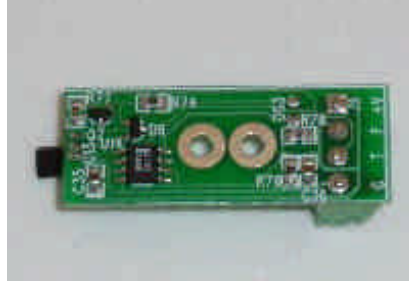
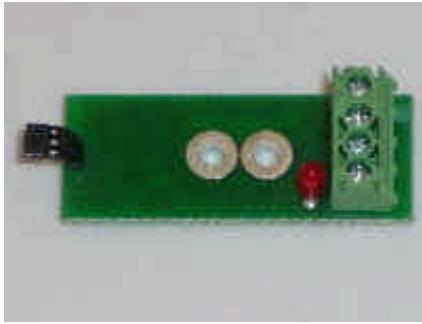


# PMDX-171 Hall Effect Sensor



## User's Manual

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PMDX  
9704-D Gunston Cove Rd  
Lorton, VA 22079-2366 USA

Web: <http://www.pmdx.com>  
Phone: +1 (703) 372-2975  
FAX: +1 (703) 372-2977

# Table of Contents

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<b>1.0</b>	<b>Overview</b> .....	<b>3</b>
1.1	Important Safety Information .....	3
1.2	Warranty Summary.....	3
1.3	Features.....	4
1.4	Updates to this Manual .....	4
<b>2.0</b>	<b>Installation and Operation</b> .....	<b>4</b>
2.1	General Operating Constraints .....	5
2.2	Magnet and Sensor Design .....	5
2.3	Output Signals .....	5
2.4	Mounting Options .....	5
<b>3.0</b>	<b>Mechanical Specifications</b> .....	<b>6</b>
<b>4.0</b>	<b>Electrical and Environmental Specifications</b> .....	<b>7</b>
	<b>Appendix A – Warranty</b> .....	<b>8</b>

# PMDX-171 Hall Effect Sensor User's Manual

Document Revision: 1.2

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## 1.0 Overview

This document describes the configuration and operation of the PMDX-171 Hall Effect Sensor. The PMDX-171 Hall Effect Sensor is useful for mill or lathe spindle speed sensing and for lathe threading index position pickup, and for limit or home switches on machines where magnetic debris is not a problem.

### 1.1 Important Safety Information

The PMDX-171 Hall Effect Sensor 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 these parts are integrated into the purchaser's system and cannot be responsible for guaranteeing the safety of your system.

The PMDX-171 Hall Effect Sensor may be used for limit or home switch applications only if magnetic debris is not a problem.

The PMDX-171 Hall Effect Sensor is not guaranteed to be fail-safe. The system into which the PMDX-171 Hall Effect Sensor are installed should provide fail-safe protection and emergency stop capability.

Automated machine tools, into which the PMDX-171 Hall Effect Sensor 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.

### 1.2 Warranty Summary

The PMDX-171 Hall Effect Sensor are 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.

**NOTE:** 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. For repairs covered under warranty shipped to a USA address 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. **Please see the support page on our web site (<http://www.pmdx.com>) for full details of our repair and shipping policies.**

# PMDX-171 Hall Effect Sensor User's Manual

Document Revision: 1.2

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## 1.3 Features

The PMDX-171 Hall Effect Sensor has the following features:

- Hall Effect magnetic sensor detects a small magnet (supplied with the sensor)
- Unipolar device, sensitive to North magnetic pole
- Typical activate 100 Gauss, typical release 50 Gauss
- Magnetic sensor leads stand 0.25" above PCB and can be bent to desired orientation
- Small size 1.575" by 0.600" circuit board is easy to mount using two screws
- Easy to use clamp style screw terminal strips for connections
- LED indicator for sensor output status
- Signals are conditioned by a Schmidt trigger to avoid multiple false transitions
- Both a True and a False output are provided so user can select desired polarity
- Outputs are NPN "open collector" style and provide either an open circuit or a path to ground depending on state of sensor
- Outputs work directly with PMDX breakout board inputs and any other board that provides a "pull-up"
- Sensor may be powered by any DC voltage from +5V to +25V VDC
- Output voltage is independent of supply voltage
- Response time of less than 5  $\mu$ s
- Mounting area of circuit board is free of electrically conducting PCB traces
- SMT component side is conformal coated to help resist harsh environments

## 1.4 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-171 Hall Effect Sensor page (follow the links from the main page).

## 2.0 Installation and Operation

These sensors are useful for mill or lathe spindle speed sensing and for lathe threading index position pickup. While you may be able to use these sensors for limit or home switches they are recommended for these applications only if magnetic debris is not a problem.

Note that all PMDX breakout boards have the necessary pull-up resistor on board and have power available to run the sensor so no external components are needed.

Pin Label	Description	Magnet Present (LED on)	No Magnet Present (LED off)
V+	+5V to +25V DC power supply	N/A	N/A
F	False (inverted) output (see section 2.3 for details)	pulled to GND (logic low)	Floats (open-collector)
T	True (non-inverted) output (see section 2.3 for details)	floats (open-collector)	pulled to GND (logic low)
Gnd	Ground (power supply return)	N/A	N/A

**Table 1 –Connector Pin-Out & Output Polarity**

# PMDX-171 Hall Effect Sensor User's Manual

Document Revision: 1.2

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## 2.1 General Operating Constraints

The maximum pulse rate using the PMDX-171 can be as high as 25 KHz. In order to guarantee an output pulse, the magnetic flux must exceed 100 Gauss for at least 20  $\mu$ s. In practice, a 4 inch disk spinning at 40,000 RPM with the PMDX-supplied magnet would work. The actual response depends on many factors, including the interface electronics and control software. For example, a large-value pull-up resistor will slow the response time of the sensor. All PMDX breakout boards have pull-up resistors that are compatible with this sensor. For other applications or other breakout boards we recommend a 1.0K ohm pull-up when using a +5V supply, or a 4.7K ohm pull-up when using a +24V supply. Finally, the time it takes the control software to read the output of the sensor will limit the maximum pulse rate and minimum interrupter width. The PMDX-171 is faster than most software sampling methods, so software performance will likely be the limiting factor. The bottom line is that, in general, you should experiment with your setup to determine the maximum operational limits.

## 2.2 Magnet and Sensor Design

The magnetic field must exceed 100 Gauss with North magnetic polarity at the sensor for 20  $\mu$ s to guarantee operations. The PMDX-supplied magnet will provide the needed field strength at 0.25 inches from the sensor face. The magnet must be mounted with the North pole facing the sensor. The poles are not labeled on the magnets, so you will have to test for proper operation before mounting the magnet.

## 2.3 Output Signals

The PMDX-171 circuit board has two open-collector outputs labeled "T" and "F", as shown in table 1 on page 4.

To obtain a valid logic level from a "floating" output, the output must have a resistor installed between the output signal and a power supply voltage. Usually this is a resistor whose value is between 1.0K ohms and 10K ohms, connected to a +5V to +25V VDC power supply. See section 4.0 for information on the maximum voltage that may be attached to the output signal.

Note that all PMDX breakout boards have the necessary pull-up resistor on board and have power available to run the sensor so no external components are needed.

## 2.4 Mounting Options

The PMDX-171 can be mounted with a mounting bracket attached to the top side of the circuit board (see the "Top View" in the mechanical drawing). **Do not put a mounting bracket directly on the bottom side of the circuit board.** If your machine requires that you mount the board from the bottom side you must use 1/4" (or taller) #4 (or 1/4" outer diameter) **non-conductive** spacers between the circuit board and the bracket or panel.

The mounting holes in the circuit board are sized for #4 hardware.

### 3.0 Mechanical Specifications

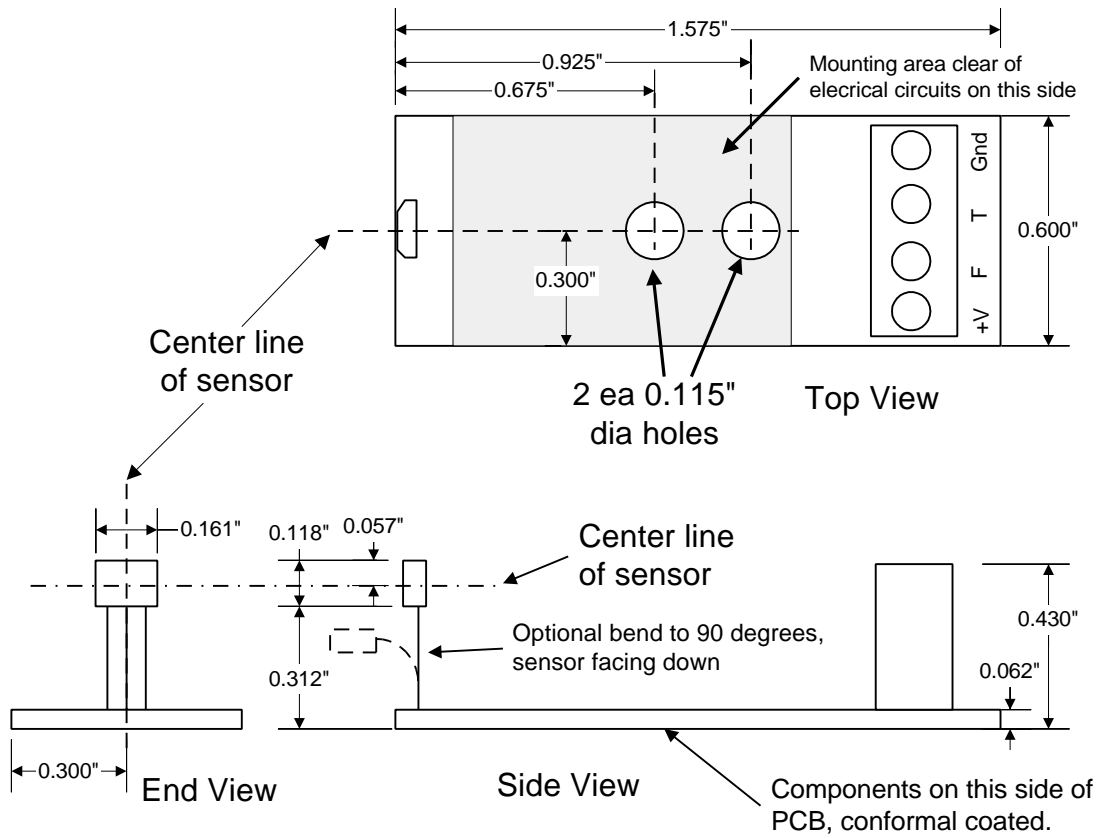


Figure 1 - PMDX-171 Hall Effect Sensor Dimensions

**WARNING:** *The PMDX-171 Hall Effect Sensor should be protected from liquids, dirt, or chips (especially metal chips which can cause shorts) coming in contact with the board.*

# PMDX-171 Hall Effect Sensor User's Manual

Document Revision: 1.2

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## 4.0 Electrical and Environmental Specifications

**Power Supply:** +5V to +25V VDC input, 25 mA maximum

**Output:** Open-collector output  
Max. output "low": 0.4V sinking up to 6 mA  
Max. output "high": pull-up resistor to 25V maximum

**Pulse Rate:** in excess 25 KHz  
5  $\mu$ s response time turning "on" or "off"  
**NOTE:** See also section 2.1 for more information.

**Magnet Strength:** Must exceed 100 Gauss for at least 20  $\mu$ s to activate  
Less than 50 Gauss to de-activate

**Environmental:** 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.