

Performax 4EX – SA

**Advanced 4-Axis
Stepper Motion Controller
Standalone Version**

Manual



1. Introduction

PMX-4EX-SA is an advanced 4 axis stepper stand-alone programmable motion controller with USB 2.0 and RS-485 communication.

PMX-4EX-SA has linear coordinated and buffered motion capability for smooth curved motion control applications such as

- 3D CAD/CAM
- Engraving
- Laser cutting

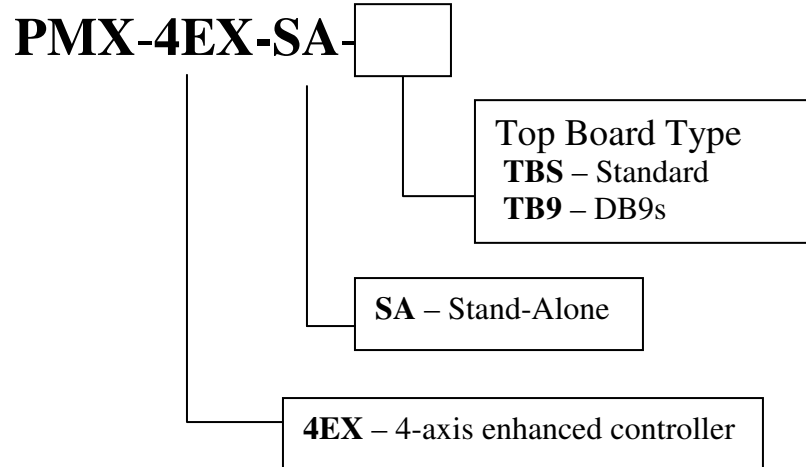
Performax 4EX SA Features

- USB 2.0 communication
- RS-485 ASCII communication with 9600, 19200, 38400, 57600, 115200 Baud rate
- Maximum pulse output rate of 6M PPS per axis
- Trapezoidal or s-curve acceleration
- On-the-fly speed change
- Continuous linear coordinated buffered move for XYZ axes for smooth move control with buffer size of 36
- XYZU linear coordinated motion
- XY circular coordinated motion
- XY arc coordinated motion
- Opto-isolated +Limit, -Limit, Home, and Alarm inputs per axis
- Homing routine using:
 - Home input only
 - Z index encoder channel only
 - Home and Z index encoder channel
- Pulse/Dir/Enable open collector outputs per axis
- Single-ended or differential quadrature encoder inputs per axis
- 8 opto-isolated digital inputs (NPN)
- 8 opto-isolated digital outputs (PNP)
 - Option to use 4 of the digital outputs for synchronous triggering
- 8 10-bit analog inputs
- Joystick control for XYZU axes
- Standalone programmable

PMX-4EX-SA comes with a Windows DLL for easy interface with the program from common programming language such as VB, VC++, and LabVIEW (USB). Sample program in VB is provided.

Model Numbers

Main Product



2. Top Board Options

The PMX-4EX-SA is available in two different top board configurations. The top board should be selected depending on your interfacing needs.

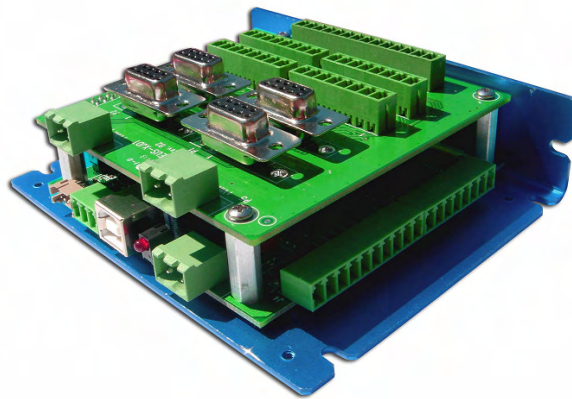
Standard Top Board (PMX-4EX-SA-TBS)

Standard Top Board consisting of 3.81 mm headers for X/Y/Z/U pulse/dir/enable outputs and alarm inputs. See picture below:

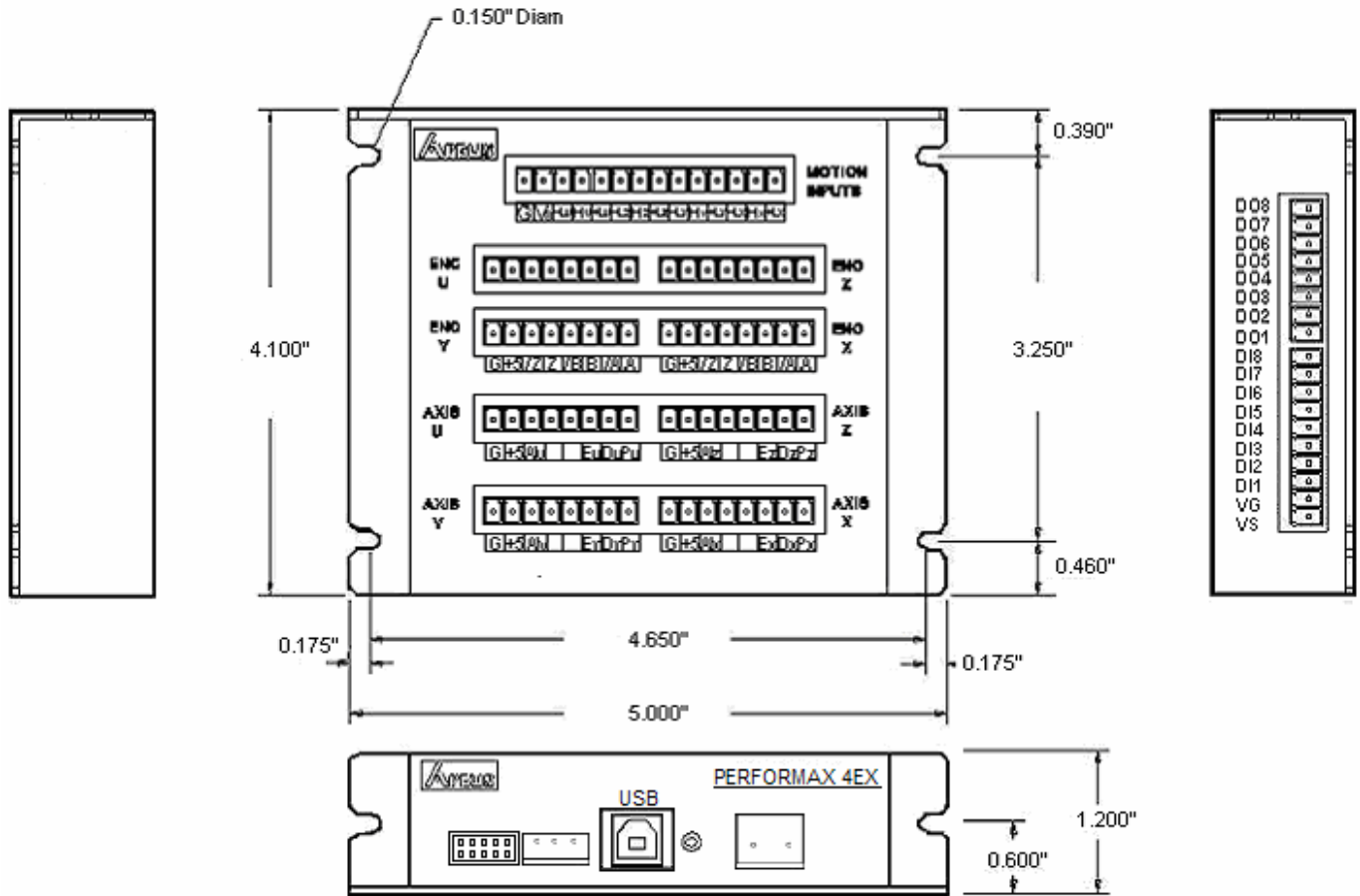


DB9 Top Board (PMX-4EX-SA-TB9)

DB9 Top Board consisting of DB9 headers for X/Y/Z/U pulse/dir/enable outputs. The DB9 headers on these top boards are pin-to-pin compatible with the Arcus series motor + driver (DMX-A2-DRV). See picture below:



3. Dimensions



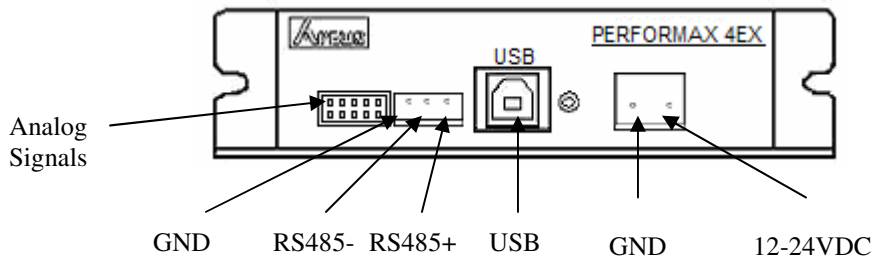
Note: The image above is of PMX-4EX-SA-TBS. The dimensions of PMX-4EX-SA-TB9 are the same, with the exception of the top board connectors.

4. Pin Descriptions

A. Connecting input power, USB and RS-485

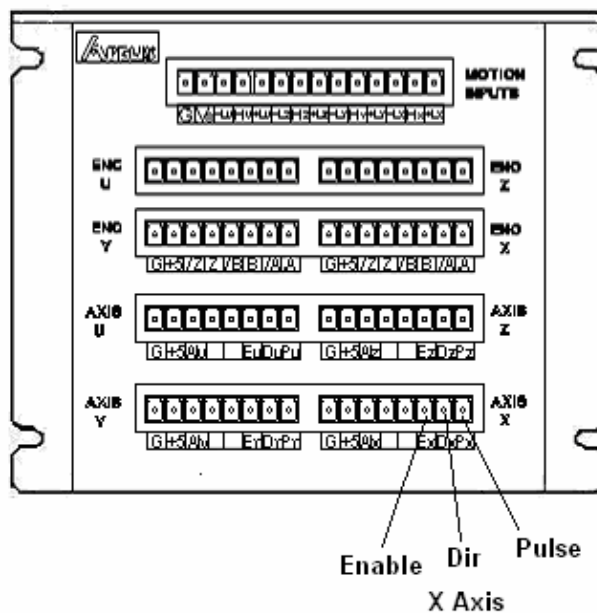
In order for PMX-4EX-SA to operate, it must be supplied with +12VDC to +24VDC. Power pins as well as communication port pin outs are shown below.

Note that only one method of communication can be used at the same time (i.e. user can not communicate via USB as well as RS-485 at the same time)



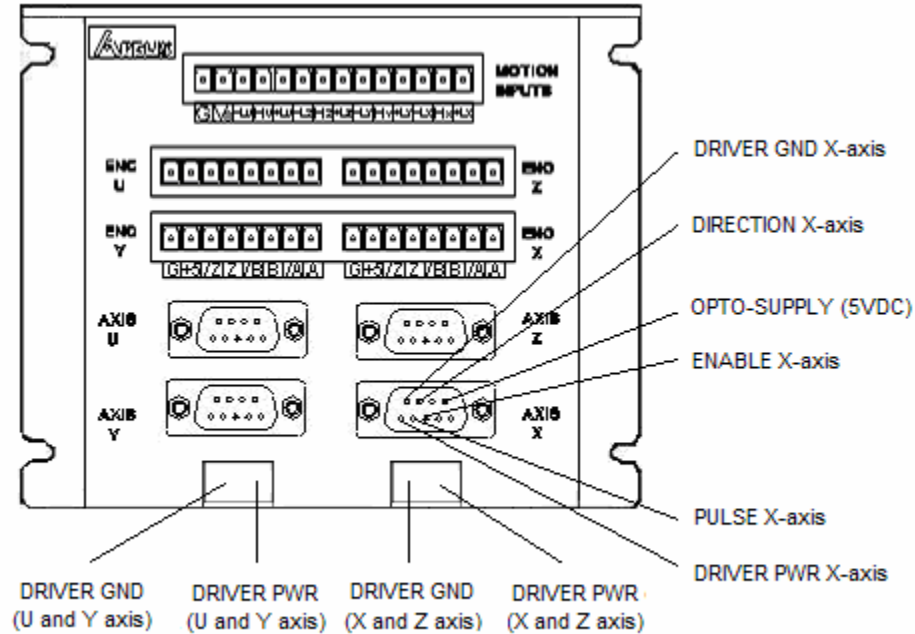
B1. Connecting to a stepper driver (PMX-4EX-SA-TBS)

Each axis has pulse, direction, and enable outputs for stepper driver control. The following shows the connector location for X axis pulse/dir/enable outputs.



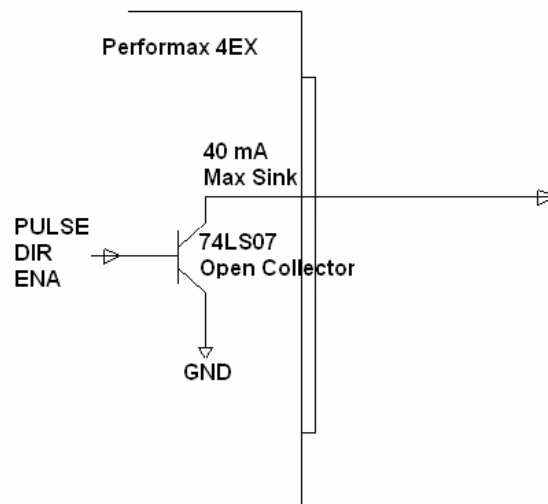
B2. Connecting to a stepper driver (PMX-4EX-SA-TB9)

Each axis has pulse, direction, and enable outputs. Following shows the connector location for X axis pulse/dir/enable outputs.

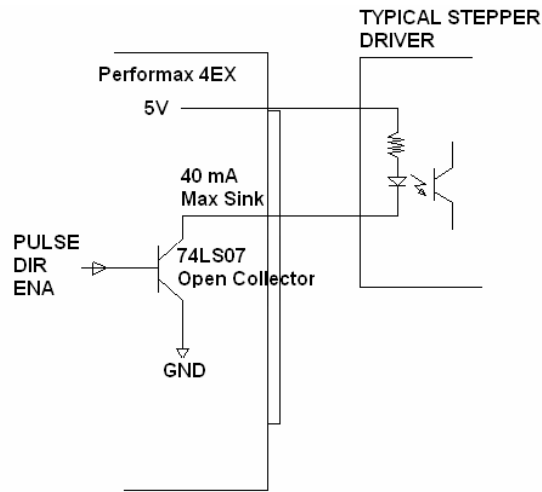


The pins on the DB9 headers can be connected directly to a DMX-A2-DRV module (pin-to-pin compatible)

Pulse/Dir/Enable outputs for both the standard and DB9 top boards are all open collector outputs capable of sinking up to 40mA of current.



Example of Pulse/Dir/Enable connection to stepper driver with opto-isolated input is shown below.

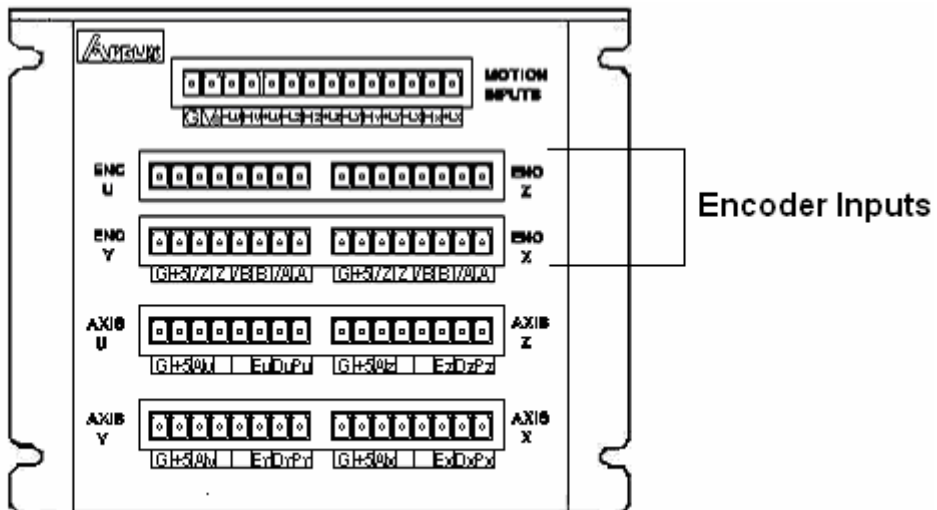


C. Connecting Encoders

PMX-4EX-SA supports both single-ended and differential quadrature encoder inputs. Inputs signals are 5V TTL.

When using single-ended encoders, use the /A, /B, and /Z inputs.

+5V supply and Ground signals are available to power the encoder. Make sure that the total current usage is less than 200mA for the +5V.



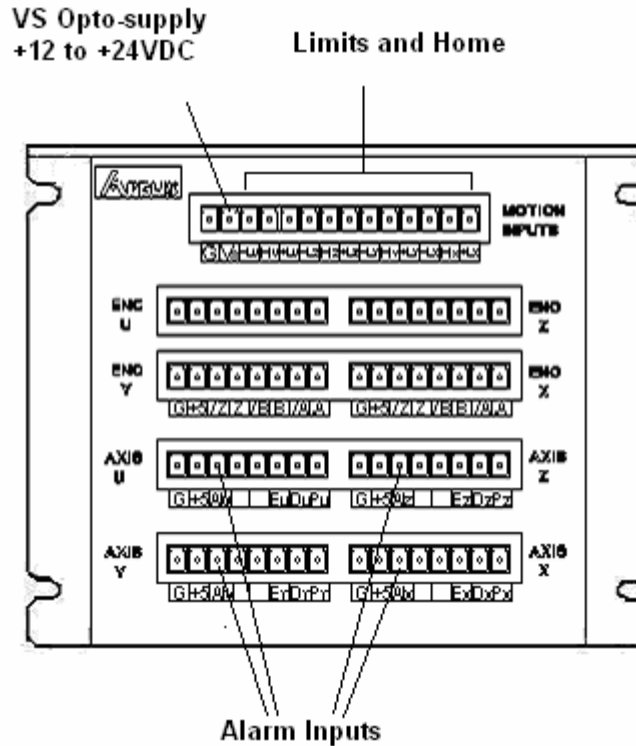
Note: Encoder pins are identical for both standard as well as DB9 top board

D. Connecting Limits/Home/Alarm

PMX-4EX-SA has opto-isolated +limit, -limit, home, and alarm inputs for each axis.

In order for these opto-isolated inputs to work properly, VS (opto-isolator voltage supply) must be supplied. Range of VS is from +12VDC to +24VDC.

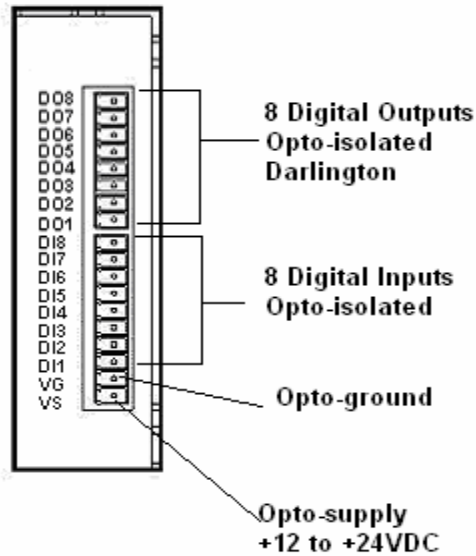
To trigger the opto-isolated inputs, sink the limit or home input signal to the ground of the Vs. For wiring diagram, see “Connecting Digital Inputs and Outputs”



Note: Limit/Home input pins are identical for both standard as well as DB9 top board.
Alarm input is not available on the DB9 top board.

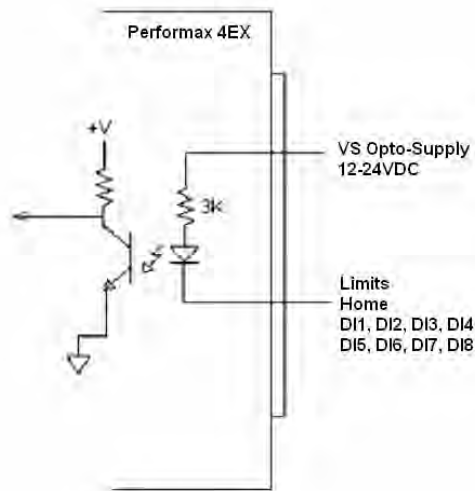
E. Connecting Digital Inputs and Outputs

PMX-4EX-SA has 8 opto-isolated digital inputs and 8 opto-isolated digital outputs.

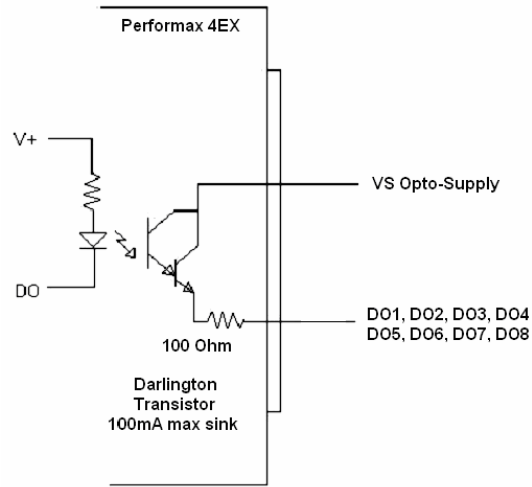


Note: Digital inputs and outputs are found on the bottom board of the PMX-4EX-SA. Therefore, pin out is the same regardless of top board choice.

In order for these opto-isolated inputs and outputs to work properly, VS (opto-isolator voltage supply) located on the side connector and VG (opto-isolator voltage ground) also located on the side connector must be supplied. Range of VS is from +12VDC to +24VDC.



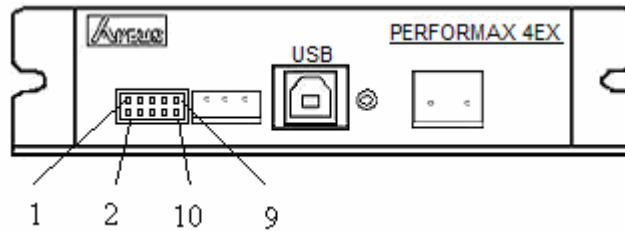
To trigger the opto-isolated digital inputs, sink the digital input signal to the ground of the VS.



For the opto-isolated outputs, the digital output signal will source from the VS opto-supply when the signal is turned on.

F. Connecting Analog Inputs

PMX-4EX-SA has eight 10-bit analog inputs. The inputs are voltage based, which accept from 0 to 5 VDC.



Description	Pin	Pin	Description
5V output	1	2	GND
AI7	3	4	AI8
AI5	5	6	AI6
AI3	7	8	AI4
AI1	9	10	AI2

Note: Analog inputs are found on the bottom board of the PMX-4EX-SA. Therefore, pin out is the same regardless of top board choice

5. Electrical Specifications

Power Requirement

Supply Power Requirement: **+12 to +24 VDC**

USB 2.0 Communication Interface

USB Connector Type: **B Type**
USB Communication Compliance: **USB 2.0**
Recommended Max USB Cable Length: **12 ft**

RS-485 Communication Interface

Baud Rate: **9600, 19200, 38400, 57600, 115K**
Type: **2-wire**
Protocol: **RS-485 Arcus ASCII command support**

Important Note:

Factory default setting for the baud rate is 9600 bps, with Device Name = 4EX00

Pulse, Dir, Enable Outputs

Type: **Open-collector output**
Maximum sink voltage: **+24 VDC**
Maximum sink current: **40 mA**

+Lim, -Lim, Home, Alarm and Digital Inputs

Type: **Opto-isolated inputs**
Voltage range: **+12V to +24VDC**
Max sink current: **40 mA**

Digital Outputs

Type: **Opto-isolated Darlington outputs**
Max voltage: **+12V to +24VDC**
Max source current: **100 mA**

Analog Inputs

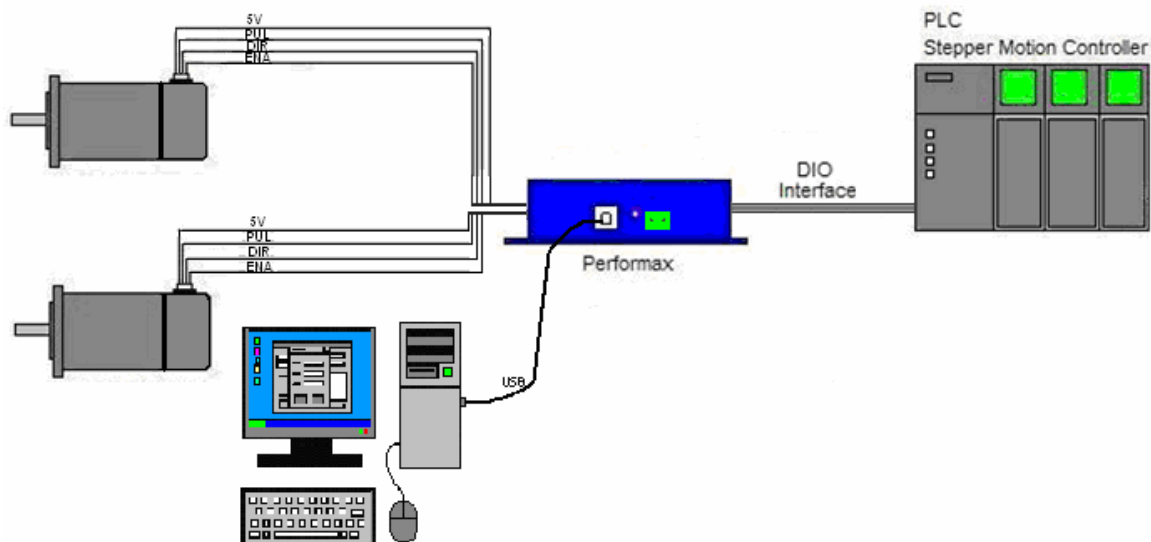
Type: **10-bit, Voltage**
Max voltage: **0V to +5VDC**
Max source current: **10 mA**

6. Getting Started

Typical Software Setup Steps for First Time Users:

- 1) **Run Performax USB Driver Setup program.** Both setup program and the manual for Performax USB Driver setup can be downloaded from the web site.
- 2) **Connect the Performax USB device to the Windows PC.** Go through typical Windows USB device setup. See the Performax USB Driver Setup manual for details.
- 3) **Use test program to check the USB communication and controller features.** Sample program for each of the Performax devices can be downloaded from the web site.
- 4) **Write your custom application program.** Sample application programs written in VB6, C++, or LabVIEW can be used as a starting point and these programs are available for download from the website.

Typical Setup



Important Note: In order to communicate with PMX-4EX-SA through USB, proper driver must be installed first. Before connecting the PMX-4EX-SA device or running any program, please go to the Arcus website and download the USB driver installation instruction and run the USB Driver Installation Program.