

AN004 – Using the PMDX-126's Error Input and Restart Output with GeckoDrive Servo Drivers and Mach3 CNC Software

1.0 Overview

This application note describes how to connect the PMDX-126 to the GeckoDrive G320/G320X/G340 step servo driver's "ERR/RST" terminal to allow the PMDX-126 to detect a GeckoDrive error (fault) state and to reset the GeckoDrive drivers once they enter a fault condition.

NOTE: The PMDX-125 has the same ERR/RST connections as the PMDX-126 Revision A and Revision B. Wherever this application note mentions the "PMDX-126 Revision A" or "PMDX-126 Revision B", it refers also to the PMDX-125.



SAFETY WARNINGS:

The PMDX-126 is intended for integration by the purchaser into industrial control systems. It is solely the purchaser's responsibility to assure that the system is configured in a manner consistent with applicable safety requirements. Practical Micro Design, Inc. does not control how this board is integrated into the purchaser's system and cannot be responsible for guaranteeing the safety of your system.

The PMDX-126 is not guaranteed to be fail-safe. The system into which the PMDX-126 is installed should provide fail-safe protection and emergency stop capability.

The PMDX-126 contains circuitry that may be connected to dangerous voltages. Care must be taken that user cannot come in contact with these voltages. An enclosure that allows for modest ventilation, but prevents intrusion by operator's hands and foreign objects, especially conductive byproducts of machining operations, should be utilized with this board. Interlock switches on power circuits should remove power when the enclosure is opened.

Automated machine tools, into which the PMDX-126 may be integrated, can cause injury. Precautions should be taken to assure that operators are trained in their proper operation and safety procedures, and that they are protected from moving parts that may be under remote control and may move unexpectedly.

2.0 GeckoDrive Connections

The GeckoDrive step servo drivers (models G320, G320X and G340) provide a terminal labeled "ERR/RES". This terminal is both an "error" signal out from the Gecko driver and a "reset" signal into the driver. See the GeckoDrive manuals for more information on the "ERR/RES" signal.

NOTE – The "ERR/RES" signal is referenced to the GeckoDrive's "POWER GND" terminal (motor power) and should not be connected to a signal that is referenced to the PC parallel port ground. The PMDX-126 provides optical isolation on all terminals that are part of the error/restart circuit (see below).

3.0 Connecting to Non-GeckoDrive Drivers

It is possible to connect the PMDX-126 (specifically the PMDX-126 Revision C) to other brands of server and stepper drivers that have error and/or reset terminals. The driver's error signal must be able to drive the opto-coupler input on the PMDX-126 (approximately 1mA at 5V) and the driver must be able to be reset by a contact closure. See our other app notes or contact us for more information.

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4.0 PMDX-126 Rev A and Rev B Connections

NOTE – The PMDX-126's "RST", "COM" and "ERR" terminals are optically isolated from the PC parallel port ground and from all other signals on the PMDX-126. This keeps the GeckoDrive "ERR/RST" and "ENC +5V" signals isolated from the rest of the PMDX-126 and from the PC parallel port.

4.1 "ERR" Input

See Figure 1. The "ERR" terminal should be connected to the "ERR/RES" terminals on all GeckoDrive drivers. This allows the GeckoDrive's error signal to trigger an E-Stop on the PMDX-126. When the Gecko Error signal goes active, the PMDX-126 will assert the E-Stop signal to the PC for approximately 1 second, and then flash an error code on the Status LED. See the section 9 of the *PMDX-126 User's Manual* for more information on the Status LED flash codes.

4.2 "RST" Output

See Figure 1. The "RST" (restart) output from the PMDX-126 should be connected to the "ERR" input on the PMDX-126 along with the "ERR/RST" terminals on all of the GeckoDrive drivers. This allows the PMDX-126 to pulse the GeckoDrive's error signal to reset the drivers. The "RST" and "COM" terminals are a pair of solid-state relay contacts that are "closed" for approximately 2 seconds (1 second on the PMDX-125) every time the PMDX-126 enables its outputs.

4.3 "COM" Terminal

See Figure 1. The "COM" (common) terminal should be connected to the encoder +5V terminal (ENC +5V) on one and only one of the GeckoDrive drivers. This provides the +5V references needed by the "RST" terminal to reset the GeckoDrive drivers. The "RST" and "COM" terminals are a pair of solid-state relay contacts that are "closed" momentarily every time the PMDX-126 enables its outputs. This restarts the GeckoDrive drivers.

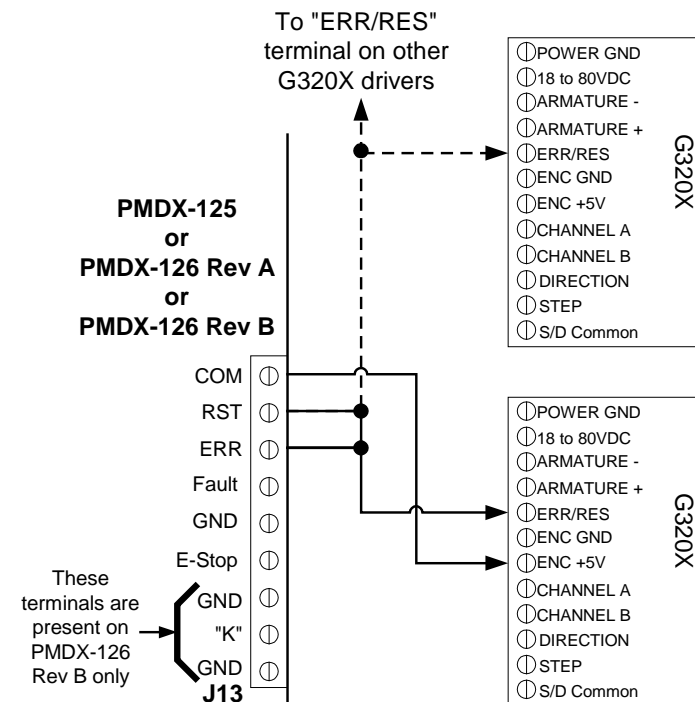


Figure 1 – Sample connections from PMDX-125 or PMDX-126 Rev A or Rev B to GeckoDrive G320X Servo Drivers

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5.0 PMDX-126 Rev C Connections

NOTE – The PMDX-126 Rev C's "RST", "COM", "ERR+" and "ERR-" terminals are optically isolated from the PC parallel port ground and from all other signals on the PMDX-126. This keeps the GeckoDrive "ERR/RST" and "ENC +5V" signals isolated from the rest of the PMDX-126 and from the PC parallel port.

5.1 "ERR+" and "ERR-" Inputs

See Figure 2. The "ERR+" terminal should be connected to the "ENC +5V" terminal on one and only one of the GeckoDrive drivers. The "ERR-" terminal should be connected to the "ERR/RES" terminals on all of the GeckoDrive drivers. This allows the GeckoDrive's error signal to trigger an E-Stop on the PMDX-126. When the Gecko Error signal goes active, the PMDX-126 will assert the E-Stop signal to the PC for approximately 1 second, and then flash an error code on the Status LED. See the section 9 of the *PMDX-126 User's Manual* for more information on the Status LED flash codes.

5.2 "RST" Output

See Figure 2. The "RST" (restart) output from the PMDX-126 should be connected to the "ERR/RST" terminal on all GeckoDrive drivers. This allows the PMDX-126 to pulse the GeckoDrive's error signal to reset the drivers. The "RST" and "COM" terminals are a pair of solid-state relay contacts that are "closed" for approximately 2 seconds every time the PMDX-126 enables its outputs.

5.3 "COM" Terminal

See Figure 2. The "COM" (common) terminal should be connected to the encoder +5V terminal (ENC +5V) on one and only one of the GeckoDrive drivers. This provides the +5V references needed by the "RST" terminal to reset the GeckoDrive drivers. The "RST" and "COM" terminals are a pair of solid-state relay contacts that are "closed" momentarily every time the PMDX-126 enables its outputs. This restarts the GeckoDrive drivers.

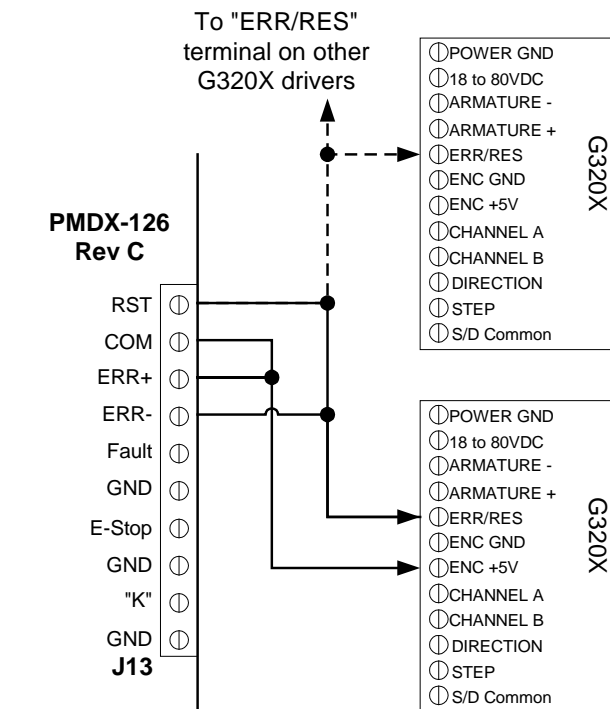


Figure 2 – Sample connections from PMDX-126 Rev C to GeckoDrive G320X Servo Drivers

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6.0 PMDX-126 Operating Modes and Restart Pulse

The “Restart” output on the PMDX-126 behaves differently depending on which operating mode the PMDX-126 is in. Please see the *PMDX-126 User’s Manual* for a full description of the operating modes which are summarized in Table 1 below

<i>PMDX-126 Mode</i>	<i>PMDX-126 DIP Switches</i>	<i>Restart Operation</i>
Run in Normal Mode	Config1 closed Config2 closed Config3 closed	The restart output is activated only when the user presses and releases the “Test” button on the PMDX-126. <i>There is no automatic control of the restart output in this mode. PMDX does not recommend operating the PMDX-126 in this mode when using the restart feature.</i>
Run in Normal Mode with Charge Pump	Config1 open Config2 closed Config3 closed	The restart output is activated whenever Mach3 enables its outputs. This is done by having the user click on the flashing “RESET” button on the main Mach3 screen. This causes Mach3 to start generating the “Charge Pump” signal, which the PMDX-126 uses to enable its outputs and activate the restart output.
Run in Expanded I/O Mode	Config1 closed Config2 open Config3 closed	
Run in Expanded Output Mode	Config1 open Config2 open Config3 closed	
Run in Expanded Input Mode	Config1 closed Config2 closed Config3 open	
Do not use	Config1 open Config2 closed Config3 open	Do not use this mode setting
Test Mode (PMDX pin-outs)	Config1 closed Config2 open Config3 open	Restart output is never active
Test Mode (alternate pin-outs)	Config1 open Config2 open Config3 open	Restart output is never active

Table 1 – PMDX-126 Modes and Restart Operation

7.0 Mach3 Configuration

There are two items in the Mach3 configuration that need to be set in order to sense the GeckoDrive’s error signal and to reset the fault condition, as described below.

NOTE – This is NOT a full tutorial on using and configuring Mach3. If you are not already familiar with changing the Mach3 configuration settings please read the *Mach3 CNC Controller Software Installation and Configuration Guide*, which can be downloaded from <http://www.machsupport.com/documentation.php>.

- (1) Enable the “E-Stop” (emergency stop) input and assign it to port 1 pin 10 with a red “X” in the “Active Low” column (i.e. E-Stop is “active high”)
- (2) Enable the “charge pump” output on port 1 pin 17 with a red “X” in the “Active Low” column.

These settings assure that a GeckoDrive error output will signal an E-Stop to Mach3, and allow the user to restart the Gekcodrives by clicking on the RESET button on the Mach3 screen.

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Note that if you are using the PMDX-126 in one of its “expanded” modes, the PMDX-126 Mach3 Plug-In will automatically enforce these settings and the plug-in will override any changes you make to these signals. See the *PMDX-126 Plug-In Installation Guide* for more information, which is available at <http://www.pmdx.com/Downloads>.

8.0 Revision History

<i>Date / Rev</i>	<i>Description</i>
14 Aug 2012 Rev 02	<ul style="list-style-type: none">• Changed app note numbering scheme (was AN125-2).• Added PMDX-126 revision C diagrams