EAGLE SDK CURRENT LOOP APP

User Guide

Version 1.0.2

CONTENTS

WARNING

Be aware that the shaft or motor will move during operation. This firmware will cause the motor to create forces and motion. Ensure the shaft and motor are mounted in a safe location and are not in danger of hitting people or property.

OVERVIEW

This is a supplemental guide for the EagleSDK_4_20_mA_loop firmware, set up to work with an Eagle controller board with additional breakouts from the GPIO section to allow for input and output current loop signals. There are provisions for two Orca motors and control signals. For basic Eagle controller and Orca motor setup, see the EagleSDK QuickStart Guide. Source code and additional text and video documentation can be found here: https://github.com/IrisDynamics/EagleSDK_2.0 in examples/EagleSDK_4_20_mA_loop.

An IrisControls window application is available for configuring the force output range, calibrating the shaft range of motion, and for general debugging and data visualization purposes. Software can be downloaded here: https://github.com/IrisDynamics/IrisControls4

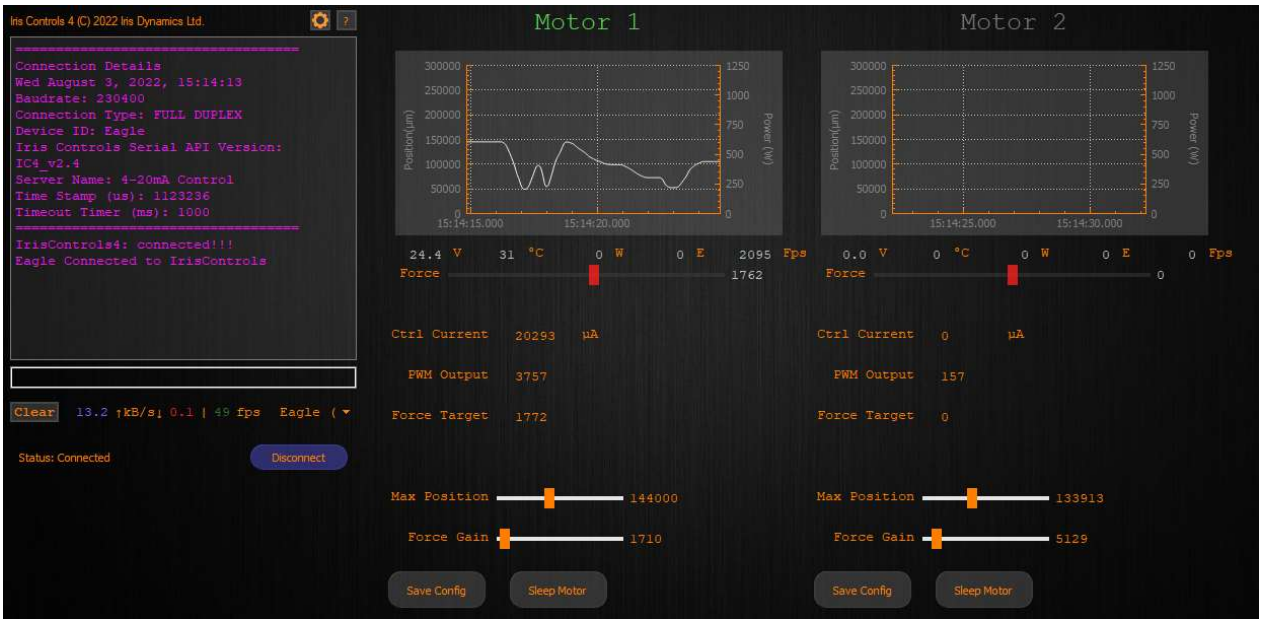

Figure 1: IrisControls application for configuration and visualized information

The 4 – 20 mA input signal is used to control the force output of the motor. This value is normalized such that 12 mA signifies 0 force, 4 mA commands a maximum negative force, and 20 mA commands a maximum positive force. The maximum force is configurable through the IrisControls app GUI's "Force Gain" slider.

When a control signal below 3.8 mA is detected, the motor enters sleep mode. Once a signal above that threshold is first received, the force output of the motor ramps up to the target over the course of 2 seconds. If there are any motor errors present, the motor will not enter force mode and will remain in sleep mode until the error is resolved.

The motor's position is output as a PWM signal from the Eagle controller that is converted to a 4-20 mA signal through a PWM to current loop converter. This output is normalized across the max position range, where 4 mA corresponds to the 0 position of the shaft and 20 mA corresponds to the fully extended shaft position. The shaft length in micrometers can be configured using the "Max Position" slider.

If the motor becomes disconnected, the current output will be 4 mA. On reconnection, provided there remains a valid control signal, the force will ramp up to the target force.

These configuration values can be configured by moving the slider or inputting a value by clicking the field to the right of the slider and typing in a number. Pressing the "Save Config" button will save the values to the Eagle's memory and will persist through reset.

There is also a "Sleep Motor" button that will have the motor enter sleep mode which will ignore control signal commands to the motor.

Once the configuration is set up, the firmware does not require connection with Iris Controls unless visual feedback is desired.

EAGLE DIAGRAM

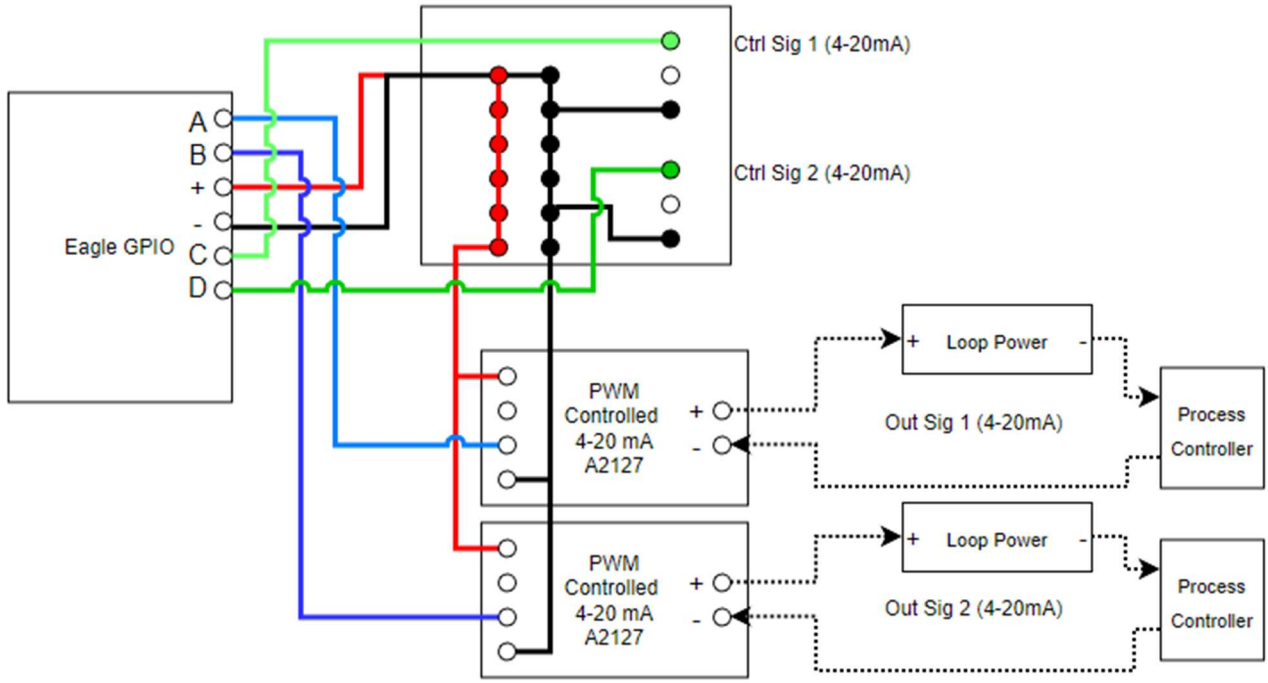

Figure 2: Peripheral Connection Wiring

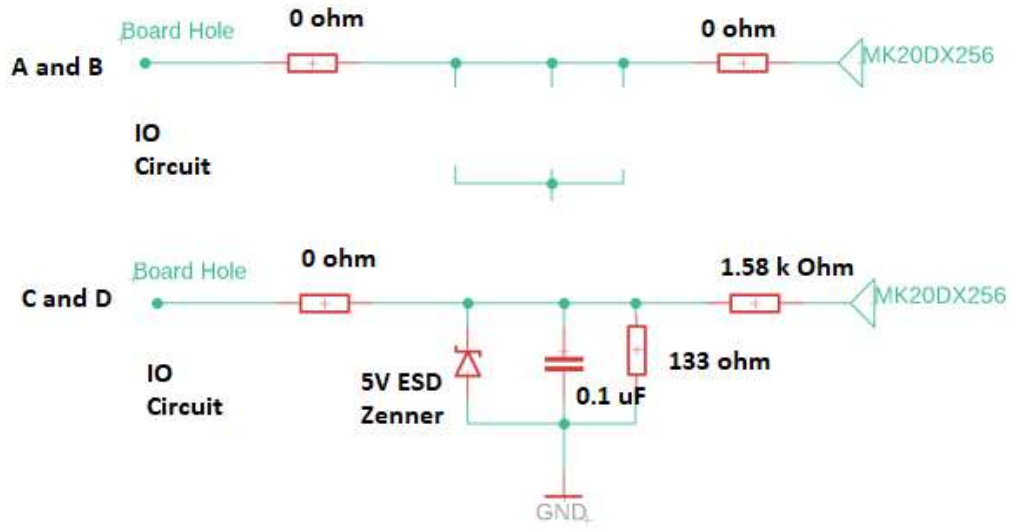

Figure 3: Onboard Eagle GPIO circuit