



# Joystick

Position / Velocity Control

## Application Note



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## Revision History

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# 1 Introduction

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## 1.1 Background

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Despite the gaining popularity of machine vision and artificial intelligence, many applications still require for an operator to manually control and maneuver machines at different stages of the process. Analog devices such as joysticks provide for an intuitive control of such machinery and are often found in control panels.

Agito motion controllers come with the joystick feature which supports the direct interfacing the joystick to the controller.

## 1.2 Scope

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This application note seeks to explain the relevant steps to connect a joystick to the controller and set it up as a command input for the controller. For more information on how to do basic setup for the motors, please refer to the Agito user manual.

## 2 Setup

### 2.1 Equipment and overview

The typical setup topology is presented in the following figure:

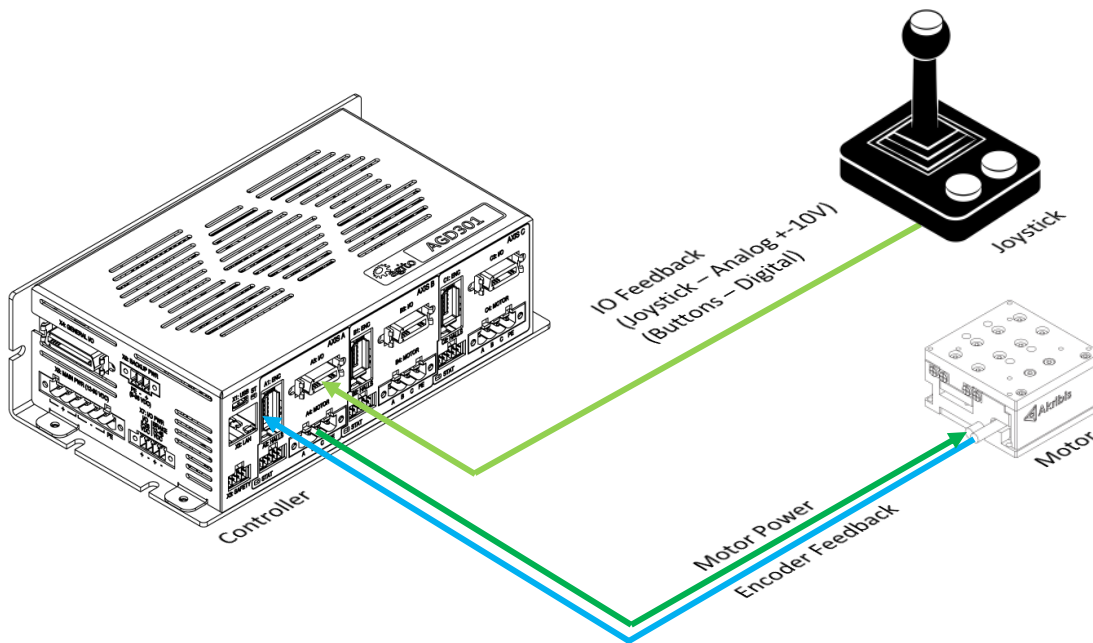


Figure 1. Standard setup topology

The example setup includes:

1. Joystick controller that supplies  $\pm 10V$  signal, as well as digital signals from the buttons.
2. Agito controller that receives the signal from the joystick and in turn drives the motor.
3. Motor with feedback (could be any rotary, linear or DC motor).

## 2.2 Wiring

### AGD301: A1 – Main Encoder Port (Example shows pinout for sincos encoder)

Function	Pin Name	Pin #	Remarks
5V	5V	1	Power for encoder
GND	GND	2	Power return for encoder
SIN+	Encoder_2+	5	Encoder signal input
SIN-	Encoder_2-	6	Encoder signal input
COS+	Encoder_3+	7	Encoder signal input
COS-	Encoder_3-	8	Encoder signal input
Z+	Encoder_4+	9	Encoder signal input
Z-	Encoder_4-	10	Encoder signal input

### AGD301: A3 – I/O port

Function	Pin Name	Pin #	Remarks
	Analog Input 1+		±12V, 12-bit resolution (16-bit option avail)
	Analog Input 1-		Analog input return. Connect to Gnd for single ended analog input.
	Digital Input 1	1	Isolated digital input (NPN or PNP, depending on connection of the group's common pin)
	Digital Input 2	12	Isolated digital input (NPN or PNP, depending on connection of the group's common pin)
	Digital Input 3	2	Isolated digital input (NPN or PNP, depending on connection of the group's common pin)
	Digital Input Common	11	Common pin for all the inputs on this port. (Connect to power for NPN sensor, and connect to return for PNP sensor)
	IO Power	19	I/O Power Output. Connected internally to X7: IO PWR Pin 1
	IO Power Return	20	Connected internally to X7: IO PWR Pin 2

### AG301: A4 – Motor Power

Function	Pin Name	Pin #	Remarks
Motor Phase A	Phase A, M1	1	Motor Power
Motor Phase B	Phase B, M2	2	Motor Power
Motor Phase C	Phase C, M3	3	Motor Power, NC for voice coils
PE	PE	4	Motor PE



**Note – Wiring for other controllers**

This example uses Agito controller, AGD301 for the example. Wiring information for other controllers or encoder protocols can be found in their respective Product Manuals.

## 2.3 Digital Input Setting

If the joystick comes with buttons, they can be used for assigning useful features for controlling the machine. For example, one button can be used to turn on the motor, while another button could be used to actuate a gripper.



In PCSuite, navigate to IO Tab , then the Digital Menu and then the Discrete Inputs

Discrete Inputs

Check that the IO are working. You may also assign built-in functions (modes) such as turning on the motor or stopping the motor. If the function that you require is not available, you can write a user program to realize the function. Do note, however, that the user program is not running at real time. Refer to the User Program manual for more information.

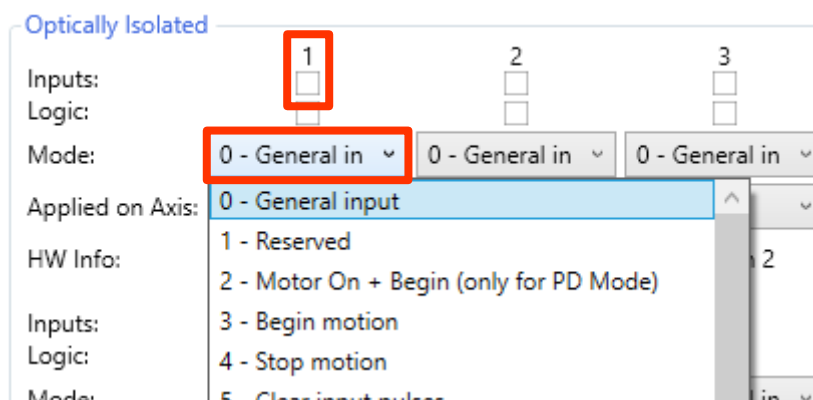


Figure 2. Screen capture of Digital Menu page on AGD301.

## 2.4 Analog Input Setting

The main functionality of the joystick is to use an analog input as a position or velocity command.



In PCSuite, navigate to IO Tab , then the Analog Menu .

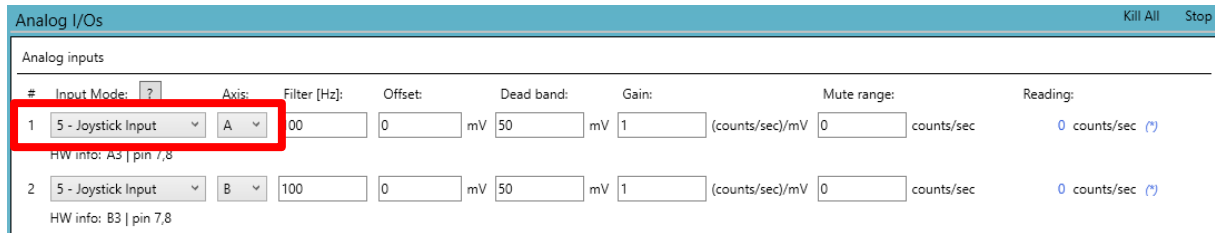


Figure 3. Screen capture of Analog I/O Menu page on AGD301.

In figure 3, the analog input 1 is configured as 5 – joystick mode for A axis, an input 2 for B axis. Then user may also use the filter, offset, dead band, gain and mute range settings to condition the input signal. It is recommended to add a dead band or mute range to remove jitter/noise from the signal at 0V.



The reading on the right shows what the command will be when joystick mode is activated. (Treat the units to be counts/sec if using input as velocity command and in counts if using as position command. PCSuite just assumes joystick will be used in velocity mode in displaying the units here.)

Check that the input reading is correct and reasonable before proceeding.



### 3 Motion



In PCSuite, navigate to Motion Tab  , then the Joystick Menu  . Select **Joystick Velocity** to use the analog input as a velocity command (MotionMode = 15).

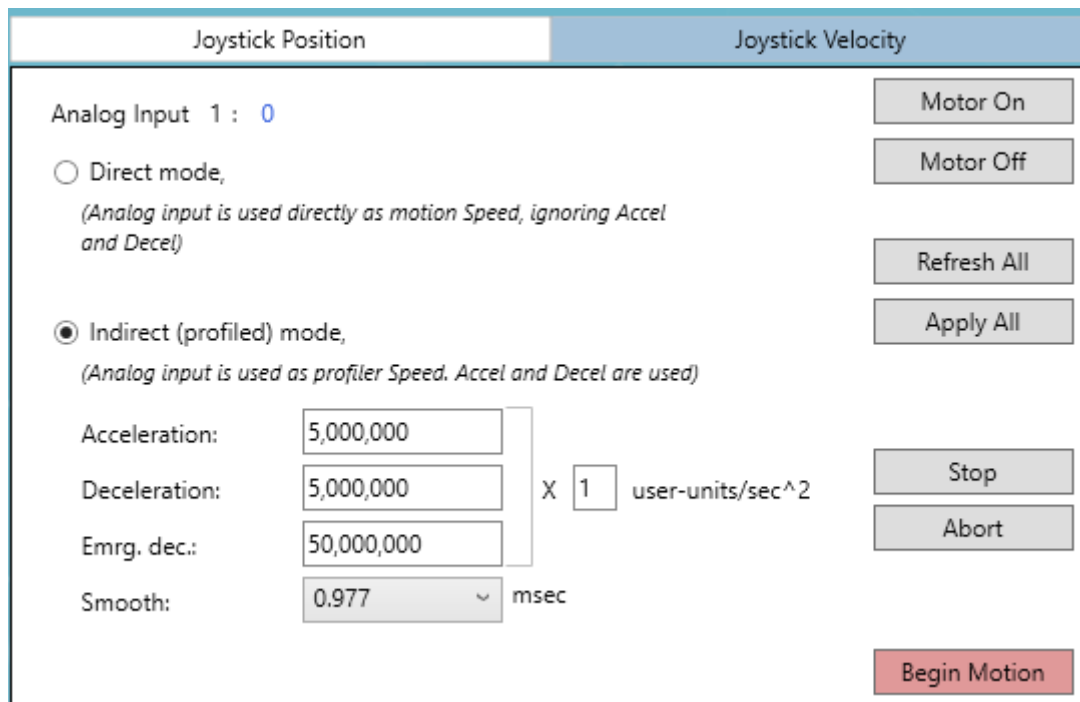


Figure 4. Joystick Menu on AGD301.

It is recommended to use the mode in Indirect mode, so that the acceleration and deceleration are limited to a reasonable value preventing possible current saturation. After configuring the values for acceleration, deceleration and smoothing factor, press the **Begin Motion** to enable the motor in joystick mode. Use the joystick to control the motor.

