Computer Control with Labview

Products:

L12-SS-GG-VV-I
L12-SS-GG-VV-R
CIB w. PQ12-GG-VV-F
CIB w. L12-SS-GG-VV-F

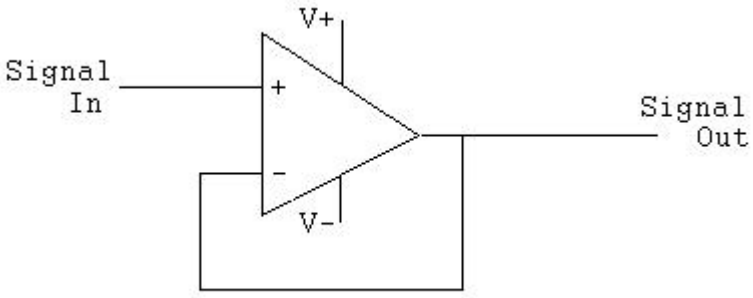
This note is supplied to provide further information regarding computer control of Firgelli Actuators. Firgelli Actuators can be used in a variety of automation and positioning projects. The most basic wiring instructions are outlined to provide a starting point for many projects. This note is written for Firgelli Micro Linear Motion Devices with internal controllers, however Firgelli's more basic actuators can be controlled in a similar way with the addition of power relays or a CIB.

Firgelli actuators can be computer controlled using one of the many Digital to Analog Converter Modules on the market. This note covers the use of a specific model but this is not necessarily the best option for any given project.

Choosing a DAC Card:

- Analog or Digital output(s) (At least 1)
- Analog input(s) if feedback is desired (At least 1)
- High input impedance required(Mohms)
- The input can be tested by powering the actuator and extending it half way. Then connect the feedback wire to the ADC input. If the actuator moves, then the impedance is too low. Test the performance and if it is not acceptable, add a

simple unity buffer between the feedback and the ADC. This is not internal to the actuator due to space constraints.



- Many op amps are suitable, however things to look for are: High Input Impedance, Rail to Rail output, Single supply, greater than 5V supply. An IC such as the AD822 may be a good choice.
- Labview's low cost NI USB-6008 works well with Firgelli controllers.

Connecting a DAC Card:

In the case of the NI DAC card, the inputs are differential and each one that is used will require a signal and a ground. Connect the actuator's feedback wire (Pin 3 - Purple) to one of the analog inputs (+) and wire the ground (-) to the DAC's AGND connection and to the actuator's Ground connection (Pin 6 – Black).

You will also need a separate power supply for the actuator; 6VDC, or 12VDC depending on the actuator you have chosen. For the L12 series a 500mA to 1A power supply is recommended. Connect the +ve to the actuators power connection (Pin 5- Red), and the power supplies ground (-) to the previously connected AGND and actuator GND.

Simple current measurement can also be implemented in a similar way as long as the inputs are differential and isolated from each other. Connect a resistor between the 12/6V supply and the actuators Red (+ve Power) wire. Ensure the resistor is rated for the maximum current of 600mA (6V) or 300mA (12V). Satisfy (Imax^2)*R<Rating. Between 0.5ohms-1ohms is usually a reasonable choice.

The current is then I=V/R. R should be chosen to give a reasonable full scale voltage without dissipating too much heat. An additional gain stage may be required depending on the Labview module.

Plug the DAC's USB cable into your computer and install Labview and drivers as instructed in the NI instructions.

Programming in Labview:

There are three options for control of the Actuators with the built in -I Controller: voltage, current, or RC.

For V:

- 0 Volts will fully retract the actuator.
- 5 Volts will fully extend the actuator.
- An analog output can be used to generate a voltage between 0-5V.
- A digital output can also be used when PWM is applied to vary the average voltage between 0-5V.

For I:

- 4mA will full retract the actuator.
- 20mA will fully extend the actuator.
- The NI6008 can not source sufficient current for this mode. The V mode is recommended instead, however other models may support this.

RC:

- A continuous square wave signal with time high pulses between 1 and 2ms.
- 1ms pulses will fully retract the actuator.
- 2ms pulses will fully retract the actuator.
- A digital output is used to generate this signal.

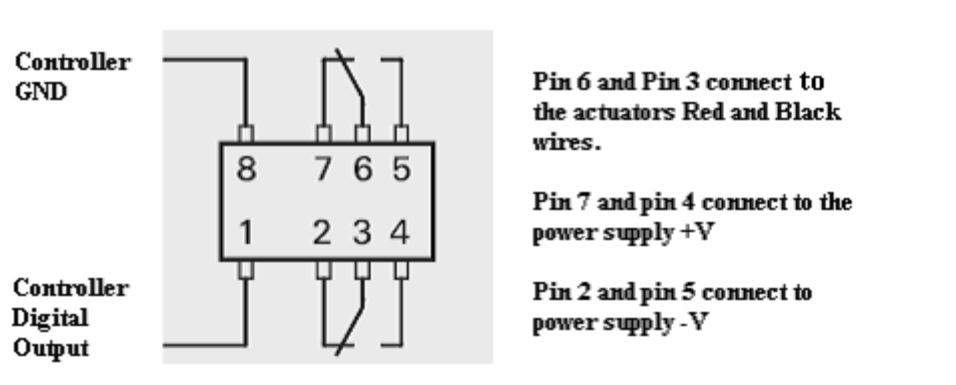
In Labview the NI-6008 can be controlled using the built in blocks for the 6008.

Controlling Actuators that do not have an integrated controller:

Firgelli's –P with linear feedback can be controlled as described above with the addition of a Firgelli CIB.

The –B and -S basic actuators with and without limit switches can be controlled with the addition of power relays. When choosing a relay, keep in mind the maximum current your controller can output (The NI-6008 uses pull ups so it will not work for this), actuator current requirements (L12 0.5A – 1A are good choices), and voltage (30V is a standard value).

A DPDT type relay works well if you just want to fully extend and retract the actuator, relying on limit switches to stop the motor. Two SPST relays can be used to allow more control. Rough position control can then be achieved using timed movements.



When you output High (5V) on the Digital output the actuator will fully retract, and when you output a Low (0V) the actuator will fully extend.

The picture shown is of a Tyco PB1170 12V, other relays may have differing pin-outs. Depending on the controller used an extra transistor stage might be required to drive relays. In that case a solid state solution may be more applicable.

For more project ideas and build instructions visit www.firgelliforum.com .

Related Documents:

- Extending actuator life

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