MicroE
Motion Control Starts Here.

TECHNICAL NOTES: INTERFACING WITH DRIVES

Connecting MicroE Optira Series Encoder to Copley Controls Accelnet Plus 1-Axis BEL Rev00

TN-1302 | REV 150921

1 INTRODUCTION

This document will follow the process involved in mounting a MicroE Optira quadrature encoder on a linear stage and the connecting it to a Copley Controls Accelnet Plus 1-Axis BEL Rev00 drive.

2 REQUIRED ITEMS

2.1 Optira

The Optira Series Encoder combines MicroE's patented PurePrecision™ technology with state-of-the-art electronics and signal processing to deliver unprecedented performance in an incredibly small and lightweight package, providing resolution of up to 5nm with all AGC, interpolation, and signal processing performed in the sensor head. Make sure to visit http://www.microesystems.com/resource/product-documentation to get our latest documentation available.

2.2 Optira Development Kit

The Optira Development Kit includes a flat cable, calibration board, and a DB-15 output cable. Refer to the Optira Spec installation manual for more info.

2.3 ACCELNET PLUS ETHERCAT 1-AXIS BEL Rev00

The BEL is a high-performance, DC powered drive for position, velocity, and torque control of brushless and brush motors via EtherCAT, an Ethernet-based fieldbus. Supported modes include: Profile Position-VelocityTorque, Cyclic Synchronous Position-Velocity-Torque, Interpolated Position Mode (PVT), Homing, and CSTCA (Cyclic-sync torque with commutation angle). Feedback from both incremental and absolute encoders is supported. A multi-mode encoder port functions as an input or output depending on the drive's basic setup. Make sure to visit http://www.copleycontrols.com to get the latest documentation available.

2.4 Computer with CME 2 Setup & Indexing software loaded

Copley Java based CME 2 software is available for download on their website. This is used to set up the drive for the first time.

2.5 Power Source

Review the documentation for the all the components to determine the correct voltage and amperage to run your equipment.

2.6 Documentation

Before you begin, have the manuals for each product available for review.

3 WIRE ENCODER-TO-DRIVE CONNECTOR (J5 CONNECTOR)

Encoder Copley J5 Connector

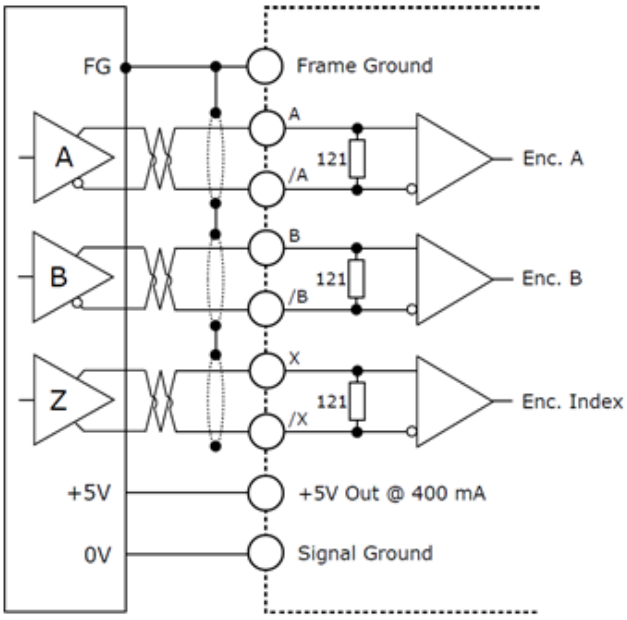

Figure 1 Digital Encoder

Encoder Copley J5 Connector

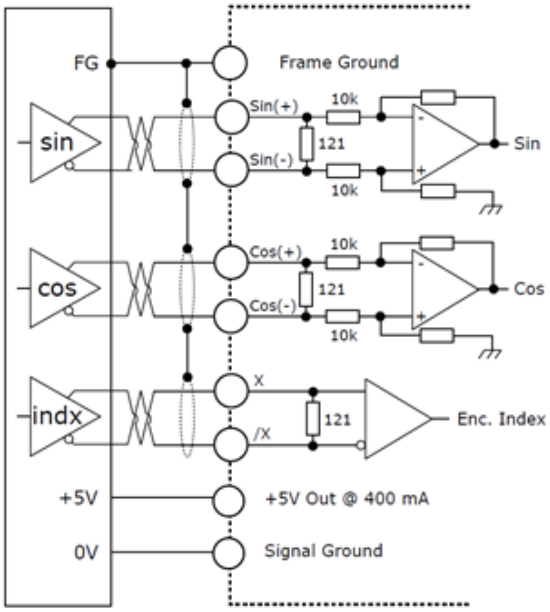

Figure 2 Analog Encoder

Copley J5	Copley Desc	MicroE Wire	MicroE DB15
1	Enc /A	GRN	6
2	Enc /B	BRN	5
3	Enc /X	VIO	4
5	Sgnd	BLK	9
12	F.G.	YEL	14
13	Enc A	ORN	13
14	Enc B	BLU	12
15	Enc X	RED	8
17	+5V	WHT	3

Copley J5	Copley Desc	MicroE Wire	MicroE DB15
3	/X	VIO	4
5	Sgnd	BLK	9
8	Sin(-)	GRN	6
9	Cos(-)	BRN	5
12	F.G.	YEL	14
15	X	RED	8
17	+5V	WHT	3
20	Sin(+)	ORN	13
21	Cos(+)	BLU	12

4 MOUNT THE TAPE SCALE

4.1 Mounting Surface Preparation

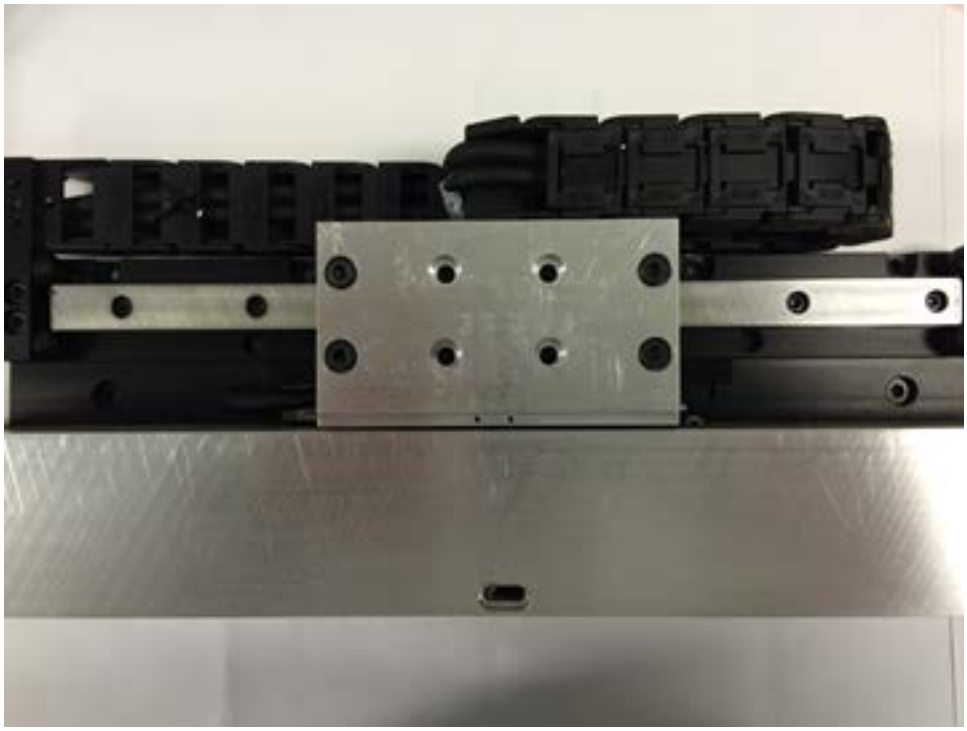

Figure 1

4.1.1 Clean surfaces, following instructions provided in the Tape and Glass Scales Installation Manual.

4.2 Installing the Scale

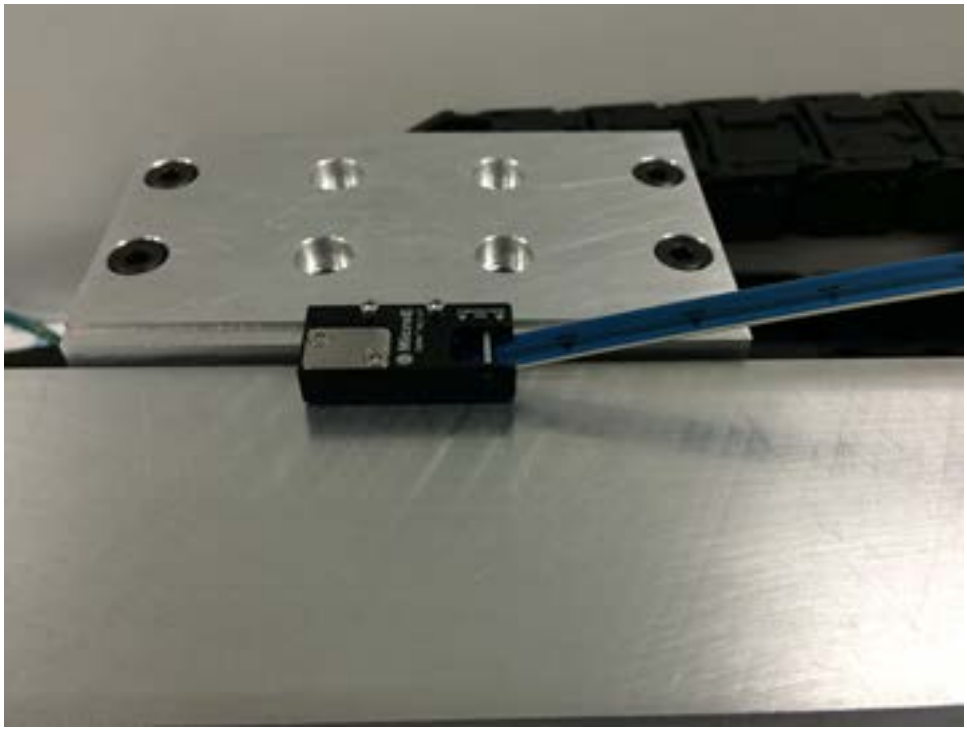

Figure 2

4.2.1 Use the mounting holes for the encoder to attach the Scale Applicator Tool using two 0-80 x 3/8”.

4.2.2 Move the stage carriage to the extreme left of travel to start.

4.2.3 5. Peel back the clear adhesive cover on the bottom of scale approximately 1 inch.

4.2.4 6. Insert the scale with the black on blue arrows pointing the same direction as the white on black arrow on the applicator tool.

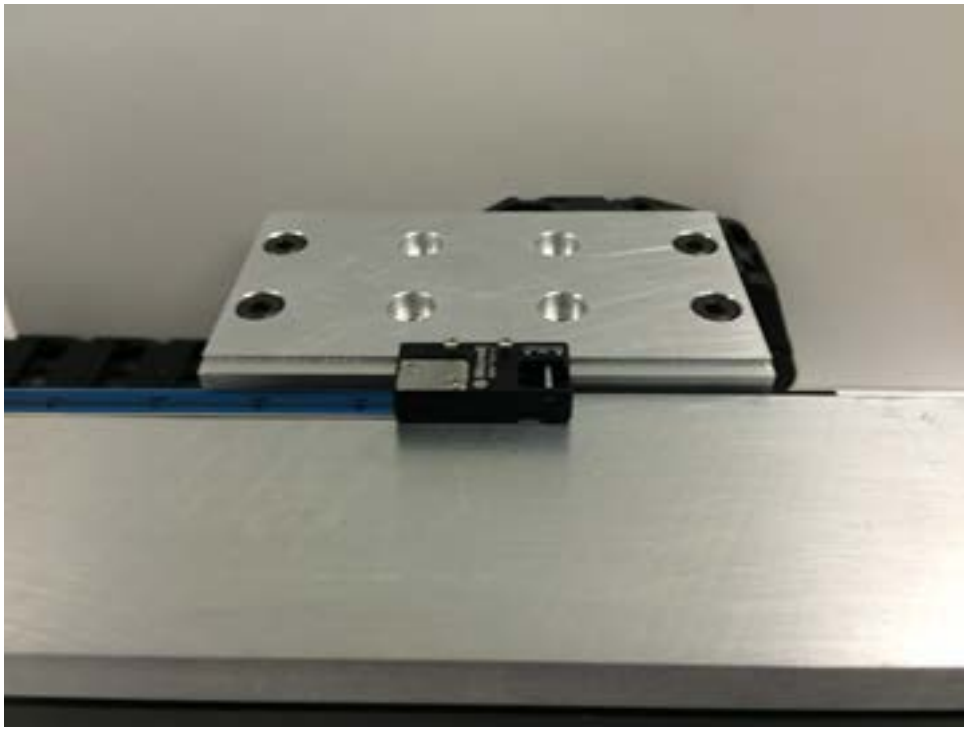

Figure 3

4.2.5 Feed the scale through the tool as you pull the carriage to the right removing the clear adhesive cover as you go.

4.2.6 You may need to remove the tool to get the last of the scale through the tool and onto the surface.

4.2.7 Use your finger to press the scale onto the surface over the full length to make sure the best adhesion.

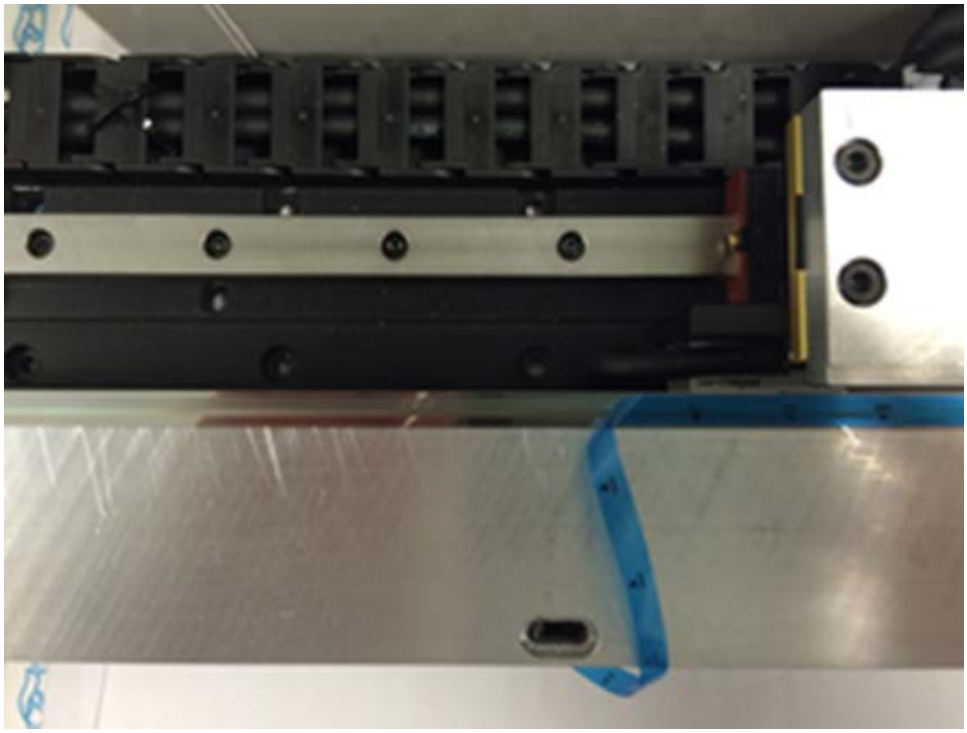

Figure 4

10. Once the scale is installed, you can remove the blue protective film from the top of the scale.

5 INSTALL OPTIRA SENSOR AND CALIBRATION BOARD

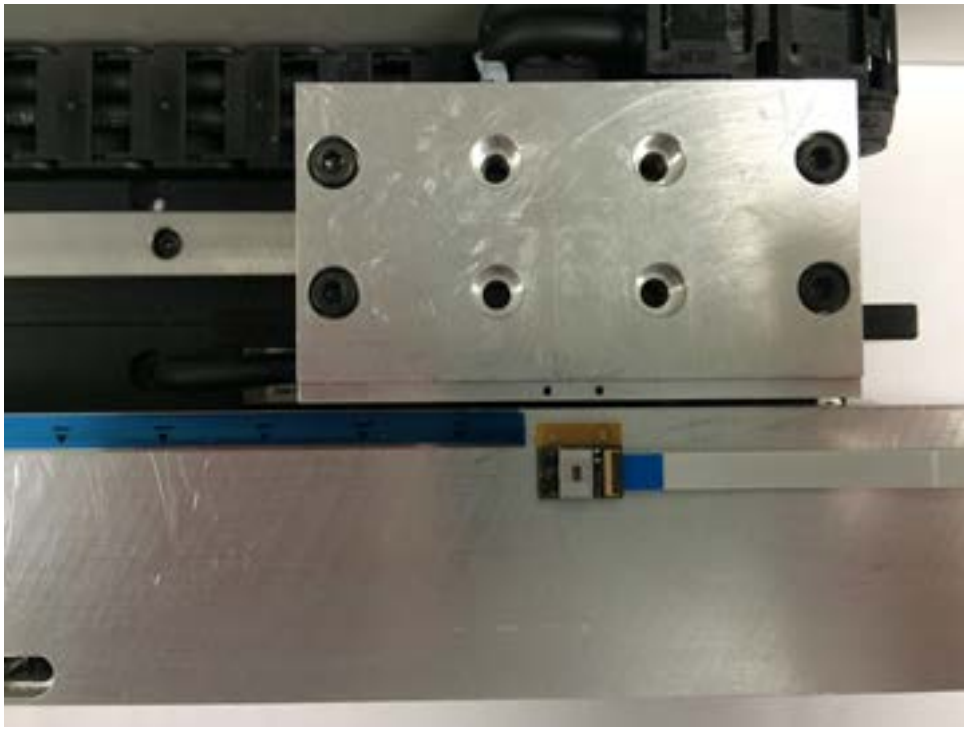

Figure 5

5.1.1 Attach the FPC (Flat Flexible) BEFORE installing the encoder.

(The flex cable exposed contacts should be on the opposite side from the brown connector lock)

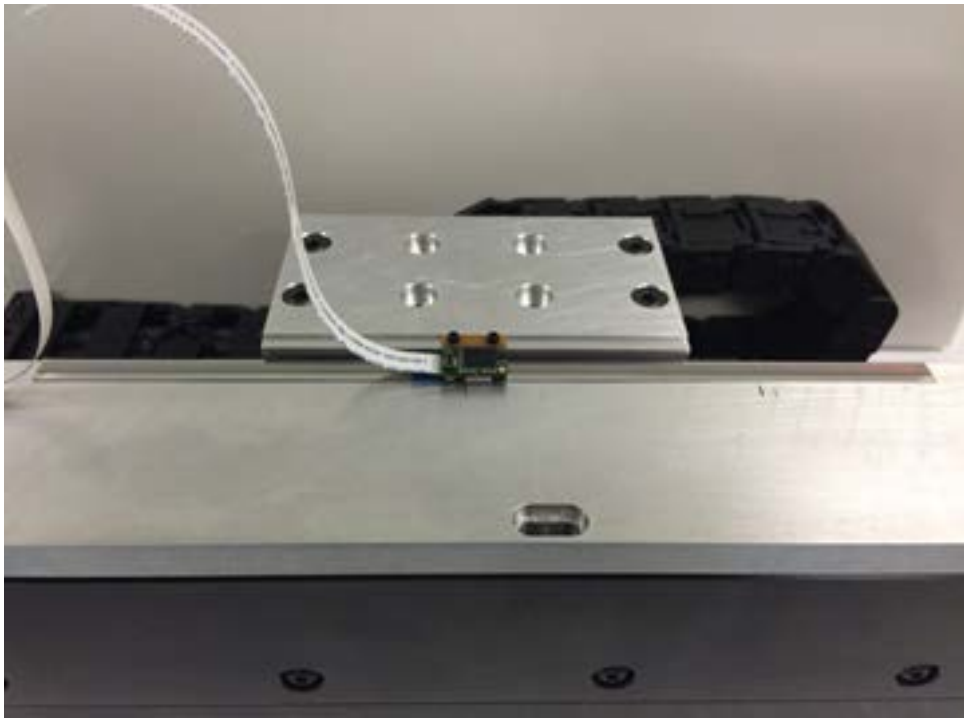

Figure 6

5.1.2 Attach the encoder to the stage carriage using two 0-80 x 1/4 button head screws.

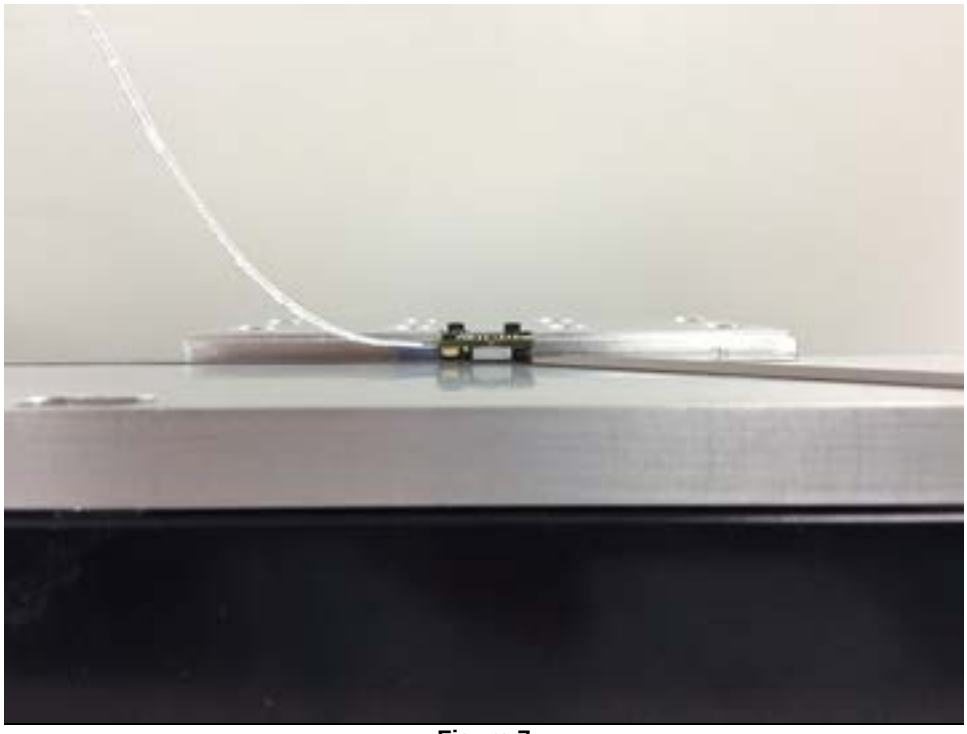

Figure 7

5.1.3 Use the Z-height Shim Spacer (part of optional development kit) to set the proper gap between the sensor's riser and the top of the scale (0.010"). Refer to the Optira Interface Drawing for details.

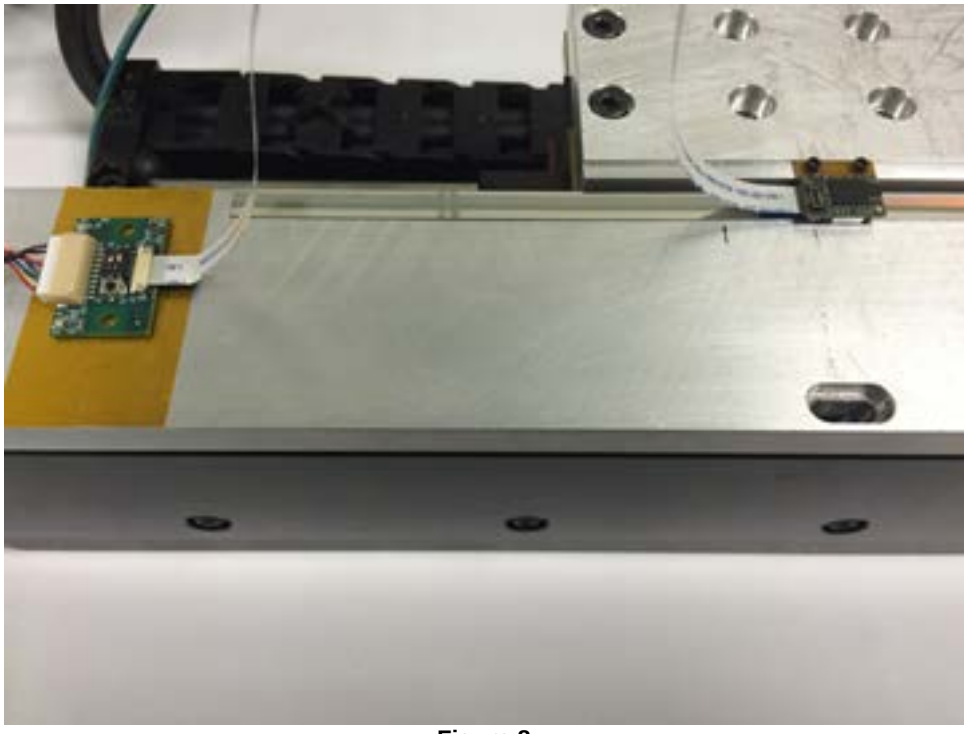

Figure 8

5.1.4 Connect the other end of the FPC (Flat Flexible) to the calibration board.

5.1.5 (The flex cable exposed contacts should be on the opposite side from the brown connector lock)

5.1.6 Mount the calibration board to the stationary part of the stage.

5.1.7 (Kapton tape is recommended for electrical isolation if you choose to mount directly to the stage)

5.1.8 Connect the DB-15 output cable to the other side of the calibration board.

6 POWER UP AND CALIBRATE OPTIRA

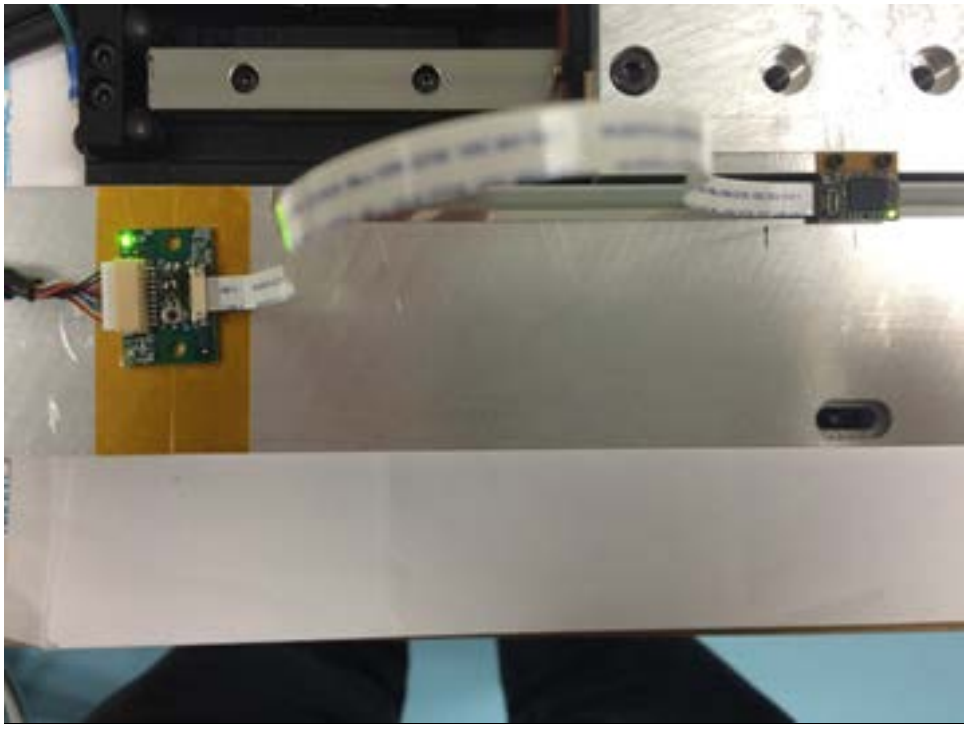

Figure 9

6.1.1 Turn on the power source to the Copley Drive (J6 should be disconnected at this point).

6.1.2 You should see a green LED on both the encoder and Calibration board.

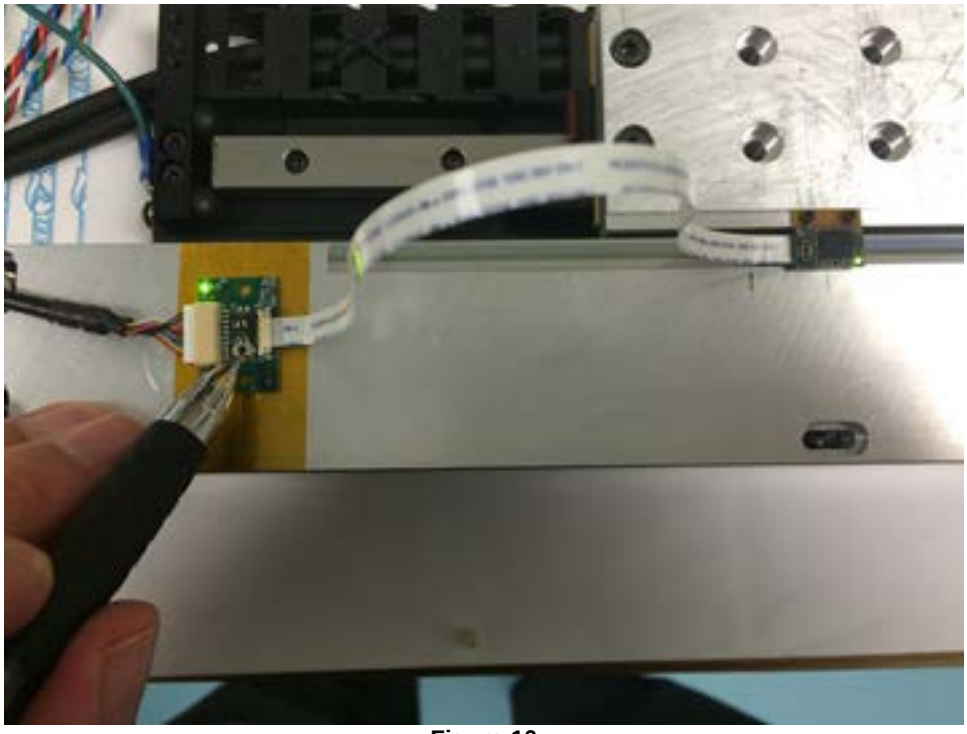

Figure 10

6.1.3 Press the Calibration momentary switch to initiate Index Optimization.

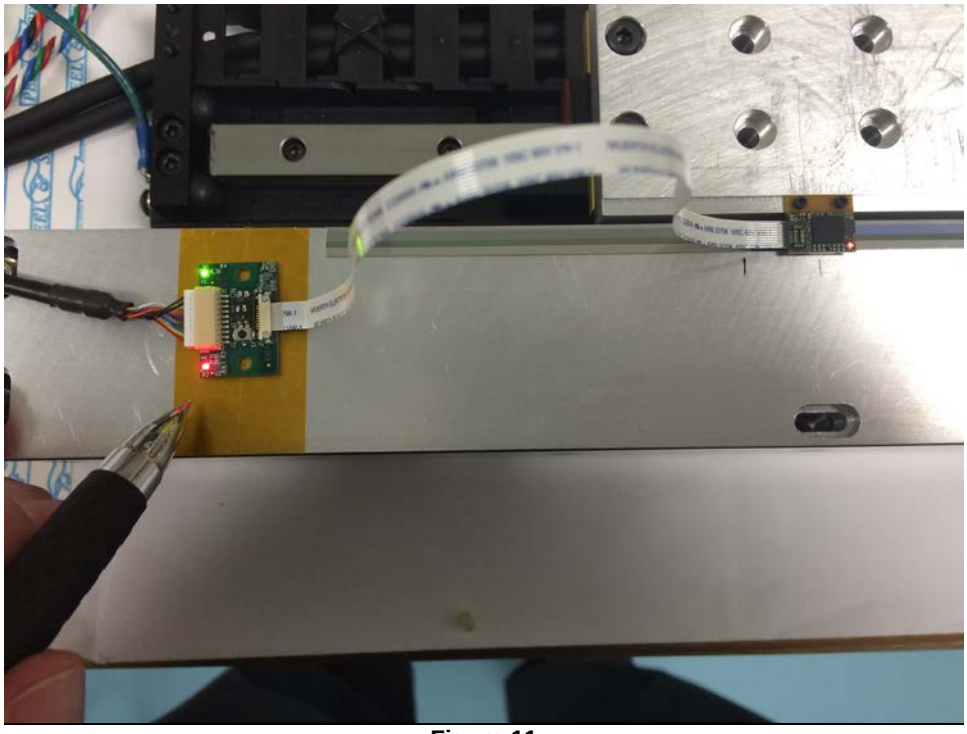

Figure 11

6.1.4 The Red Fault LED will illuminate to indicate that it is in calibration mode.

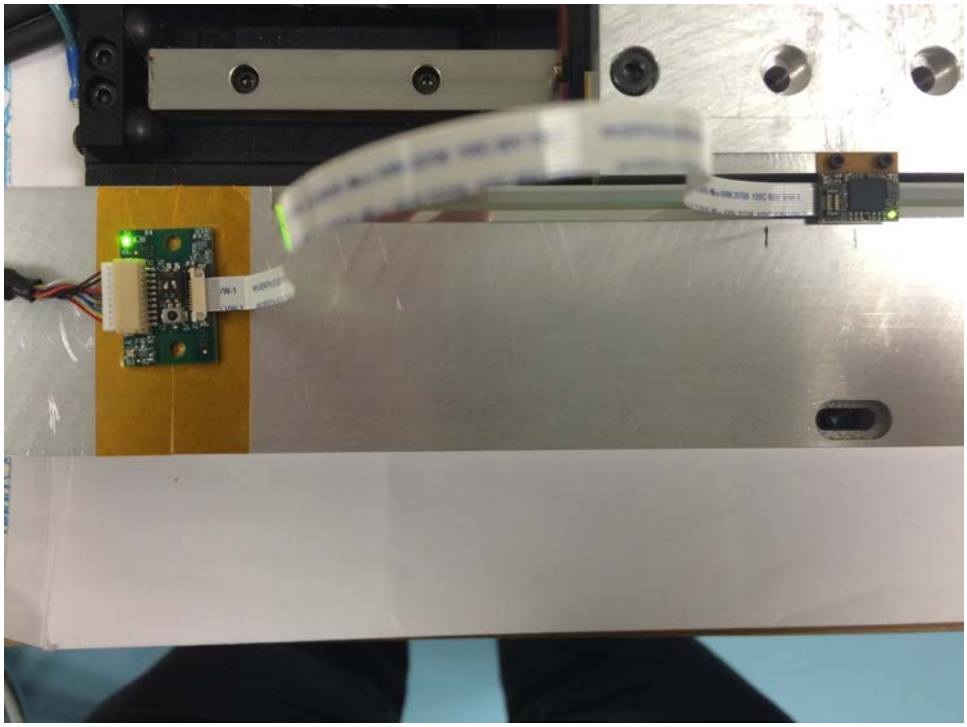

Figure 12

6.1.5 Manually move the encoder/carriage repeatedly over the index on the scale until the LED turns green.

7 COPLEY DRIVE SETTINGS

7.1 Set up communications

Figure 13

7.1.1 Open Copley's CME 2 software.

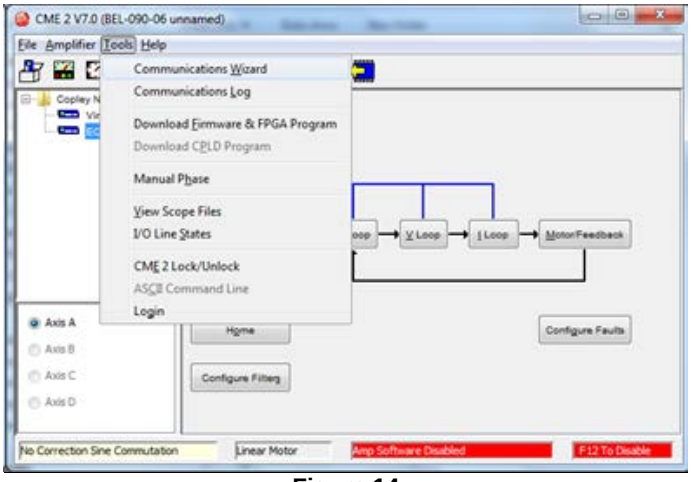

Figure 14

7.1.2 With a CAT5 Cable connected to the drive and PC, Select Tools/Communications Wizard.

Figure 15

7.1.3 Select EtherCAT/Next.

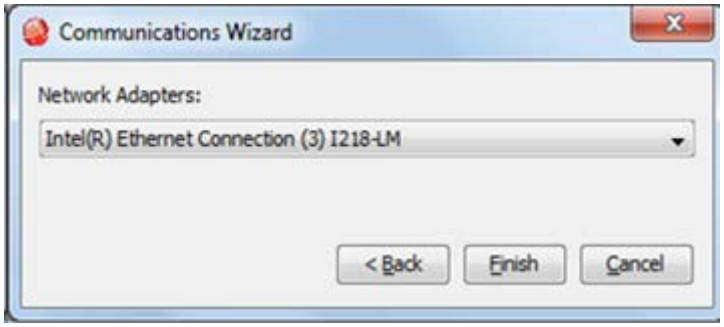

Figure 16

7.1.4 Select your Ethernet Connection/Finish.

7.2 Set your encoder type.

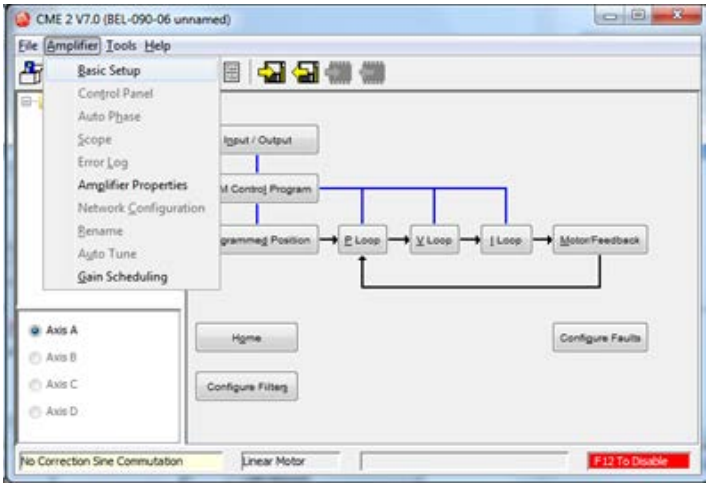

Figure 17

7.2.1 Select Amplifier/Basic Setup.

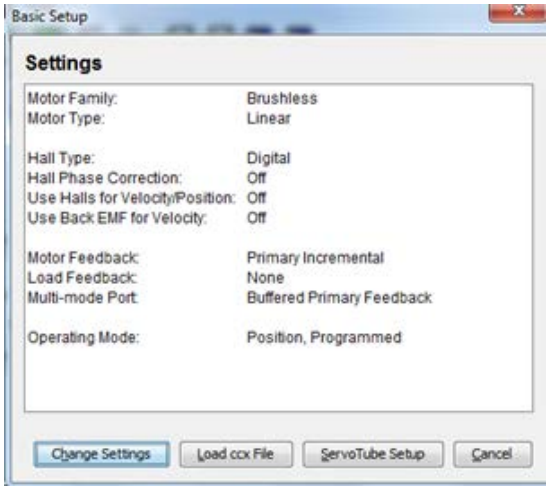

Figure 18

7.2.2 Select Change Settings.

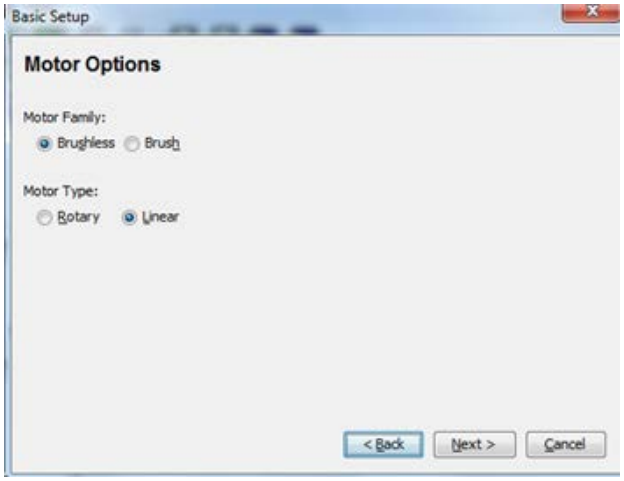

Figure 19

7.2.3 Under Motor Options select Motor Family and Motor Type and then click Next.

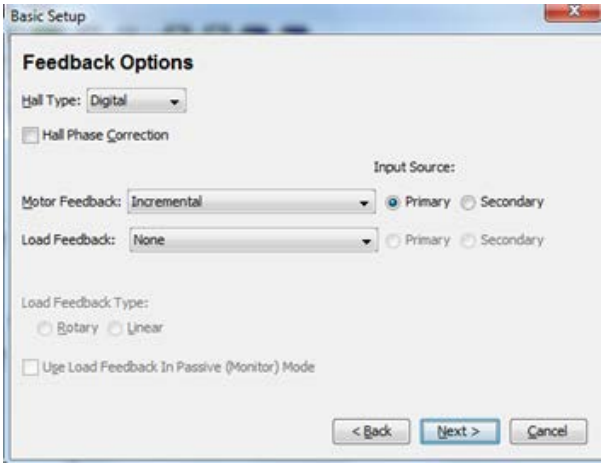

Figure 20

7.2.4 Under Feedback Options select your Hall Type Motor/Load Feedback values. This is where you will inform the drive about what type of encoder feedback to look for (Incremental or Analog). Choose the option that describes the encoder you have wired up and select Next.

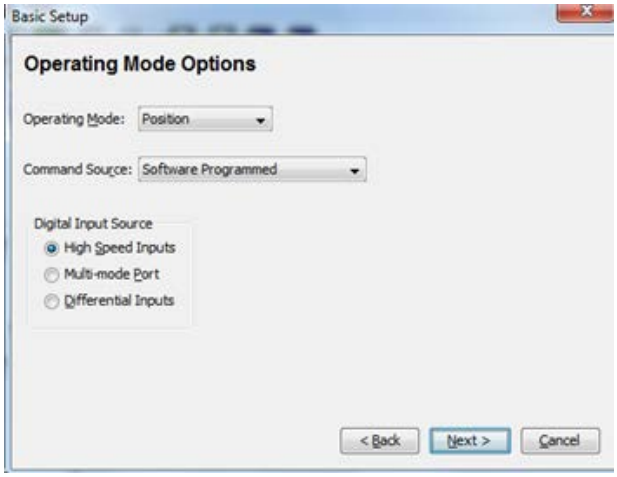

Figure 21

7.2.5 Under Operating Mode Options select an Operating Mode, Command Source, and Digital Input Source and then select Next.

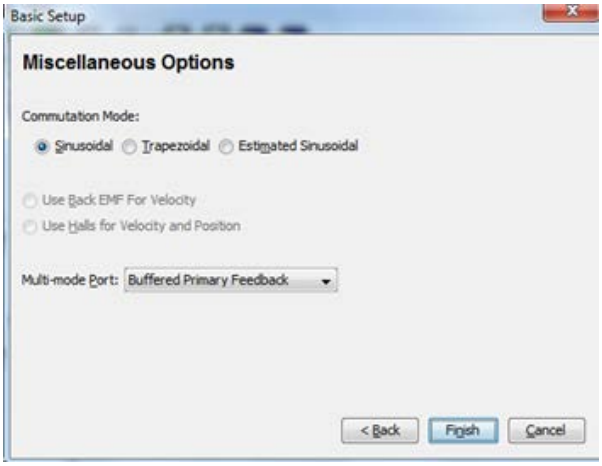

Figure 22

7.2.6 Under Miscellaneous Options select a Commutation Mode and Multi-mode Port option then Finish.

7.2.7 OK to save changes to the Amplifier Flash.

7.3 Set your digital encoder resolution

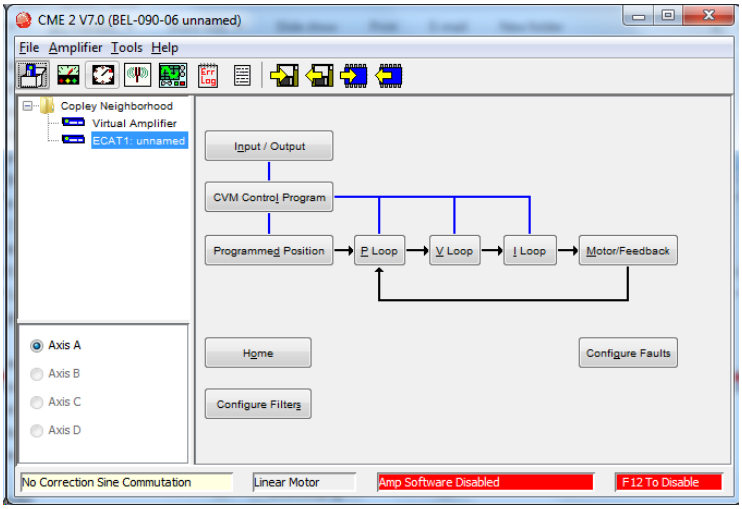

Figure 23

7.3.1 Click on the Motor Feedback block in the feedback loop graphical representation.

Figure 24

7.3.2 Click on the Feedback tab.

7.3.3 IF you had configured your feedback device as Incremental you would simply have to set the resolution of the encoder.

7.4 Set your analog encoder resolution

Figure 26

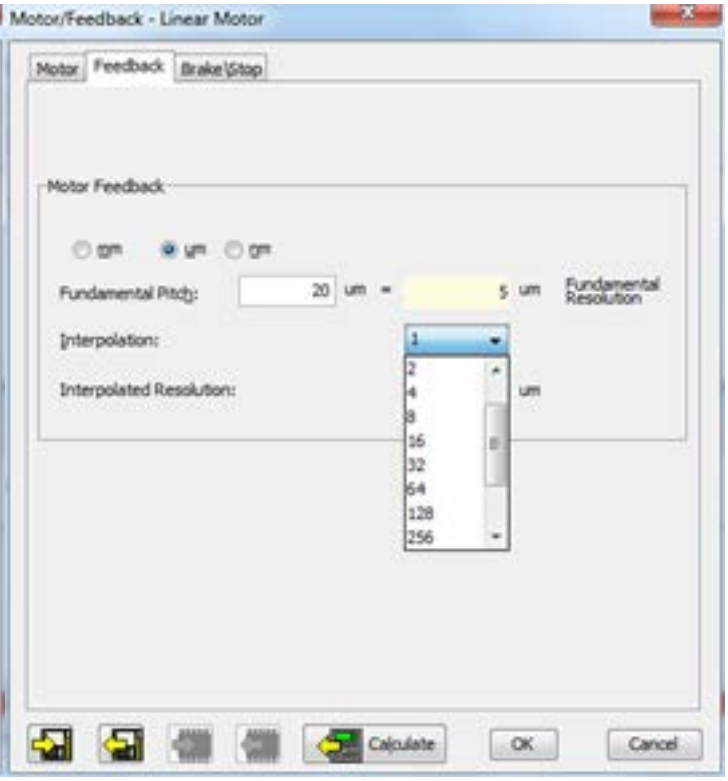

Figure 25

7.4.1 IF you had configured your feedback device as Analog you would set the Fundamental Pitch to 20 um.

7.4.2 Select an Interpolation multiplier to get the required resolution.

7.4.3 Select  to save a copy of your settings to disk.

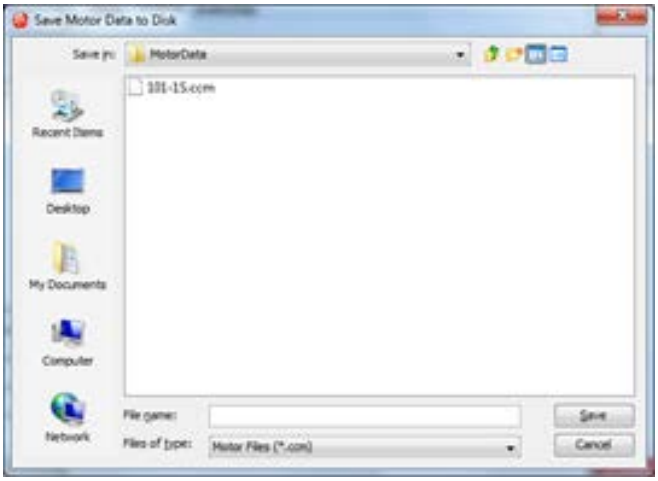

Figure 27

7.4.4 Chose a location, file name, and Save.

7.4.5 The system is now ready to set up your motor and begin tuning.

8 CONCLUSION

This document gives a brief description of how to set up a Copley drive with a MicroE Optira encoder using Copley's CMA 2 software. It should be used in conjunction with the most recent installation manuals for both components which will be available at www.microesystems.com and www.copleycontrols.com . There is also application assistance available at celera_support@gsig.com