

# KOBOLD PDD Series Digital Pressure Switch

PDD-153 and PDD-253 Series

User Instructions



KOBOLD Instruments Inc. 1801 Parkway View Drive Pittsburgh PA 15205

Phone (412) 788-2830 • Fax (412)-788-4890 • [www.koboldusa.com](http://www.koboldusa.com)

Manual-PDD



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**CAUTION:** For safety reasons, please read the cautionary information located at the end of the manual, before attempting installation.

## 1.0 General

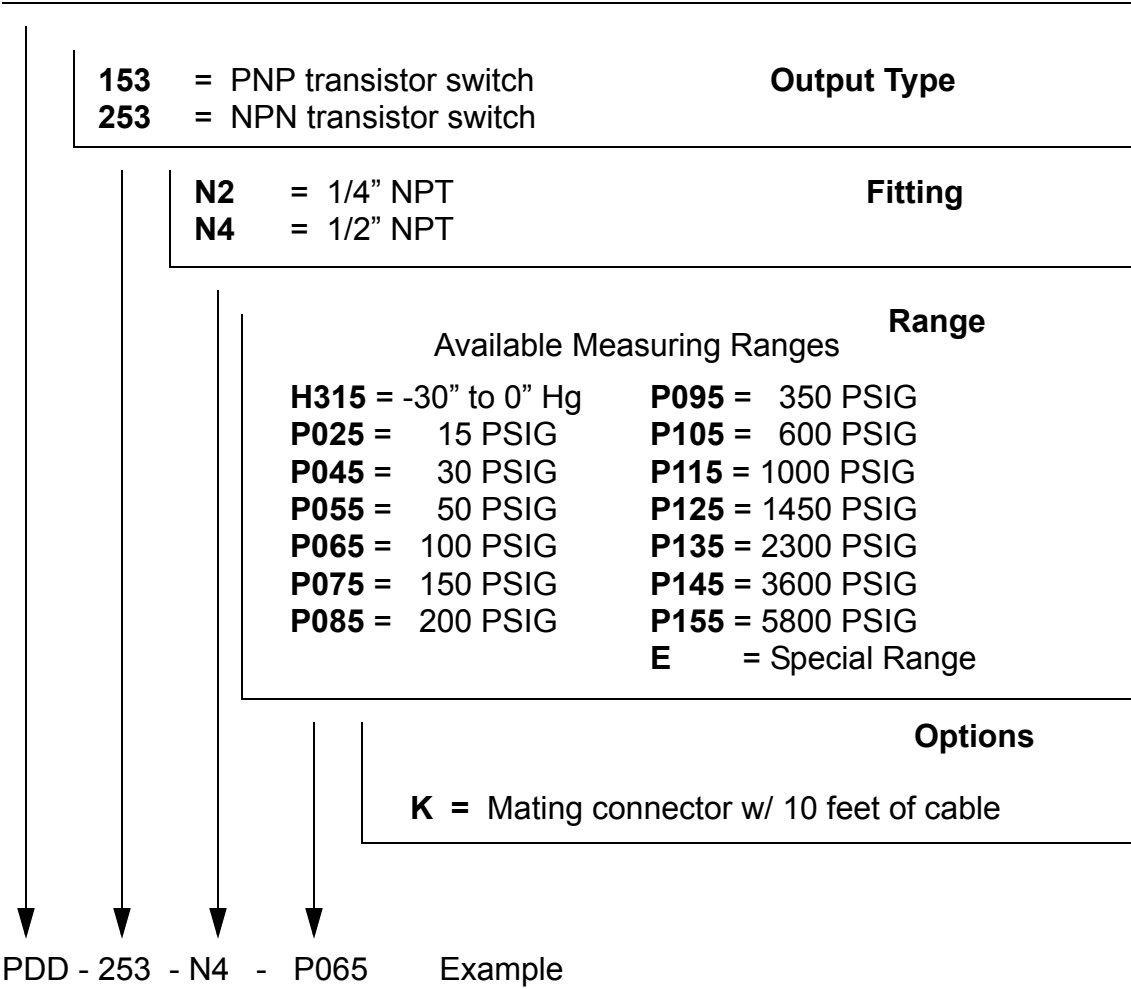
The KOBOLD PDD Series is a solid state, electronic pressure switch which employs a ceramic sensor element as the heart of the sensing system. The ceramic sensing element provides excellent corrosion resistance and very high cycle life with virtually no calibration drift over its service life. The PDD's microprocessor based electronics allow the user to program a setpoint, adjust switching hysteresis, dampening and switch logic. In addition to the switch output, the PDD has a digital display for local indication of pressure

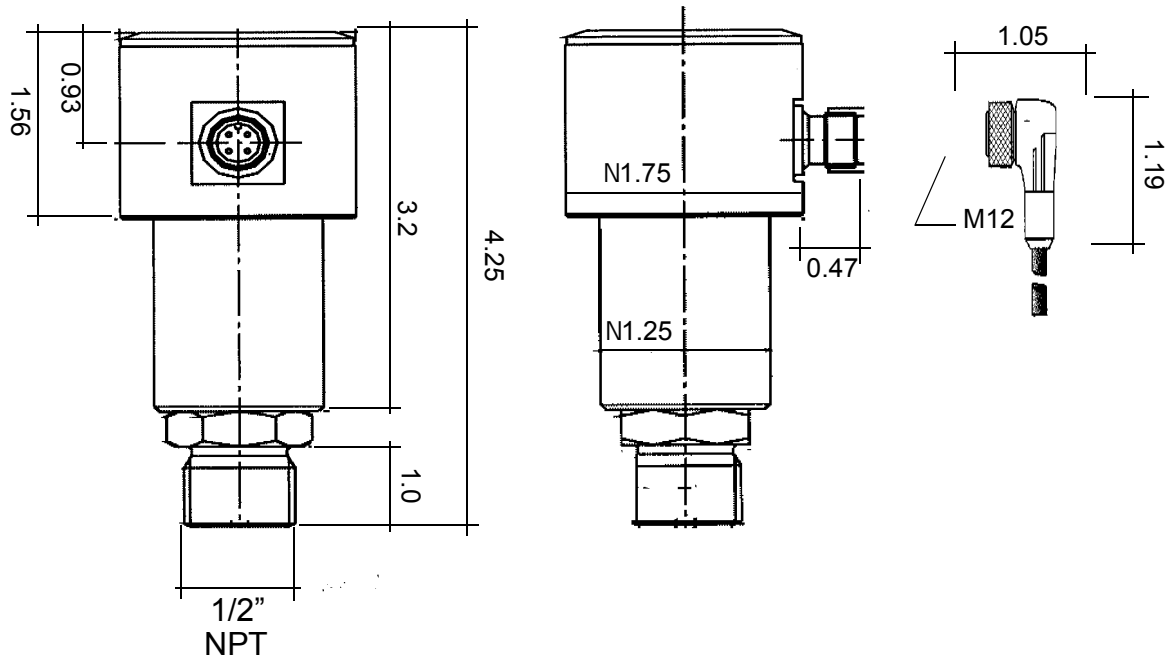
## 2.0 Specifications

Available Measuring Ranges:	-30" Hg to 5800 PSIG
Display Type:	3 Digit LED
Switch Status:	Red LED on when pressure is above setpoint
Accuracy:	±0.5% of full scale
Sensor Element: element	Piezoresistive ceramic
Operating Temperature Range	
Process Medium:	-4 to 176°F
Ambient:	-4 to 140°F
Overpressure Ratings	
-30" HG to 1450 PSIG:	2X max range
>1450 to 5800 PSIG:	1.2X max range
Process wetted parts	
Sensing Element:	Ceramic
Connection:	316L stainless steel
O-ring:	Viton
Housing Material:	304 SS
Electrical Data	
Switch Type:	Open collector NPN or PNP based on model number, programmable N/O or N/C
Switch Rating:	Max. 300 mA, short circuit protected
Response Time:	50 mSec.
Power Supply Requirement:	24 VDC ±20%, 40 mA Max.
Electrical Connection:	M-12, Micro-DC connect male
Electrical Protection:	NEMA 4X/IP 65

Table 2.1    Part Number Identification

**PDD**    =    Compact Electronic Pressure Switch





### 3.0 Mechanical Installation

The following general installation instructions and precautions must be followed to insure proper, reliable switch operation:

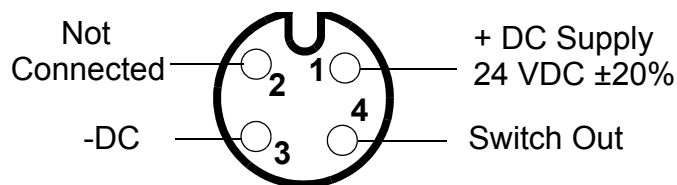
1. Select a suitable location on the piping system for installation. Installation in a location where sediments can collect in the switch's pressure sensing port (such as the underside of a horizontal piping run) will cause sluggish or faulty operation.
2. The ambient temperature range which the switch can withstand is  $-4^{\circ}\text{F}$  to  $+140^{\circ}\text{F}$ . If the switch is located outdoors in a cold environment the switch must be protected from excessively cold temperatures with insulated heat tracing or by other suitable means. In hot environments the switch should be located in an area where the ambient temperature does not exceed  $140^{\circ}\text{F}$ .
3. If installing in a liquid process with pressure spikes and/or pressure pulsations, install the switch with a suitable pressure snubber or damage to the pressure sensing element may result.

#### 4.0 Electrical Installation

The following electrical installation instructions and precautions must followed to insure proper switch and analog output operation. Failure to follow these instructions may result in irreparable damage to the switch:

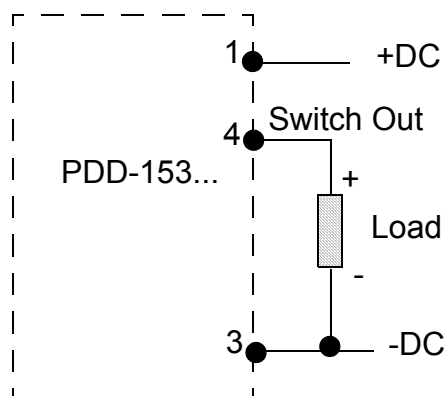
1. The unit employs an open collector NPN or PNP transistor switch. To verify which model you are installing check the model number codes in Section 2.0, Specifications. When the PNP version activates, it connects the DC supply voltage to the switch output pin. When the NPN version activates, it connects the DC ground to the switch output pin.
2. This switch can only switch fixed polarity DC loads with a maximum current draw of **300 mA**. To switch higher current DC loads or AC loads use an appropriately sized relay.
3. In order to minimize electromagnetic noise pickup, a jacketed instrument and control cable with shield should be used. The shield should be connected to the power system earth ground at one end of the cable only.

Optional Mating Connector

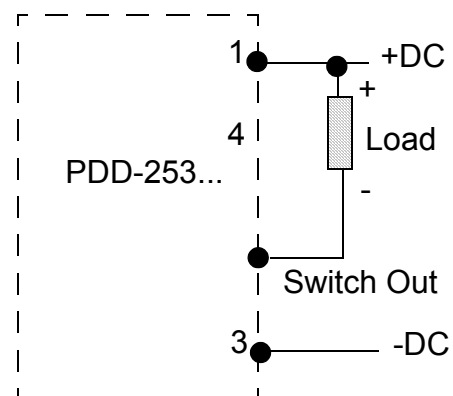


Brown = 1 = +DC  
 White = 2 = Not Connected  
 Blue = 3 = -DC  
 Black = 4 = Switch Out

PNP Switch Version

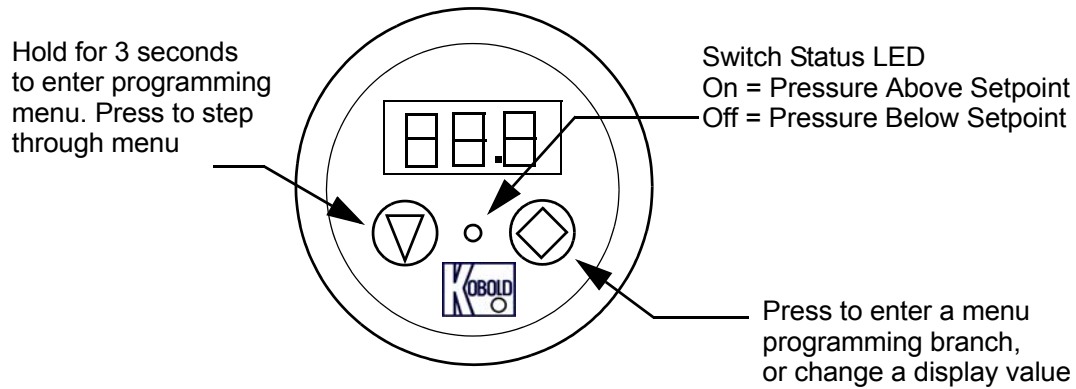


NPN Switch Version






## 5.0 Operation



### 5.1 Programming Functions

The PDD digital pressure switch is programmed via membrane push-buttons on the faceplate of the switch as shown in the following figure.

#### During Normal Operation

-  : Press for 3 Sec to Enter Setup Mode
-  : Display Switch Point/ Window Point

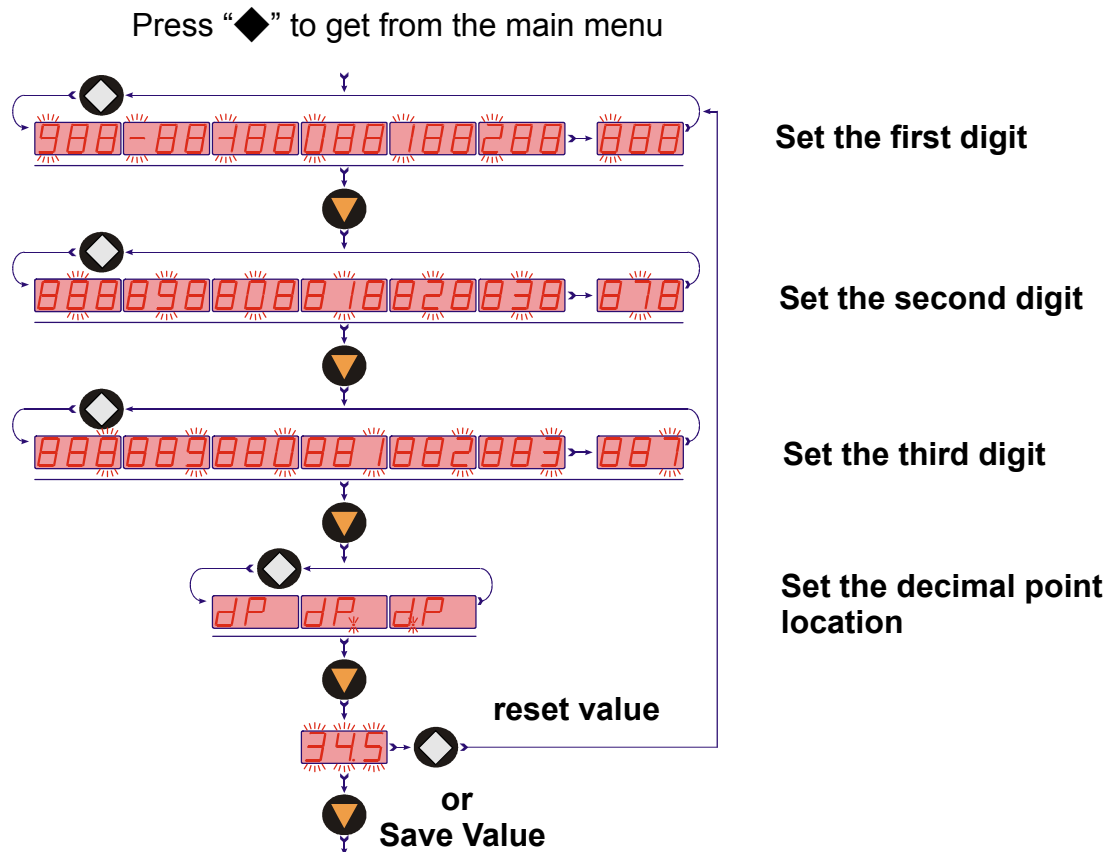
#### During Setup Mode

-  : Next Step
-  : Change Values

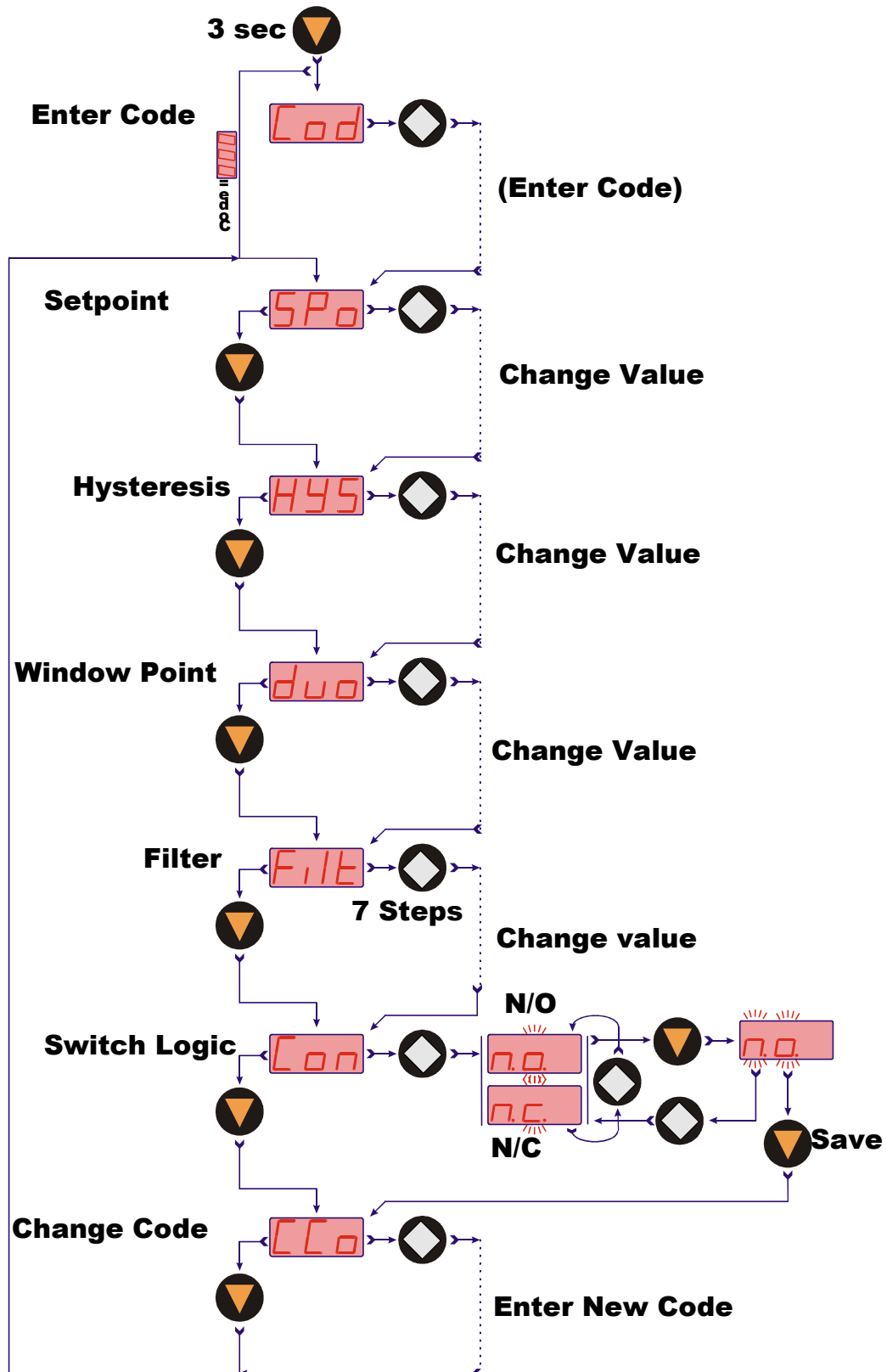
 **Press 3 sec**  
**Or for 20 sec**  
**Press no buttons**  
  
**Exit Setup**

### 5.1.1 Changing Values in Setup Mode

When in the Setup Mode the actual values of setpoint, hysteresis, switch logic and other functions are adjusted as required by the user. From the main menu (e.g. switching point “SPo”), press the “◆” button to adjust that functions value. The following diagram shows the sequence of steps required to change a value.



### 5.1.2 Programming Flow Chart



## 5.2 Programming Menu Item Descriptions

After the ▼ Button is depressed for three seconds to enter the setup mode, and the lockout code is entered (if lockout is enabled), the programming menu is accessed. Diagram 5.3 provides a flowchart of the programming menu. Section 5.1.1 and diagram 5.2 provide details on how to change the value of each menu item parameter. The following is a detailed description of each menu item.

### 5.2.1 Cod - Code

If the lockout feature was enabled during a prior setup, the user code which was selected at that time must be entered. Section 5.1.1 'Changing Values in Setup Mode' on page 6 provides steps required to enter the value.

### 5.2.2 SPo - Switchpoint

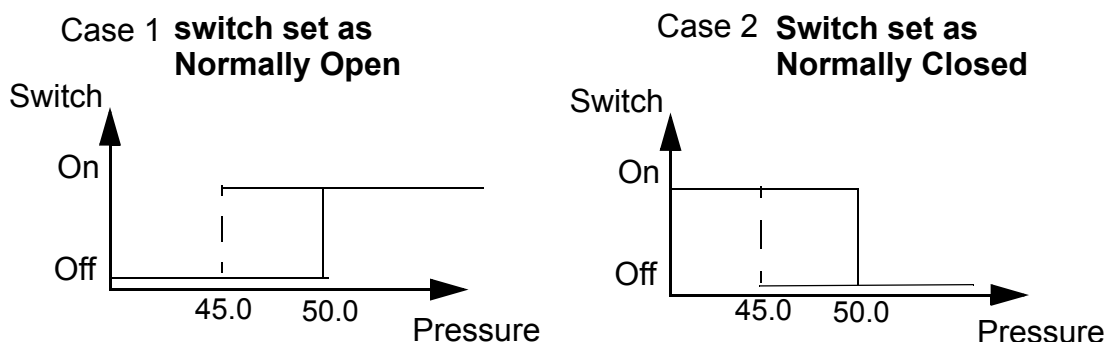
This menu item allows the user to input the desired switching point. Any number between -199 and 999 can be entered. Additionally, a decimal point can be added if desired. Section 5.1.1 'Changing Values in Setup Mode' on page 6 provides steps required to change a value. If the measured pressure exceeds the switchpoint value, the switch will activate.

### 5.2.3 HYS - Hysteresis

This menu item allows the user to set a deadband value below the switchpoint such that the switch will not de-activate until the measured pressure falls below the setpoint minus the hysteresis value. The hysteresis value will always be a negative value and can be set as any number between 0 and -199. Additionally, a decimal point can be added if desired. Section 5.1.1 'Changing Values in Setup Mode' on page 6 provides steps required to change a value.

**Example:** Switchpoint Value (**SPo**) is set at 50.0

Hysteresis Value (**HYS**) is set at -5



### 5.2.4 **duo** - Window Point

This menu item allows the user to set a value above the switchpoint such that a pressure band, or window can be monitored.

**Note:** The **duo** value must be a positive number and it must be a larger value than the **SPo** value. If it is not, an error message is displayed. If the error occurs both the **SPo** value and the **duo** values are cleared and must be re-entered.

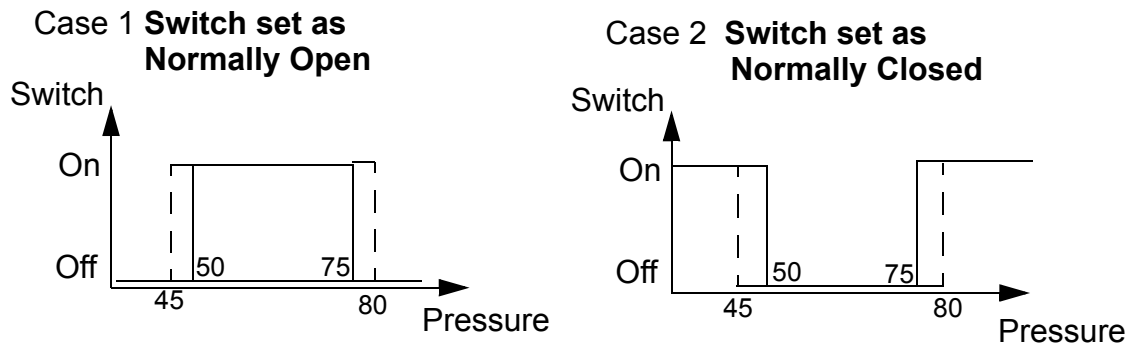
Additionally, a decimal point can be added if desired. Section 5.1.1 'Changing Values in Setup Mode' on page 6 provides steps required to change a value. When the measured pressure is above the switchpoint, the switch will activate. The switch will de-activate when the measured pressure either increases to above the window point value or decreases to below the switchpoint value. The window point can also be used with the hysteresis function if desired. The following example illustrates.

**Example:** Switchpoint Value (**SPo**) is set at 50

Window Point (**duo**) value is set at 75

Hysteresis Value (**HYS**) is set at -5

The switch will activate (LED on) when measured pressure is above 50.0 and will de-activate (LED off) when measured pressure is above 80 ( $75 + 5$ ) or below 45 ( $50 - 5$ ).



### 5.2.5 **Filt** - Filtering

This menu item allows the user to average the measured output over 1, 2, 4, 8, 16, 32 or 64 samples. Section 5.1.1 'Changing Values in Setup Mode' on page 6 provides steps required to change a value. Adding filtering provides a more stable display and prevents false switching for systems in which pressure pulsations are a problem. The larger the number of samples the more stable the display and switch. A **Filt** value of "1" shuts off the filtering.

When filtering is being used, the PDD series employs an integrated overshoot function which detects any overshoot above 6.25% and processes that measured value without

filtering. This feature allows the switch to differentiate between pulsations and actual system pressure changes and process the pressure change signals without filtering. This greatly enhances the switch's response time when the filtering function is being used.

#### 5.2.6 **Con** - Switch Logic

This menu item allows the user to select the output switch logic as either normally closed (**nc**), or normally open (**no**):

**Normally Open:** Switch activates when measured pressure above switchpoint

**Normally Closed:** Switch activates when measured pressure below switchpoint

#### 5.2.7 **S -A** - Zero Adjust

This menu item allows the user to zero the pressure sensing element if desired. The ceramic pressure sensing element used by the PDD series takes about 15 minutes for the zero to stabilize after power is applied. Therefore if zeroing is desired, for best results wait for at least 15 minutes after power is applied to do so. To perform the zero adjust, use the ▼ button to get to the **S - A** menu item. Then press the ◆ button and hold down for 7 seconds. The display will flash "000". Then press the ▼ button to continue through the setup menu.

#### 5.2.8 **CCo** - Change Code

This menu item allows the user to set a pass code which will lock out the programming functions. This protects the device from un-authorized access to the setup menu. Section 5.1.1 'Changing Values in Setup Mode' on page 6 provides steps required to change a value. The code can be any value from 000 to 999. A code of 000 disables the lockout function. A value other than 000 will require entry of that code to access the setup menu.

### 6.0 Maintenance

The PDD series pressure switches have no moving parts therefore are virtually maintenance free. Depending on the type of media, the pressure sensing port may become clogged over time. Sluggish response to changes in system pressure would be evidence of this. If clogging occurs, remove the switch from the system and clean the pressure sensing port using compressed air or a water stream. If clogging occurs frequently, installation of a diaphragm seal should be considered.

## **CAUTION**

PLEASE READ THE FOLLOWING WARNINGS BEFORE ATTEMPTING  
INSTALLATION OF YOUR NEW DEVICE. FAILURE TO HEED THE  
INFORMATION HEREIN MAY RESULT IN EQUIPMENT FAILURE AND  
POSSIBLE SUBSEQUENT PERSONAL INJURY.

- **User's Responsibility for Safety:** KOBOLD manufactures a wide range of process sensors and technologies. While each of these technologies are designed to operate in a wide variety of applications, it is the user's responsibility to select a technology that is appropriate for the application, to install it properly, to perform tests of the installed system, and to maintain all components. The failure to do so could result in property damage or serious injury.
- **Proper Installation and Handling:** Use a proper thread sealant with all installations. Take care not to overtighten the fittings. Always check for leaks prior to system start-up.
- **Wiring and Electrical:** Section 2.0, Specifications and Section 4.0, Electrical Connections, provide the voltage and current limitations and the wiring for the various sensor types. The sensor electrical ratings should never be exceeded. Electrical wiring of the sensor should be performed in accordance with all applicable national, state and local codes.
- **Temperature and Pressure:** Section 2.0, Specifications, provides the temperature and pressure limits for each model. Operation outside these limitations will cause damage to the unit and can potentially cause personal injury. Fluid should never be allowed to freeze inside the sensor.
- **Material Compatibility:** Make sure that the model which you have selected is chemically compatible with the application liquids. While the meter is liquid and spray resistant when installed properly, it is not designed to be immersed.
- **Flammable, Explosive and Hazardous Applications:** The PDD series is not an intrinsically safe or explosion proof design. They should not be used in installations in which an intrinsically safe or explosion proof design is required.
- **Make a Fail-safe System:** Design a fail-safe system that accommodates the possibility of switch or power failure. In critical applications, KOBOLD recommends the use of redundant backup systems and alarms in addition to the primary system.





