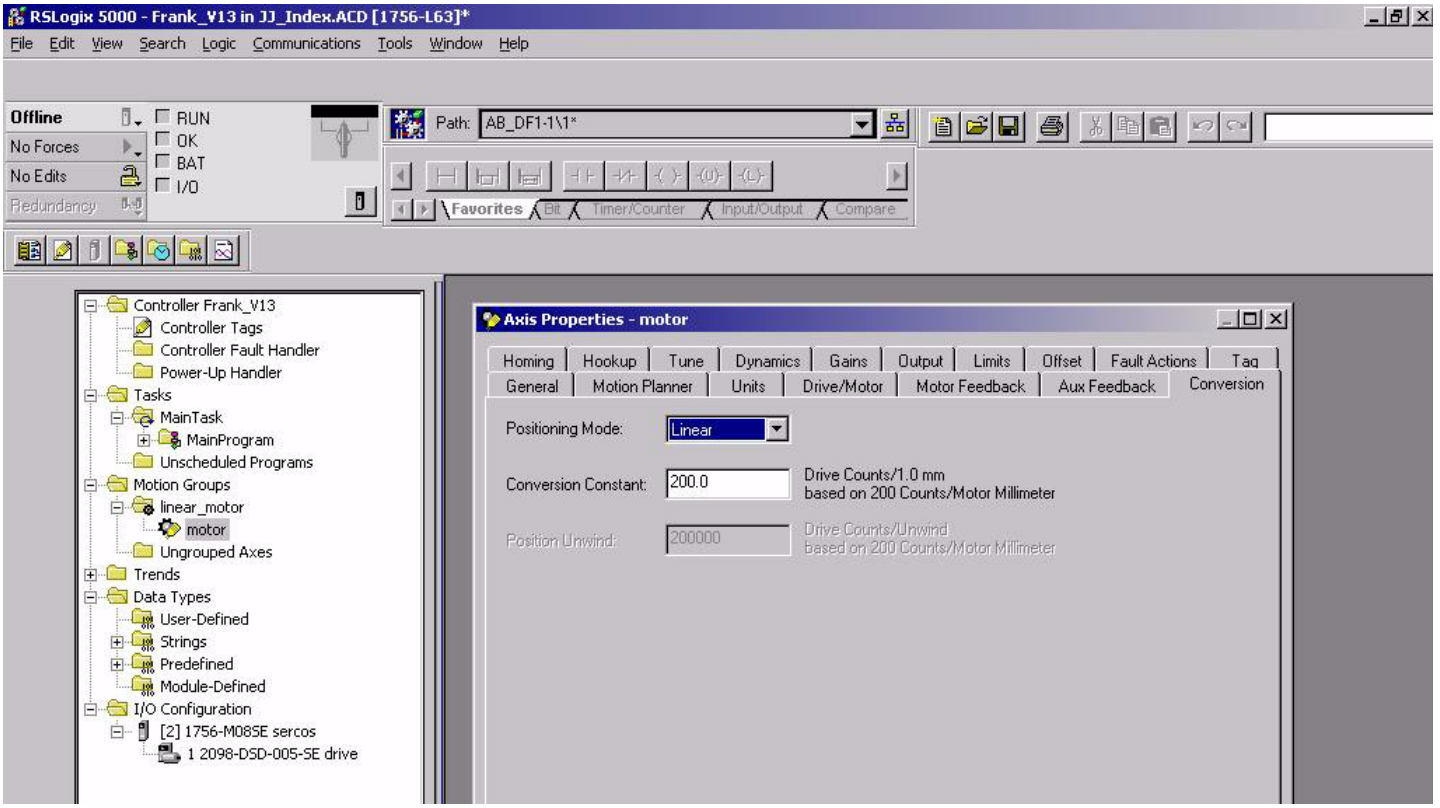


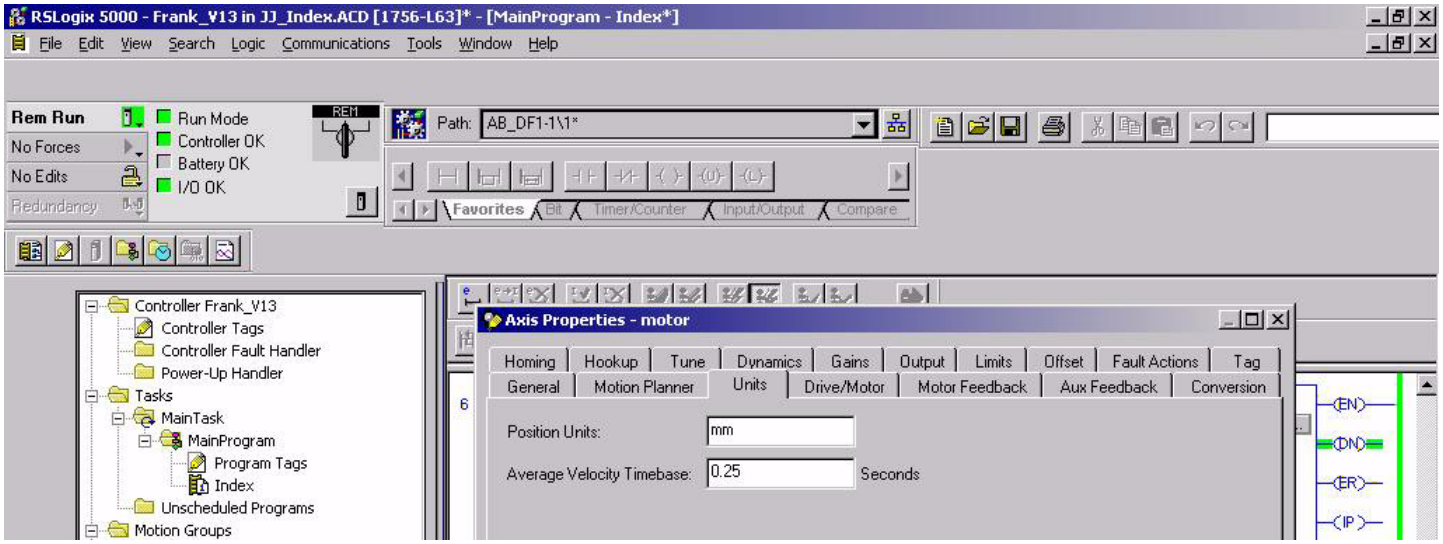
Table E Settings for the Conversion Tab

Parameter	Setting	Comment
Positioning Mode	Linear	
Conversion Constant	**200**	**5 micron encoder**
	1000	1 micron encoder
	2000	0.5 micron encoder

Axis Properties: Units Tab

Configure parameters in Figure 8 as shown in Setting column in Table F and click OK.

Figure 8 Units Tab



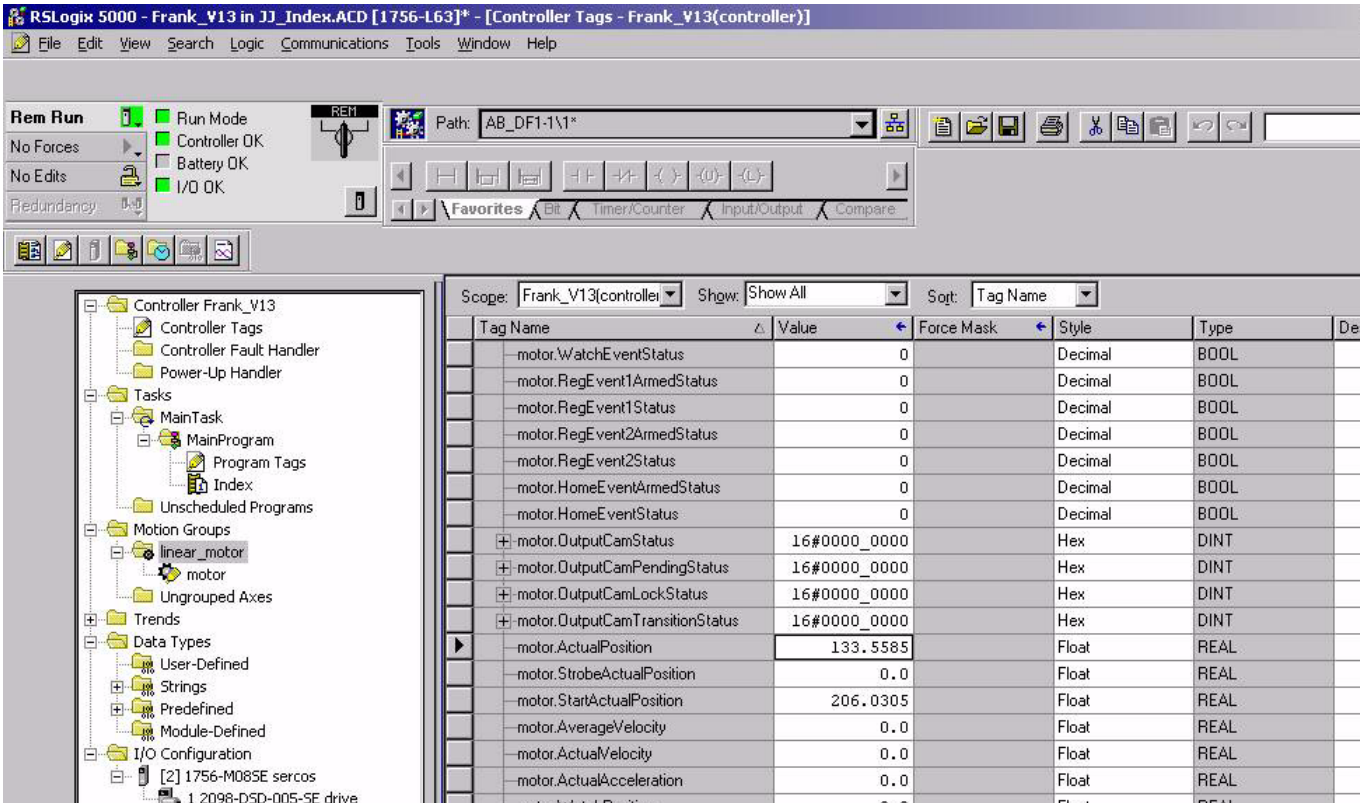
Configure parameters as shown in Setting column in Table F and click OK.

Table F Settings for the Units Tab

Parameter	Setting
Units:	mm
Average Velocity Timebase:	0.25 seconds

Verify Direction and Resolution

Select Controller tags, and Monitor the motor_ActualPostion tag.



1. With the drive DISABLED, move the axis and verify that the ActualPostion tag increases in value as you move in the positive direction.

   If the direction of travel does not match what has been defined by the motor power and Hall Sensing wiring, then you can change the direction by changing the encoder wiring using Table G.

Table G Changing Direction by Changing Encoder Wiring

Move		To	
Encoder Phase	Drive CN2, pin	Encoder Phase	Drive CN2, pin
A+	1	B+	3
A-	2	B-	4
B+	3	A+	1
B-	4	A-	2

2. Move the axis a know distance, and verify that the ActualPosition tag moves the correct distance in millimeters.

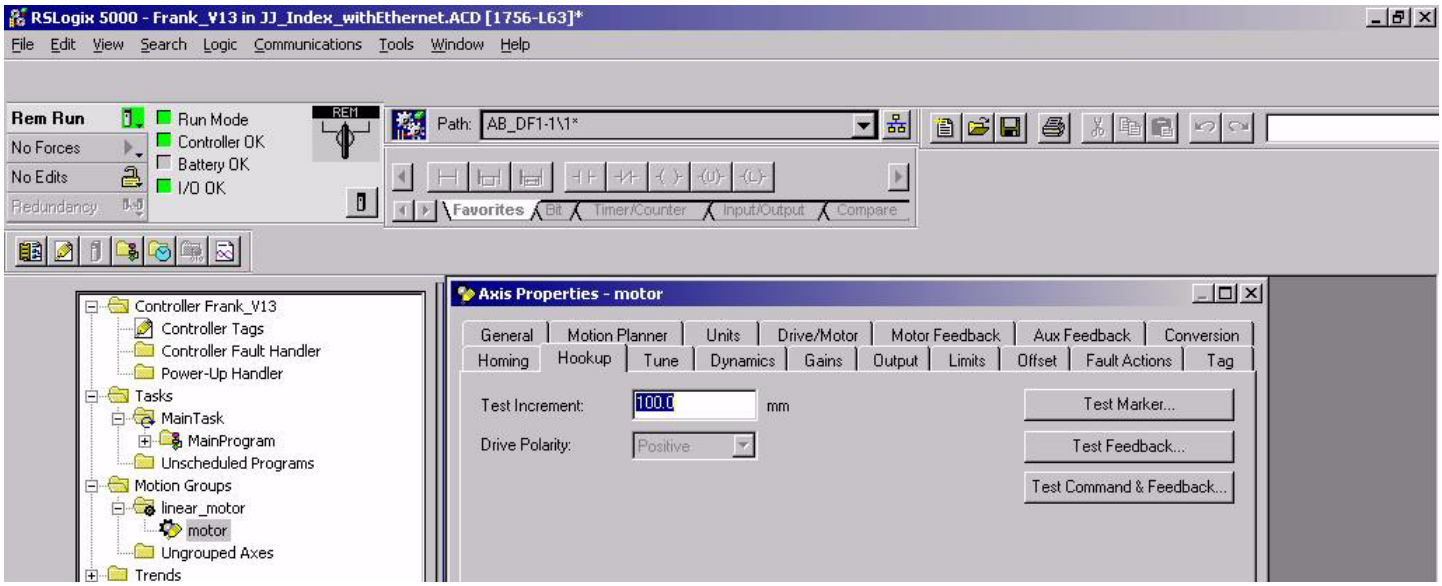
Connection Check and Tests

The following tabs check that the Motor Power (U, V, W), Hall Sensing S1, S2, S3 and the feedback incremental encoder wiring is correct and agrees with Logix motor data base.

Axis Properties: Hookup Tab

Configure parameters in Figure 9 as shown in Setting column in Table H and click OK before running tests.

Figure 9 Hookup Tab



Test Setup

Table H Test Setup

Parameter	Setting
Test increment	100.0 mm suggested
Drive Polarity	Positive

1. Press the Test Feedback button and then move the axis by hand at least 100mm when prompted.
2. Position the stage so that it can move 100 mm in the forward or reverse direction.
3. Press the Test Command & Feedback button and follow instructions on screen.

Axis Properties: Tune Tab

When the Hookup Tab: Test Feedback and Test Command and Feedback tests have successfully passed proceed with Tune Tab.

Configure parameters in Figure 10 as shown in Setting column Table I. Leave all other Tune options off at first and follow normal tuning procedures found in Control Logix Motion Module Setup and Configuration Manual User Manual 1756-UM006F-EN-P.

You may find you have to reduce the Velocity Loop Proportional Gain to maintain stability

Figure 10 Tune Tab

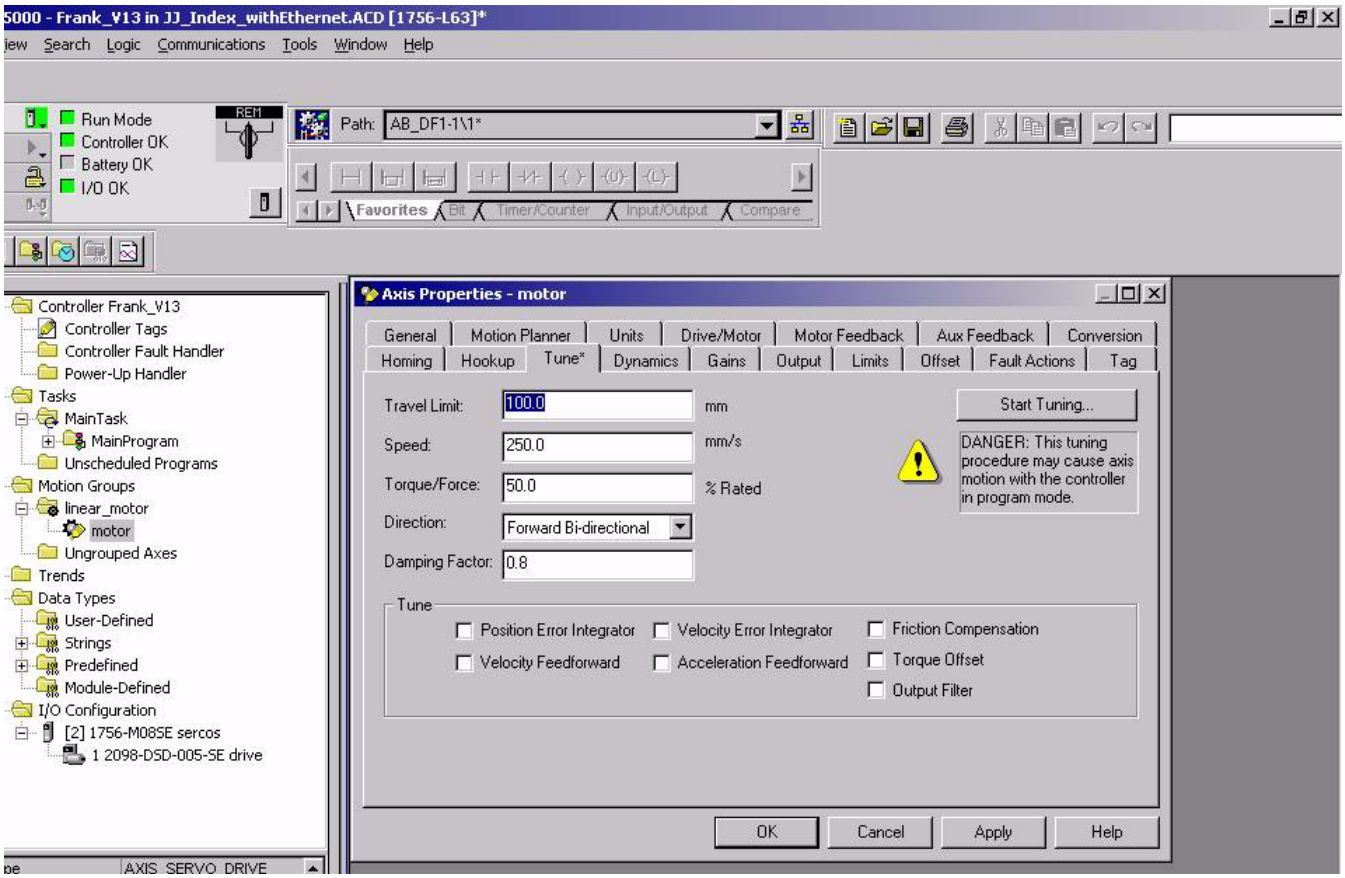


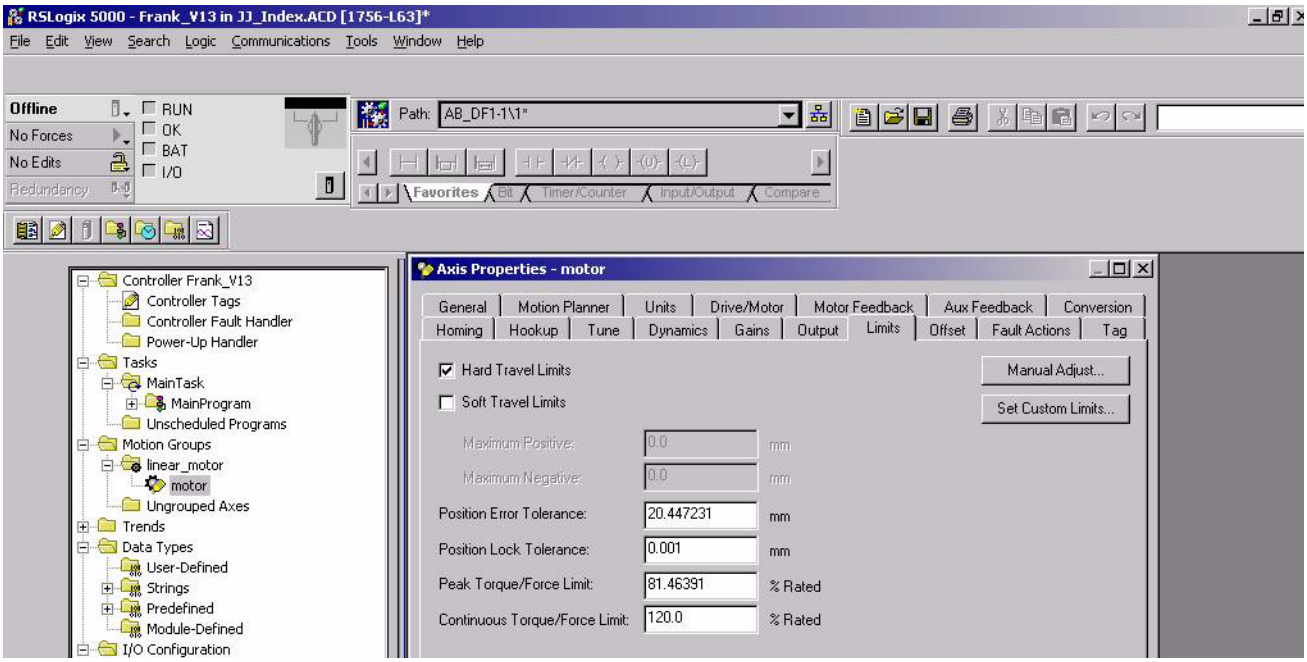
Table I Setting for Tune Tab

Parameter	Setting	Units	Note
Travel Limit	100	mm	Suggested
Speed	250	mm/sec	
Torque/Force	50	% Rated	
Direction	Forward Bi-directional		
Damping Factor	0.8		(default)

Axis Properties: Limits Tab

The Continuous Torque/Force Limit setting shown in Figure 11 Limits Tab should be set to reflect the motor cooling configuration.

Figure 11 Limits Tab



For Anorad Linear motors this field data entry is limited to integer values between 0-150 percent. For standard motors, (NC) no cooling, this value can be set up to 100%, for (AC) air cooled motors this value can be set up to 120%, for (WC) water cooled motors this value can be set up to 150%.

Note: Increasing or decreasing the motor continuous current rating does not change the drives's continuous current limiting.

Table A Ultra-3000 Connectors to other Anorad Linear Motors

Motor Type	Hall Location	S1	S2	S3	U	V	W
LEA, LEB, LEM	Cable end	BLU	ORN	WHT	RED	BLK	WHT
LEC	Cable end	BLU	WHT	ORN	RED	BLK	WHT
LCK	Cable end	ORN	BLU	WHT	RED	BLK	WHT
LC Series	Cable end	WHT	BLU	ORN	RED	WHT	BLK
LF	Cable end	BLU	WHT	ORN	BLK/RED	BLK/GRN	BLK/WHT

The motor commution phasing and Hall sensor wiring shown is Table A is such that positive direction is when the motor coil is moving towards its power cable.

Anorad/Rockwell Automation
100 Precision Drive
Shirley, NY 11967-4710

Web site http://www.anorad.com
E-mail anorad@anorad.com

Technical Support:
Tel (631) 344-6600
Fax (631) 344-6660
email techsupport@anorad.com

Item Number 814039 - Rev 2 March 2005