

# KOBOLD PDA Series Digital Pressure Transmitter

PDA-153 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)

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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 PDA Series is a solid state, electronic pressure transmitter 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 PDA's microprocessor based electronics allow the user to program zero point, transmitter span, dampening and lockout code.

In addition to the analog output, the PDA 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
Accuracy:	±0.5% of full scale
Sensor Element:	Piezoresistive ceramic element
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:	1.5X max range
Process wetted parts	
Sensing Element:	Ceramic
Connection:	316L stainless steel
O-ring:	Viton
Housing Material:	304 SS
Electrical Data	
Output Type:	4-20 mA, 3 wire
Max. Loop Burden:	500 ohms
Response Time:	50 mSec.
Power Supply Requirement:	24 VDC ±20%, 80 mA Max.
Electrical Connection:	M-12, Micro-DC connect male
Electrical Protection:	NEMA 4X/IP 65

Table 2.1 Part Number Identification

**PDA** = Compact Electronic Pressure sensor

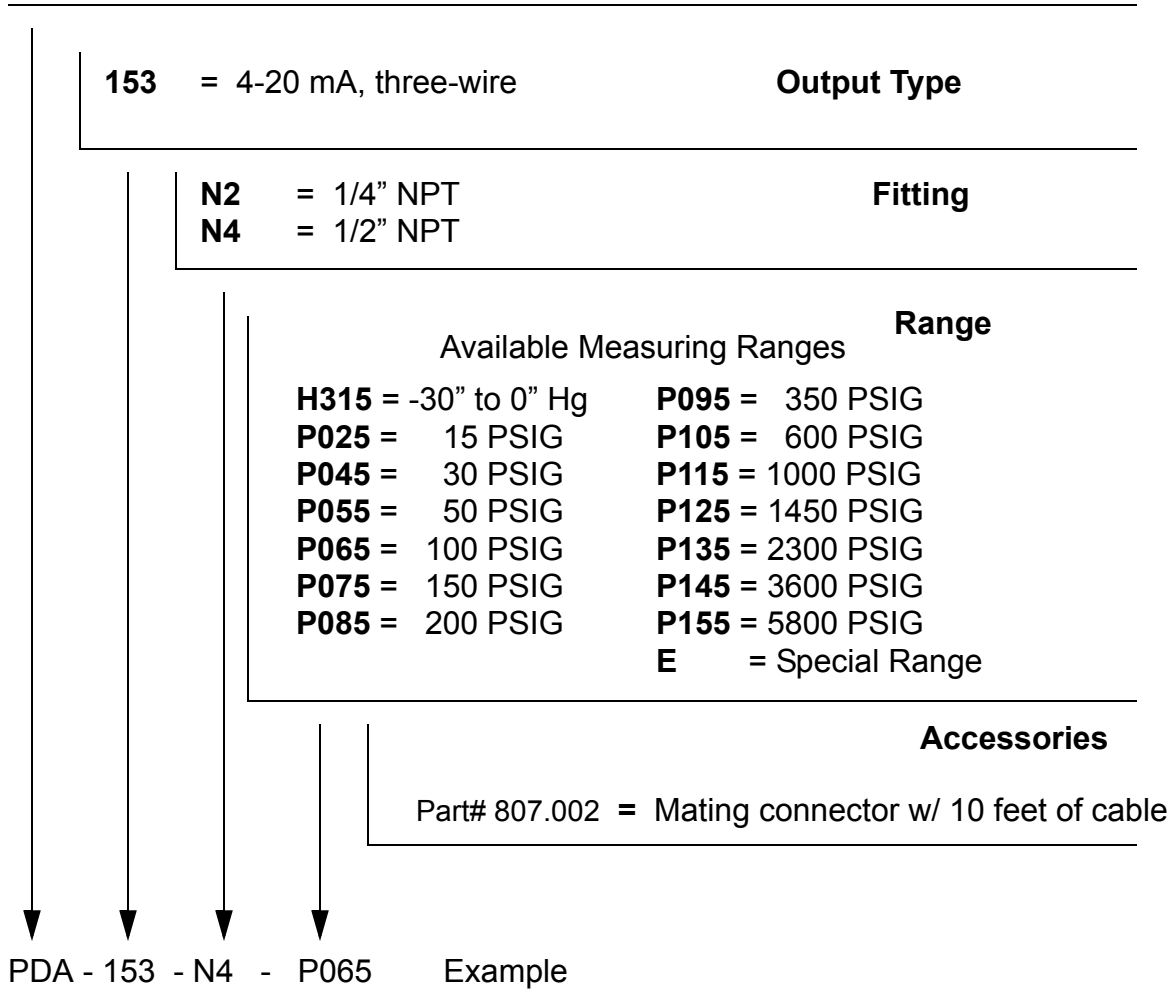
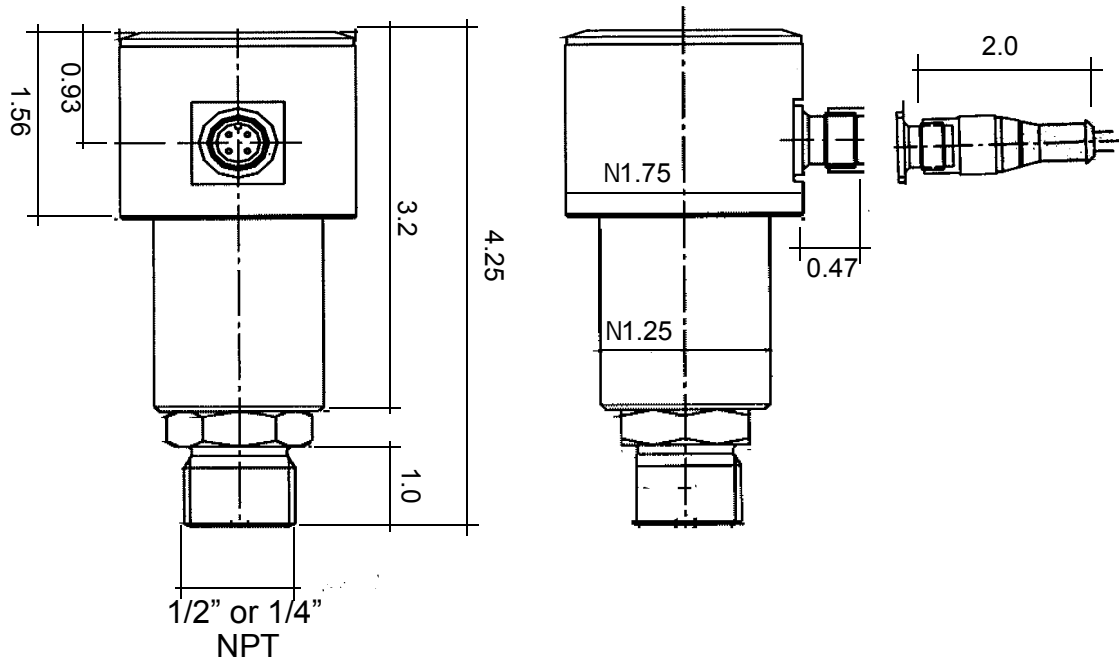


Diagram 2.1 Dimensions



### 3.0 Mechanical Installation

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

1. Select a suitable location on the piping system for installation. Installation in a location where sediments can collect in the 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 sensor can withstand is  $-4^{\circ}\text{F}$  to  $+140^{\circ}\text{F}$ . If the sensor is located outdoors in a cold environment the sensor must be protected from excessively cold temperatures with insulated heat tracing or by other suitable means. In hot environments the sensor 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 sensor with a suitable pressure snubber or damage to the pressure sensing element may result.

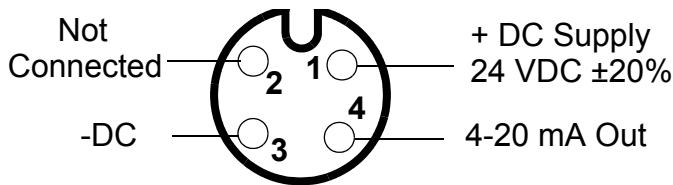
**4.0 Electrical Installation**

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

1. This device requires a power supply rated at 24 VDC  $\pm$ 20%. The current requirement is 80 mA maximum. Ensure that the power supply used is capable of providing this current and voltage.
2. 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.

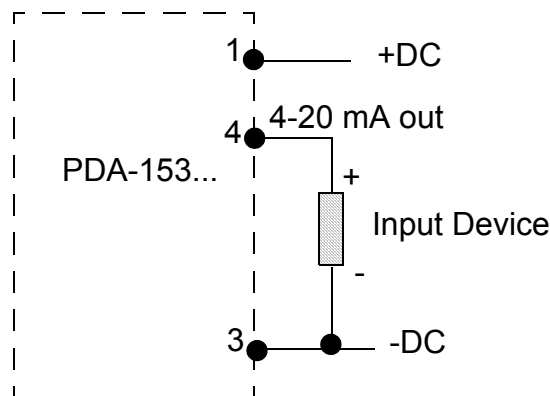
Diagram 4.1 Electrical Connections

Typical Wiring



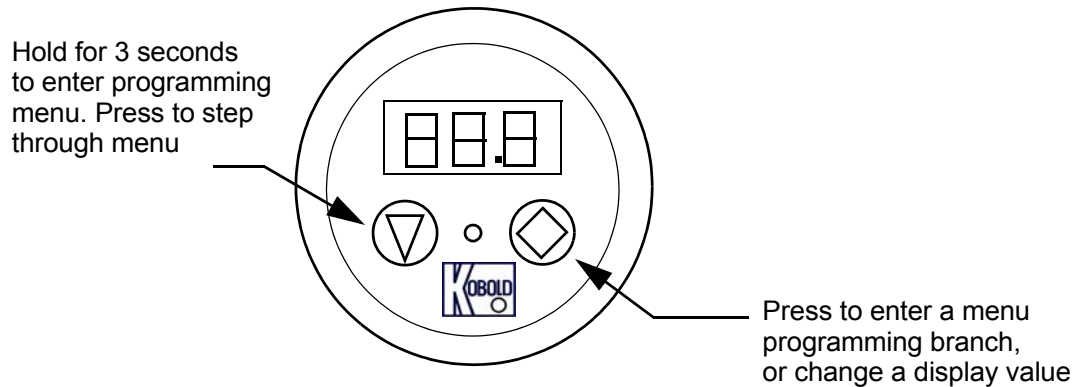
Optional Mating Connector

- Brown = 1 = +DC
- White = 2 = Not Connected
- Blue = 3 = -DC
- Black = 4 = 4-20 mA out



## 5.0 Operation

Diagram 5.1 Displays and Controls



### 5.1 Programming Functions

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

Diagram 5.2 Programming Functions

#### During Normal Operation

 : Press for 3 Sec to Enter Setup Mode

#### During Setup Mode

 : Next Step

 : Change Values

 **Press 3 sec**

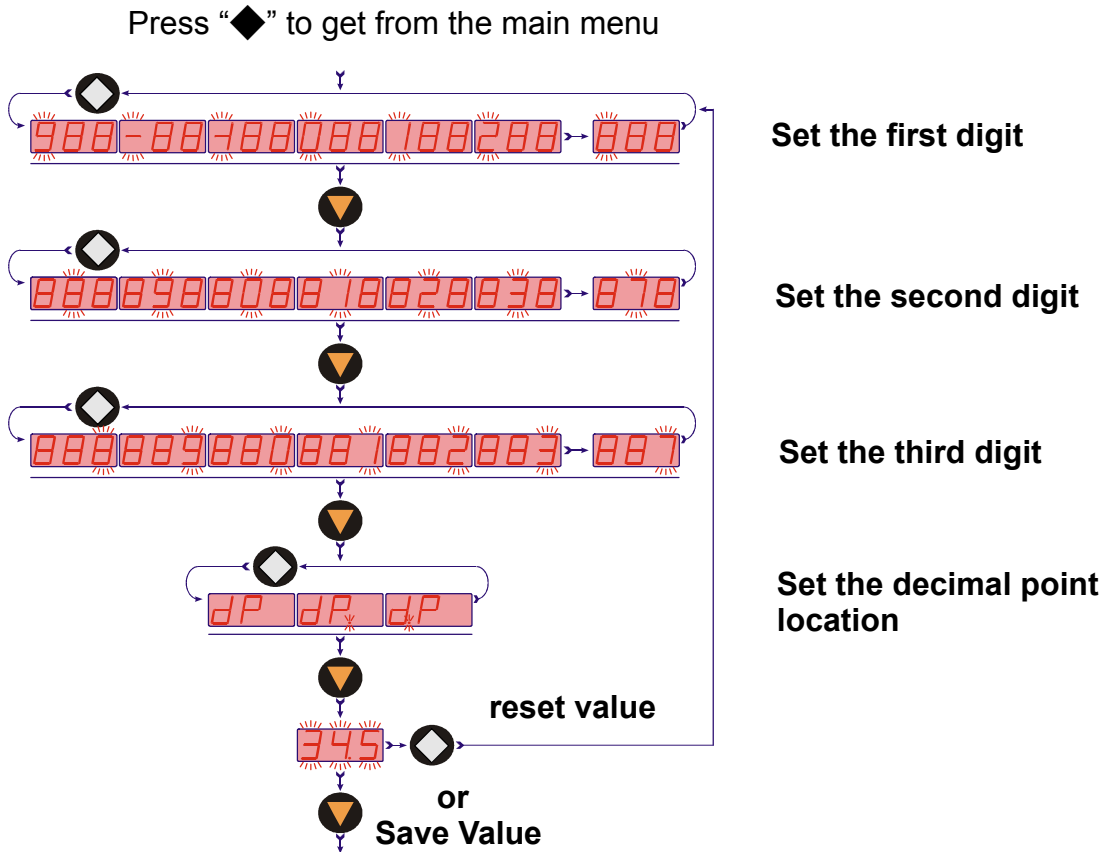
**Or for 20 sec**  
**Press no buttons**

**Exit Setup**

### 5.1.1 Changing Values in Setup Mode

When in the Setup Mode the actual values of zero, span, dampening and other functions are adjusted as required by the user. From the main menu (e.g. Change Code "CCo"), press the "◆" button to adjust that functions value. The following diagram shows the sequence of steps required to change a value.

Diagram 5.3 Sequence to Change a Value





5.1.2 Programming Flow Chart

Diagram 5.4 Programming Flowchart

TO BE ADDED IN FUTURE REVISION

## 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 5.4 provides a flowchart of the programming menu. Section 5.1.1 and diagram 5.2 and 5.3 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 S - C - Start Current

This menu item allows the user to input the pressure which corresponds to the current transmitter's zero point (4 mA or 0 mA point). Typically this value is zero (i.e. zero PSIG = 4 mA). Any number between -199 and 999 within the measuring range of the device can be entered. Additionally, a decimal point can be added if desired. To perform the Start Current adjustment, if desired, use the ▼ button to get to the **S - C** menu item. Then press the ◆ button and hold down for 7 seconds to enter the **S - C** branch. After entering, Section 5.1.1 'Changing Values in Setup Mode' on page 6 provides steps required to change a value. The transmitter output will remain at its zero point (4 mA or 0 mA) until the system pressure rises above the Start Current setting.

### 5.2.3 E - C - End Current

This menu item allows the user to input the pressure which corresponds to the current transmitter's maximum span (20mA point). The device is preset at the factory with this value set to the transmitters full scale measuring range. Any number between -199 and 999 within the measuring range of the device can be entered. Additionally, a decimal point can be added if desired. To perform the End Current adjustment, if desired, use the ▼ button to get to the **E - C** menu item. Then press the ◆ button and hold down for 7 seconds to enter the **E - C** branch. After entering, Section 5.1.1 'Changing Values in Setup Mode' on page 6 provides steps required to change a value.

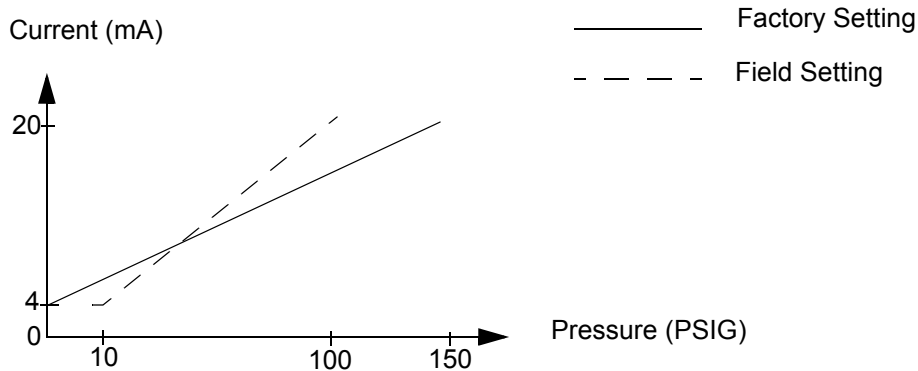
### 5.2.4 SCS - Start Current Select

This menu item allows the user to select a transmitter zero point of either 0 mA or 4 mA. A zero point of 4 mA is preset at the factory. To change this setting, if desired, use the ▼ button to get to the **SCS** menu item. Then press the ◆ button and hold down for 7 seconds to enter the **SCS** branch. Use the ◆ button to change the value. Use the ▼ button to accept the value. Use the ▼ button to proceed through the programming menu

**Example:** A PDA series pressure transmitter is purchased with a measuring range of 0-150 PSIG (The Max. measuring range can be determined by the model number code, or by applying power to the device. When power is first applied the Max. measuring range flashes on the display for 3 seconds.) From the factory, the Start Current (**S - C**) value is preset at 00.0 and the End Current (**E - C**) value is preset at 150. The Start Current Select (**SCS**) value is set at 4 for 4 mA.

It is desired to field program the transmitter's output such that the zero point is at 10 PSIG (**S - C** adjusted to 10.0) and the span point is at 100 PSIG. (**E - C** adjusted to 100). The transmitter output Vs. pressure for the factory settings and the field modified settings are shown in Diagram 5.5

Figure 5.5 Start Current and End Current Example



### 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 output for systems in which pressure pulsations are a problem. The larger the number of samples the more stable the display and output. A **Filt** value of "1" shuts off the filtering.

When filtering is being used, the PDA series employs an integrated overshoot function which detects any overshoot above 6.25% and processes that measured value without filtering. This feature allows the sensor to differentiate between pulsations and actual system pressure changes and process the pressure change signals without filtering. This greatly enhances the sensor's response time when the filtering function is being used.

### 5.2.6 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 PDA 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.

### 5.2.7 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 PDA series pressure sensors 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 sensor 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 PDA 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 device or power failure. In critical applications, KOBOLD recommends the use of redundant backup systems and alarms in addition to the primary system.