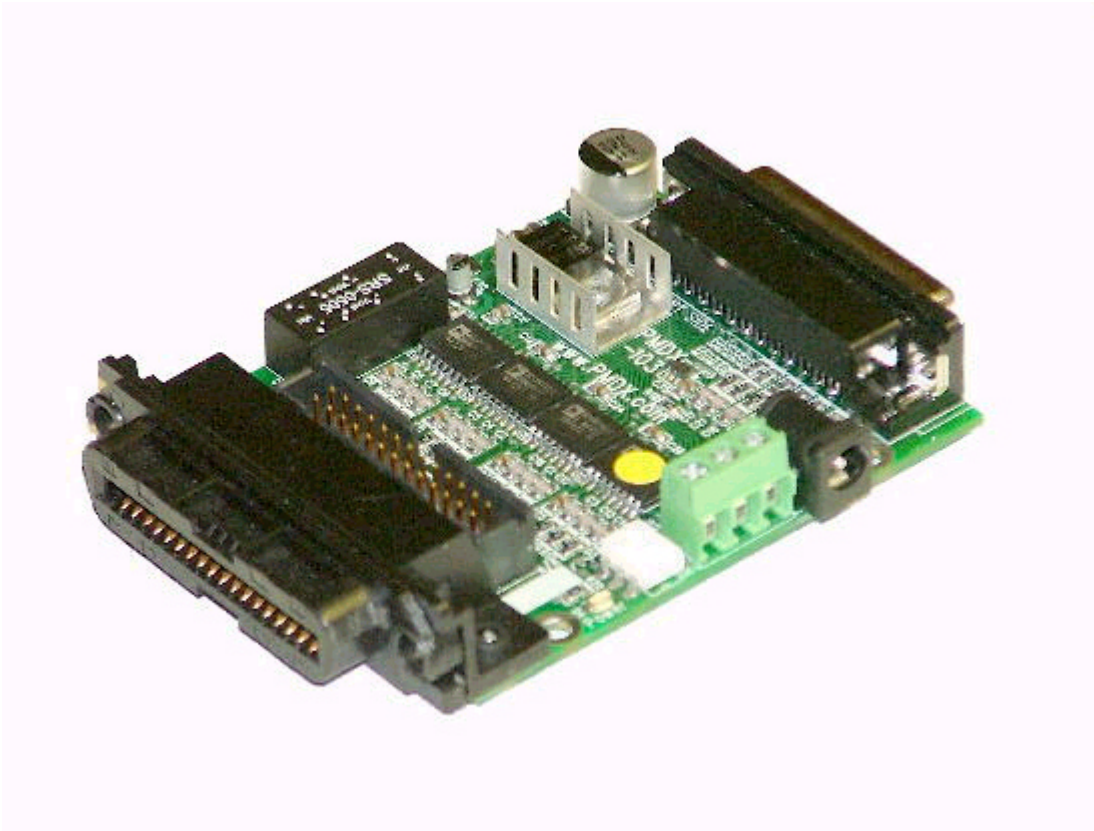


# PMDX-103

## Parallel Port Isolator Board



## User's Manual

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## **1.0 Overview**

This document describes the configuration and operation of the PMDX-103 Parallel Port Isolator Board. The PMDX-103 provides isolation for all PC parallel port signals (ground, data, control and status) between a PC and external equipment (including industrial machinery). This serves to isolate the PC interface from the external power and equipment. This document pertains to the following versions of the PMDX-103:

Circuit Board Revision: PCB-447B (marked on the bottom of the board)

### **1.1 Ordering Information (part numbers)**

The PMDX-103 can be built with different connectors on the "equipment" side, as designated by the full part numbers:

<u>Part Number</u>	<u>Equipment Side Connector</u>
PMDX-103-01	25-pin "D" connector (matches the PC parallel port)
PMDX-103-02	26-pin ribbon cable header

### **1.2 Important Safety Information**

The PMDX-103 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-103 is not guaranteed to be fail-safe. The system into which the PMDX-103 is installed should provide fail-safe protection and emergency stop capability.

The PMDX-103 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-103 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.

This product may not be used in life support or other critical safety applications.

### **1.3 Warranty Summary**

The PMDX-103 is warranted against failure due to defective parts or workmanship for 90 days from the date of sale. Refer to Appendix A for complete warranty details.

If you have an item requiring service, please see the support page on the PMDX web site (<http://www.pmdx.com>) for return instructions.

The purchaser must pay shipping to return the unit to PMDX. We will ship the repaired unit back to you via ground transportation at our expense. Repairs are normally completed within 10 business days. See Appendix A for our complete warranty details.

## 1.4 Features

The PMDX-103 has the following features:

### PC Parallel Port:

- Electrically isolates signals to/from the PC parallel port
- Allows use of all 8 data bits, 4 control outputs and 5 status inputs
- Centronics cable connector uses standard PC printer cable
- 26-pin ribbon cable connector for use with optional "ribbon cable to 25-pin 'D' connector" adapter cable

### Equipment Connector:

- 5 each status inputs w/pull-up resistors
- 4 each control outputs
- 8 each data outputs (bi-directional data is not supported)

- 25-pin "D" connector w/same pin-out as a PC parallel port (part number "PMDX-103-01")
- 26-pin ribbon cable header (part number "PMDX-103-02", this connector replaces the 25-pin "D" connector).

### Power Supply:

- +7 to +12 VDC **or** 9 VAC input via 2.1mm coaxial jack
- Alternate +5V input via screw-terminal connector
- Alternate +7 to +12 VDC **or** 9 VAC input via screw terminal connector
- Auxiliary +5 volt supply output (available for output only when **not** used as +5V input)

## 1.5 Updates to this Manual

Check the PMDX web site for revisions or updates to this manual (<http://www.pmdx.com>). The latest revision of this manual is available on the PMDX-103 page (follow the links from the main page).

## 2.0 Connectors

The PMDX-103 contains the following connectors. The following sections describe the pin-out and functionality of each connector. For all connectors, pin "1" is the pin closest to the reference designator (i.e. J1 pin 1 is the pin closest to the "J1" text on the circuit board). In addition, all connectors have square pads on pin 1 (look on the bottom of the circuit board).

Connector	Description
J1	Centronics 36-pin connector from PC parallel port
J2	Ribbon cable alternate to J1 from PC parallel port
J3	Ribbon cable alternate to J5 to equipment (available on part number PMDX-103-02)
J4	Alternate power connector
J5	25-pin "D" connector to equipment (available on part number PMDX-103-01).
J6	Power input via 2.1mm coax connector

Table 1 - Summary of PMDX-103 Connectors

### 2.1 PC Parallel Port (J1 and J2)

The PMDX-103 provides a Centronics-style connector for connections to a PC's parallel port. This allows the use of a standard PC printer cable. The board also provides a 26-pin ribbon cable header. When used with a "ribbon cable to 25-pin 'D' connector" cable, J2 is an alternative to the Centronics connector J1 (i.e. *don't use both J1 and J2 at the same time*).

**NOTE** – Some printer cables do not have good signal shielding. Some cables also omit some of the status or control signals (such as “~Auto Feed” and “Select Out”, 25-pin “D” connector pin numbers 14 and 13, respectively). We recommend using cables that are listed as IEEE-1284 compliant.

PC (note 1)	Pin Numbers		PC Signal Name	Direction (relative to PC)
	J1 (note 2)	J2 (note 3)		
1	1	1	~Strobe	out
2	2	3	Data 0	out
3	3	5	Data 1	out
4	4	7	Data 2	out
5	5	9	Data 3	out
6	6	11	Data 4	out
7	7	13	Data 5	out
8	8	15	Data 6	out
9	9	17	Data 7	out
10	10	19	~Ack (note 5)	in
11	11	21	Busy	in
12	12	23	Paper End	in
13	13	25	Select Out (note 4)	in
14	14	2	~Auto Feed (note 5)	out
15	32	4	~Error (note 5)	in
16	31	6	~Init (note 5)	out
17	36	8	~Select In (note 4 & 5)	out
18 – 25	19-30, 33	10 to 26, even	Ground	

**Table 2- PC Parallel Port Connectors (J10 and J9)**

**NOTE 1** – The PC Pin number column lists the pin numbers as they would appear on the PC's 25-pin “D” connector when using a standard printer cable.

**NOTE 2** – J1 is the Centronics 36-pin connector on the PMDX-103.

**NOTE 3** – J2 is the ribbon-cable connector (alternate to the Centronics 36-pin connector, J2).

**NOTE 4** – The “~Select In” and “Select Out” signals are named relative to the printer's point of view. That is why the “~Select In” is an *output* from the PC, and “Select Out” is an *input*.

**NOTE 5** – The “~” character at the beginning of some of the signal names indicates a signal that is “active low” (measured at the PC's 25-pin “D” connector) *when connected to a printer*. The PMDX-103 does not care about signal polarities nor does it alter the signal polarities. All signals on the equipment connector (J5 or J3) have the same polarity as the corresponding signal on the PC connectors.

The following web sites provide information regarding the PC's parallel port, including pin-outs, signal names and useful data for software control of the parallel port:

- IBM PC Parallel Port FAQ and tutorial  
<http://www.pmdx.com/Resources/parallel-port.html>  
 and  
<http://et.nmsu.edu/~etti/fall96/computer/printer/printer.html>
- General information and lots of links  
<http://www.lvr.com/parport.htm>
- If the previous links do not work, go to <http://www.pmdx.com> (our main web page), click on the "handy CNC information" link and then look for the links to parallel port information pages

Please note that these web links were accurate as of the printing date of this manual. While we expect that these non-PMDX sites will remain available at these addresses, it *is* possible that they will move or disappear.

## 2.2 Alternate Power Connector (J4)

Connector J4 provides alternate connections for input power (rather than using J6), and under some circumstances can provide a +5V output.

Pin 1 provides a ground reference for the non-isolated (i.e. equipment) interface. This ground is also connected to the main power connector (J6) and the equipment connector (J5).

Pin 2 can be either a +5V input or a +5V output. To use this pin as a power supply input, connect a regulated +5V power supply across J4 pins 2 and 1 instead of using the "Vin" connections on J4 or J6. ***Do not connect any power source to J4 pin 3 or to J6 when using J4 pin2 as a +5V supply input.*** To use this pin as a +5V power output, connect an AC or DC power supply to J4 pins 3 and 1, or to J6. In this case, the PMDX-103 can supply a regulated +5V output at up to 50 mA.

Pin 3 provides an alternate connection for the main power supply input. Connect the power supply either to J6 or across J4 pins 3 and 1. ***Do not connect any power source to J4 pin 2 when using either J6 or J4 pin3 as a power supply input.***

Pin	Label	Description
1	GND	Non-isolated ground
2	+5V	+5V (input or output, see text)
3	Alt. Vin	Alternate Vin (power supply voltage)

**Table 3 – Alternate Power Supply Connector Pin-Out (J4)**

**WARNING:** *Connect only one power source to the PMDX-103, either on J6 or on J4 pin 3 or on J4 pin 3. Connecting power sources to more than one of these connector terminals will damage the PMDX-103.*

## 2.3 Equipment Connector (J5 and J3)

The equipment connector provides an isolated version of the PC's 25-pin "D" connector. This connector can be connected to equipment using the same cables that would be used when connecting directly to the PC's parallel port. Two different connectors are available for the equipment side of the PMDX-103, determined by the full part number as shown in section 1.1, *Ordering Information*.

All of the status inputs on the equipment connector have 4.7K ohm pull-up resistors, and RC filters to reduce transient glitches.

Pin Numbers		PC Signal Name	Direction (relative to PMDX-103)	Pin Numbers		PC Signal Name	Direction (relative to PMDX-103)
J5 (note 1)	J3 (note 2)			J5 (note 1)	J3 (note 2)		
1	1	~Strobe	out	10	19	~Ack	in
2	3	Data 0	out	11	21	Busy	in
3	5	Data 1	out	12	23	Paper End	in
4	7	Data 2	out	13	25	Select Out	in
5	9	Data 3	out	14	2	~Auto Feed	out
6	11	Data 4	out	15	4	~Error	in
7	13	Data 5	out	16	6	~Init	out
8	15	Data 6	out	17	8	~Select In	out
9	17	Data 7	out	18 – 25	10 to 26, even	Ground	

**Table 4- Equipment Connector Pin-Out (J5 and J3)**

**NOTE 1** – J5 is the 25-pin “D” connector installed on part number PMDX-103-01.

**NOTE 2** – J3 is the ribbon-cable connector installed on part number PMDX-103-02.

### 2.4 Power Connector (J6)

Connector J6 is used to provide either +7 to +12 VDC *or* 9 VAC power to the PMDX-103. This connector is a standard 2.1mm diameter coaxial power connector that is compatible with many wall-mounted power packs.

**WARNING:** When using J6, make sure that no power source is connected to J4 pin 2 (+5V) or to J4 pin 3 (Aux. Power In). See section 2.2 for more information.

Pin	Description
Center Pin	Positive voltage (or AC voltage)
Sleeve	Ground

**Table 5 – Power Supply Connector Pin-Out (J6)**

### 3.0 Power LED (D4)

The PMDX-103 provides an LED (D4, labeled “Power”) that indicates the presence of the isolated +5V supply. The isolated +5V supply is generated by the PMDX-103 using an isolated DC-to-DC converter, and it is used to power the interface to the PC. When the LED is lit, the power converter is functioning.

**NOTE** – When no power is applied to the PMDX-103, and the PMDX-103 is connected to the PC’s parallel port, this LED may glow dimly. This is because the data and control outputs from the PC can source a small amount of power when driven high. This does *not* mean that power is available to the rest of the board.

### 4.0 Grounding and Isolation Issues

Do not connect the PC ground to the equipment ground. Doing so will bypass the isolation provided by the PMDX-103.

## 5.0 Mechanical Specifications

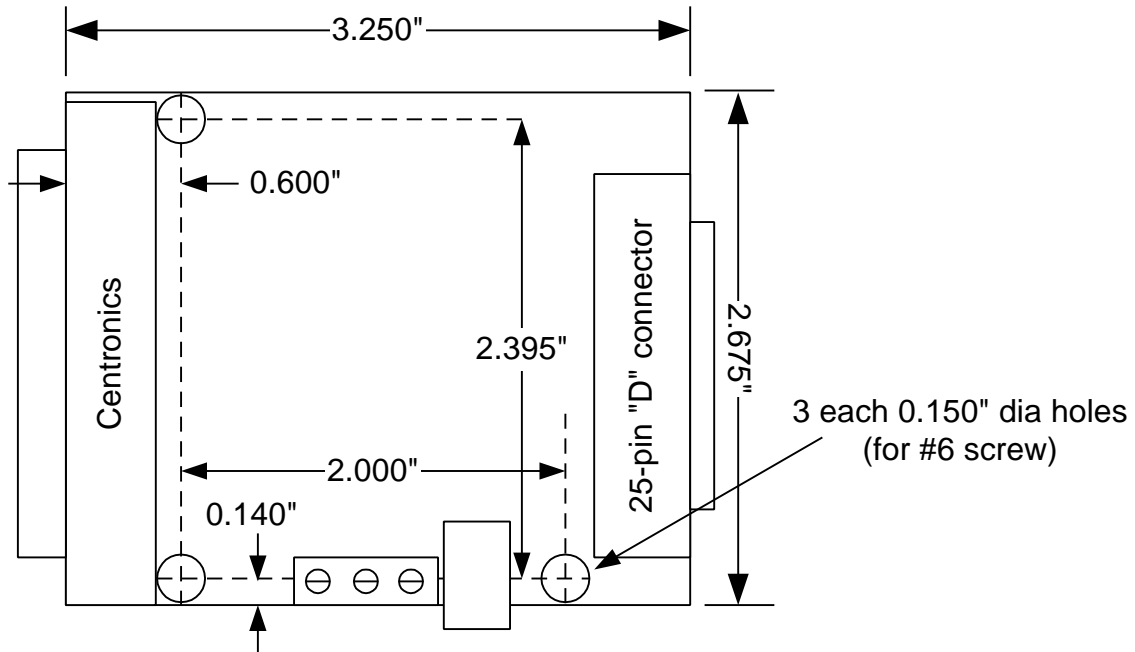


Figure 1 - PMDX-103 Dimensions and Mounting Holes

**WARNING:** *The PMDX-103 should be protected from liquids, dirt, or chips (especially metal chips which can cause shorts) coming in contact with the board.*

## 6.0 Electrical and Environmental Specifications

### Power Supply:

Main Power In: +7 to +12 VDC **or** 9 VAC input, 200 mA maximum (on J6 or J4)

Alt. +5V In: +5V DC, regulated, 200mA maximum (see section 2.2)

+5V Output: +5V regulated, up to 50 mA on J4 pin 2 (see section 2.2)

### PC (Isolated) Side (at J1 or J2):

Outputs: Min. output "high": 4.6V sourcing up to 4mA per output (see note 1)  
 (status except ~Ack) Max. output "low": 0.4V sinking up to 4mA per output (see note 1)

Outputs: Min. output "high": 3.3V sourcing up to 6mA (see note 1 and 2)  
 (~Ack) Max. output "low": 0.4V sinking up to 10mA (see note 1)

Inputs: Min. input "high": 2.0V  
 (data & control) Max. input "low": 0.8V (sinking at least 1mA per status input)

**Note 1:** Referenced to the "Gnd" signals on J1 or J2.

**Note 2:** The ~Ack signal is pulled high by a resistive pull-up.



**Equipment (Non-Isolated) Side (at J5):**

Outputs: (data & control)	Min. output "high": Max. output "low":	4.6V sourcing up to 4mA per output (see note 3) 0.4V sinking up to 4mA per output (see note 3)
Inputs: (status except ~Ack)	Min. input "high": Max. input "low":	2.0V (see note 3) 0.8V (sinking at least 1mA per status input, see note 3)
Inputs: (~Ack)	Min. input "high": Max. input "low":	3.3V (see note 3) 1.8V (sinking at least 1mA, see note 3)

**Note 3:** Referenced to the "Gnd" signals on J5.

<b><u>Environmental:</u></b>	Temperature:	0° to +55° C
	Relative Humidity:	20% to 80% relative humidity, non-condensing

## Appendix A – Warranty

### Statement

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Practical Micro Design, Inc. (PMD) warrants that this hardware product is in good working condition, according to its specifications at the time of shipment, for a period of 90 days from the date it was shipped from PMD. Should the product, in PMD's opinion, malfunction within the warranty period, PMD will repair or replace the product without charge. Any replaced parts become the property of PMD. This warranty does not apply to the software component of a product or to a product which has been damaged due to accident, misuse, abuse, improper installation, usage not in accordance with product specifications and instructions, natural or personal disaster or unauthorized alterations, repairs or modifications.

### Limitations

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All warranties for this product, expressed or implied, are limited to 90 days from the date of purchase and no warranties, expressed or implied, will apply after that period.

All warranties for this product, expressed or implied, shall extend only to the original purchaser.

The liability of Practical Micro Design, Inc. in respect of any defective product will be limited to the repair or replacement of such product. Practical Micro Design, Inc. may use new or equivalent to new replacement parts.

Practical Micro Design, Inc. makes no other representations or warranties as to fitness for purpose, merchantability or otherwise in respect of the product. No other representations, warranties or conditions, shall be implied by statute or otherwise.

In no event shall Practical Micro Design, Inc. be responsible or liable for any damages arising

- (a) from the use of the product;
- (b) from the loss of use of the product;
- (c) from the loss of revenue or profit resulting from the use of the product; or
- (d) as a result of any event, circumstance, action or abuse beyond the control of Practical Micro Design, Inc.

whether such damages be direct, indirect, consequential, special or otherwise and whether such damages are incurred by the person to whom this warranty extends or a third party.