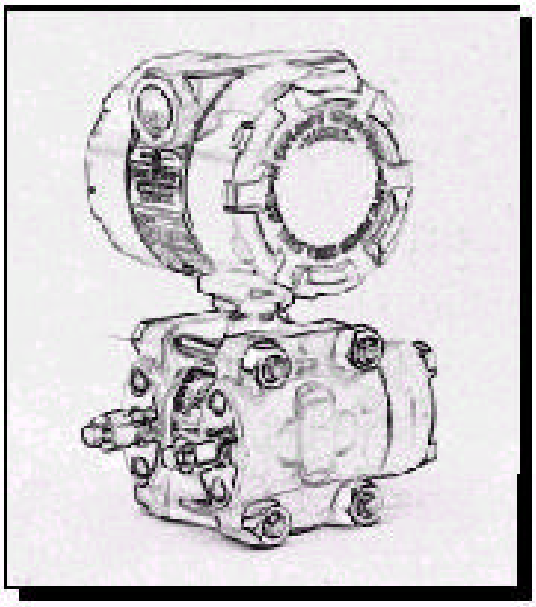
User's Guide

CE



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PX750

Pressure Transmitter

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Table of Contents

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SECTION
1

Introduction

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OVERVIEW

This section outlines the models covered and the organization of this manual.

⚠WARNING

The following performance limitations may inhibit efficient or safe operation. Critical applications should have appropriate diagnostic and backup systems in place.

Pressure transmitters contain an internal fill fluid. It is used to transmit the process pressure through the isolating diaphragms to the pressure sensing element. In rare cases, oil leak paths in oil-filled pressure transmitters can be created. Possible causes include: physical damage to the isolator diaphragms, process fluid freezing, isolator corrosion due to an incompatible process fluid, etc.

A transmitter with an oil fill fluid leak can continue to perform normally for a period of time. Sustained oil loss will eventually cause one or more of the operating parameters to exceed published specifications while a small drift in operating point output continues. Symptoms of advanced oil loss and other unrelated problems include:

- Sustained drift rate in true zero and span or operating point output or both
- Sluggish response to increasing or decreasing pressure or both
- Limited output rate or very nonlinear output or both
- Change in output process noise
- Noticeable drift in operating point output
- Abrupt increase in drift rate of true zero or span or both
- Unstable output
- Output saturated high or low

MODELS COVERED

This manual provides basic installation, commissioning, and troubleshooting information for the following PX750 Pressure Transmitters:

Model PX750 - Differential Pressure Transmitter

measures differential pressure from 2 inH_2O to 1,000 psi (0.497 to 6895 kPa).

Model PX750 - Gage Pressure Transmitter

measures gage pressure from 2 inH_2O to 1,000 psi (0.497 to 41369 kPa).

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Model PX750– Alphaline Draft Range Differential Pressure Transmitter
designed for monitoring low pressure flow rates with positive and/or negative static pressure capabilities and 0–½ to 0–6 inH_2O rangeability.

USING THIS MANUAL

This manual is designed to assist in basic installation and operation of Model PX750 Pressure Transmitters.

Section 2 Installation
provides a flowchart outlining installation procedures and installation wiring diagrams.

Section 3 Commissioning
provides a description of common commissioning tasks for the Model PX750 Smart Pressure Transmitter.

Section 4 Commissioning
provides a description of common commissioning tasks for the Model PX750 Analog Pressure Transmitter.

Section 5 Troubleshooting
provides basic troubleshooting techniques for common diagnostic messages associated with the transmitter and the communicator.

Section 6 Reference Data
provides range tables, a typical model structure, and bolt torque specifications for Model PX750 Transmitters.

Appendix
contains menu tree and fast key sequence for the HART Communicator.

SECTION
2

Installation

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OVERVIEW

This section contains a flowchart in Figure 2-1 and wiring diagrams in Figures 2-2 through 2-5 to guide you to a successful Model PX750 installation. Shielded cable should be used for best results in electrically noisy environments.

⚠WARNING

Failure to follow safe installation guidelines can cause death or serious injury. Please review the following safety messages before installing a Model PX750 Pressure Transmitter.

- To avoid output shifts in critical applications, do not plug the low side with a solid plug.
- To avoid process leaks, install and tighten all four flange bolts before applying pressure, or process leakage may result. Attempting to remove the flange bolts while the transmitter is in service may cause process fluid leaks.
- To avoid explosions, do not remove the instrument cover or make electrical connections in explosive atmospheres when the circuit is alive. Make sure the instrument is installed in accordance with intrinsically safe or nonincendive field wiring practice.
- To meet explosion proof requirements, make sure that both transmitter covers are fully engaged.

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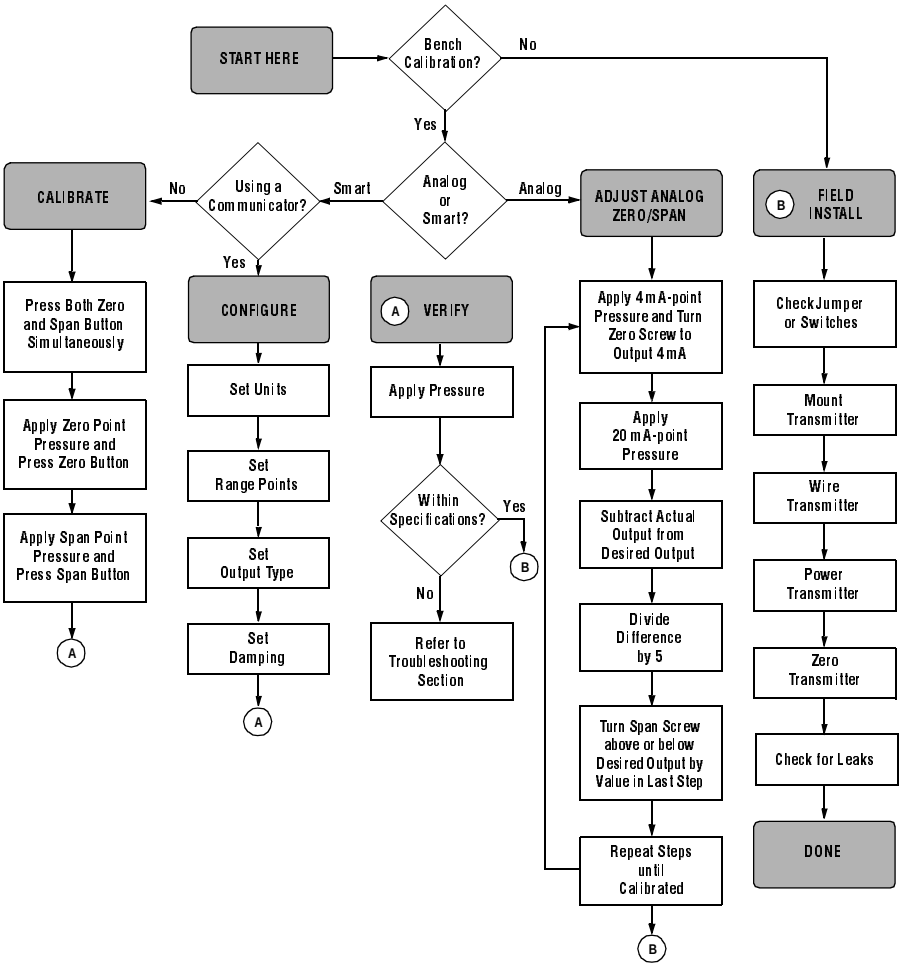
FIGURE 2-1. Installation Flowchart.

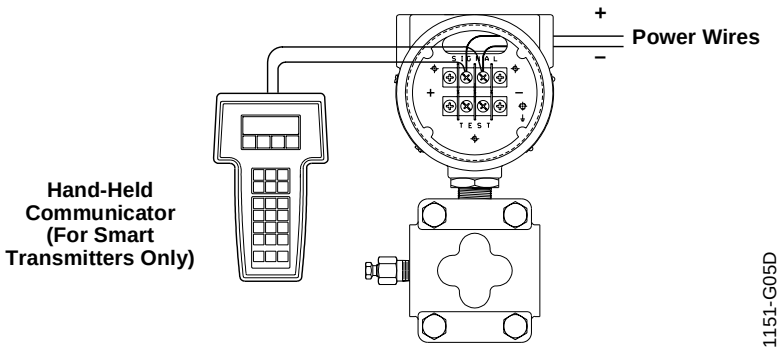


WIRING CONNECTIONS

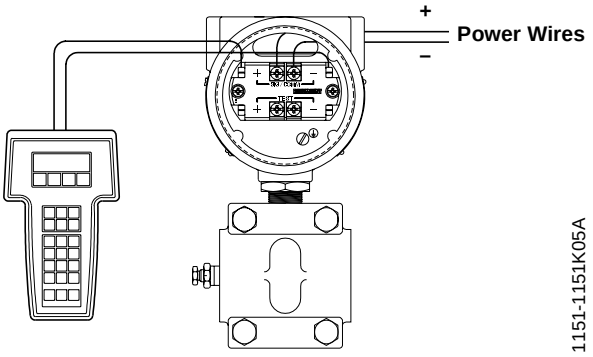
Figure 2-2 shows wiring connections necessary to power a Model PX750 Transmitter and if smart, enable communications with a hand-held communicator. Shielded cable should be used for best results in electrically noisy environments.

NOTE
A resistance of at least 250 ohms must exist between the communicator and the power supply for communications.

FIGURE 2-2. Field Wiring Diagram.



STANDARD TERMINAL BLOCK



OPTION CODE R1 TERMINAL BLOCK

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FIGURE 2-3. Model PX750 Wiring Diagrams for Output Codes J and F.

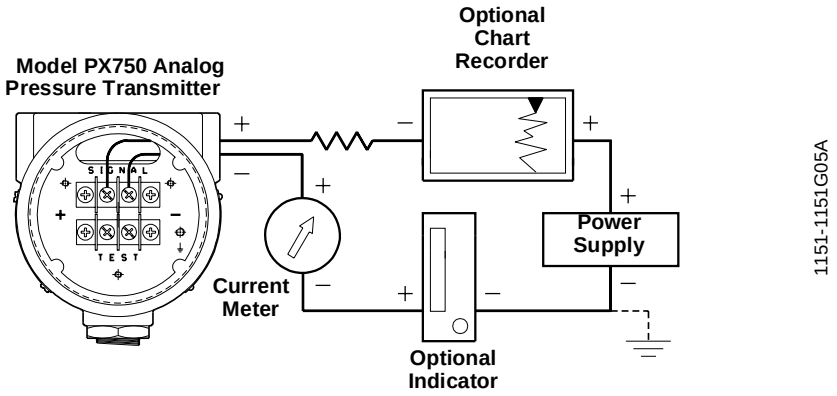
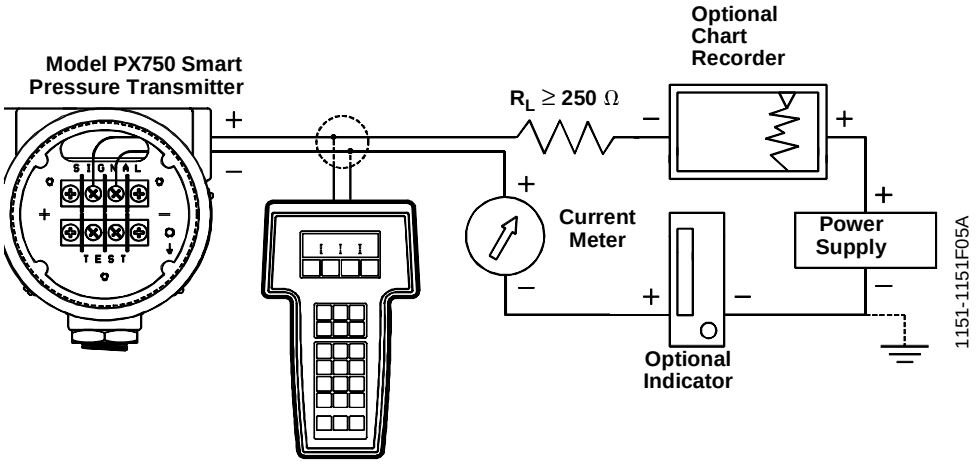


FIGURE 2-4. Model PX750 Wiring Diagram for Smart Output Code S.



NOTE
Signal Loop may be grounded at any point or left ungrounded.

NOTE
A HART Interface may be connected at any termination point in the loop. Signal loop must have 250 ohms minimum load for communications.

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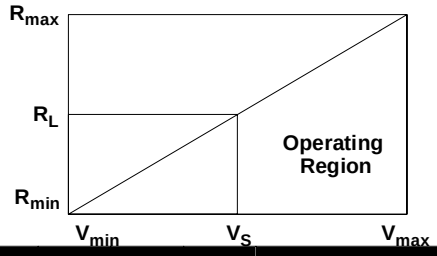
Load Limitations

FIGURE 2-6. Model PX750 Power Supply Requirements.

NOTE
External power supply required.
Transmitter operates on 12 to 45 V dc with no load for Output Codes S and E.



Code	V_{min}	V_{max}	R_{min}	R_{max}	R_L at Supply Voltage (V_S)
S(1)	12	45(2)	0	1650	$R_L = 43.5 (V_S - 12)$
E, J	12	45	0	1650	$R_L = 50 (V_S - 12)$
G	30	85	0	1100	$R_L = 20 (V_S - 30)$
L	5	12	Low Power Minimum Load Impedance: 100 kΩ		
M	8	14			

(1) A minimum of 250 ohms is required for communication.

(2) Vmax for CESI is 42.5 V dc.

SECTION
3

Commissioning the Smart Transmitter

EN

OVERVIEW

This section provides summarized procedures needed to commission the Model PX750 Smart Transmitter.

⚠WARNING

Failure to follow safe commissioning guidelines can cause death or serious injury. Please review the following safety messages before commissioning a Model PX750 Pressure Transmitter.

- To avoid explosions, do not remove the instrument cover or make electrical connections in explosive atmospheres when the circuit is alive. Make sure the instrument is installed in accordance with intrinsically safe or nonincendive field wiring practice.
- To meet explosion proof requirements, make sure that both transmitter covers are fully engaged.

Configure the Analog Output Parameters

Calibrate the Sensor

Calibrate the 4–20 mA Output

FAST KEY SEQUENCES

For your convenience, fast key sequences are listed for common transmitter functions. Complete tables of fast key sequences are located in Appendix A.

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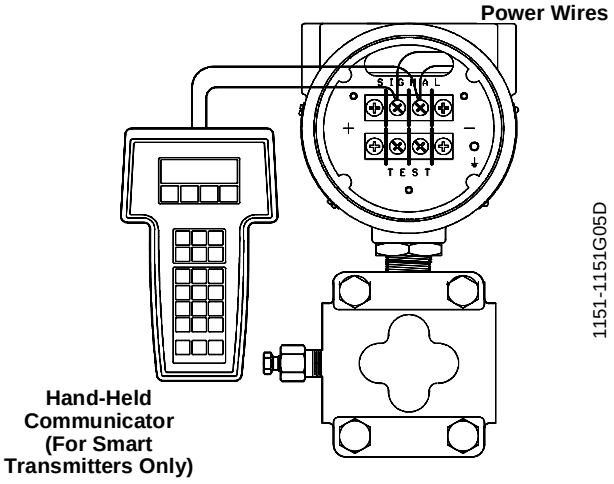
If you are unfamiliar with the communicator or how to follow fast key sequences, please refer to Appendix A for communicator operations.

The fast key boxes in this section contain codes for the HART Communicator Model 275. From the Online Menu (HART Communicator), press these key sequences to access the desired transmitter function.

TABLE 3-1. Fast Key Box.

HART Comm.	1, 5, 3, 2

FIGURE 3-1. CommunicatorWiring Connections.



CONFIGURE THE ANALOG OUTPUT PARAMETERS

Setting Process Variable Units

HART Comm.	1, 3, 2

The Model PX750 allows any of the following output units: inH_2O, inHg, ftH_2O, mmH_2O, mmHg, psi, bar, mbar, g/cm^2, kg/cm^2, Pa, kPa, torr, and atm.

Reranging

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Reranging matches the transmitter range points with the applied process pressures. It can be performed three ways: using the communicator, using the communicator and a reference pressure, or by using the transmitter zero and span buttons.

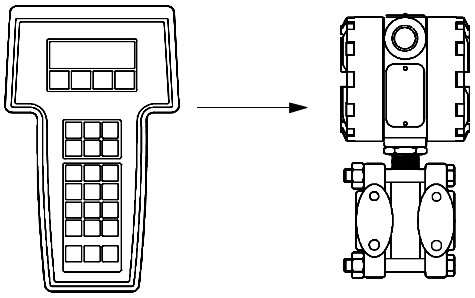
To decide which method is appropriate, consider the following:

- Reranging with the keypad changes the analog 4 and 20 mA points independently.
- Reranging with a pressure input source and the keypad allows you to maintain the same analog span.
- Reranging with a pressure input source and the zero and span screws allows you to maintain the same analog span.

Reranging with a Communicator Only

HART Comm.	1, 2, 3, 1, 1

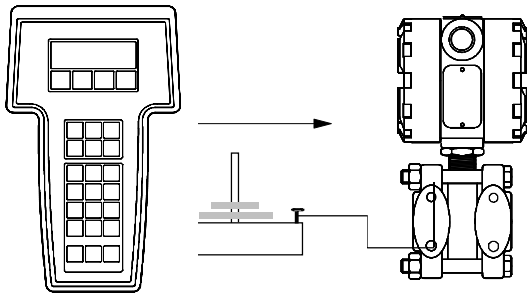
Reranging with the keypad changes the 4 and 20 mA points independently.



Reranging with a Pressure Input Source and a Communicator

HART Comm.	1, 2, 3, 1, 2

Reranging with a pressure input source maintains the same span.



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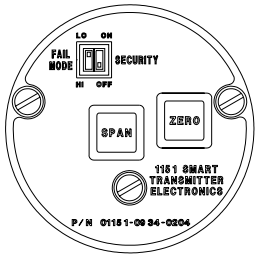
Reranging Using Transmitter Buttons

1. Locate the transmitter zero and span buttons on the transmitter faceplate, as shown in Figure 3-2.

FIGURE 3-2. External Zero and Span Buttons.



1151-0908A02A

2. Press both span and zero buttons simultaneously for 10 seconds.
3. Using a pressure source with an accuracy three to ten times the desired calibrated accuracy, apply the 4 mA-point pressure to the high side of the transmitter.
4. Press the zero button for five seconds and verify that the output is 4 mA.
5. Apply a pressure equivalent to the 20 mA-point pressure to the high side of the transmitter.
6. Press the span button for five seconds to set the 20 mA point. Verify that the output is 20 mA.

NOTE
Both the lower and upper range values must fall within the lower and upper range limits of the sensor module, and meet the minimum and maximum span criteria allowed by the transmitter.

Setting the Output Type

HART Comm.	1, 3, 5

Setting the output type changes the mathematical relationship between the input pressure and the 4–20 mA output.

The transmitter output type can be set to either linear or square root.

Setting Damping

HART Comm.	1, 3, 6

The Model PX750 has electronic damping that can increase the response time of the transmitter to smooth the output when there are rapid input variations. It can also decrease response time when a rapid response to the process is required.

CALIBRATE THE SENSOR

EN

Digital Trim

Smart transmitters are factory characterized. The information is stored in the sensor module EEPROM during the characterization process. The digital trim function allows you to make adjustments to this factory-stored curve.

Full Trim

HART Comm.	1, 2, 3, 3

A full trim is a two-point sensor calibration where two end-point pressures are applied, and the transmitter process variable output is adjusted to agree with the pressure input.

NOTE

A full trim requires a pressure source at least three times more accurate than the transmitter. For best accuracy, make sure the applied pressure is equal to or slightly less than the desired 4 mA setpoint, or equal to or slightly greater than the 20 mA setpoint.

Zero Trim

HART Comm.	1, 2, 3, 3, 1

A zero trim is a simpler, one-point process variable adjustment. It must be performed with the low trim value. A zero trim may be used when an exact pressure source is not available for the second pressure needed in a full trim.

A zero trim is useful for compensating for mounting position effects or for zero shifts due to static pressure in differential pressure applications.

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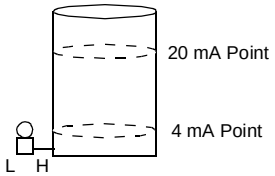
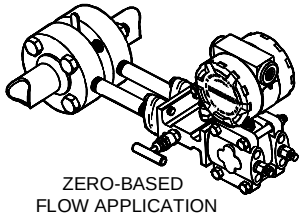
Zero-Based Applications:

Use the communicator “Zero Trim” function to change the 4 mA point to represent “0” pressure.



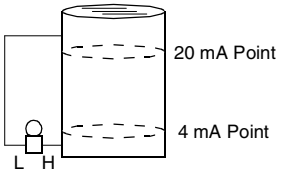
ZERO-BASED
LEVEL APPLICATION



ZERO-BASED
FLOW APPLICATION

EN

Nonzero-Based Applications:
Use the zero pushbutton to shift the 4 and 20 mA points together (maintaining span) to represent new pressure values.



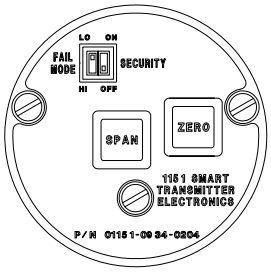
NONZERO-BASED
LEVEL APPLICATION

Zeroing Using Transmitter Buttons

Locate the transmitter zero and span buttons on the transmitter faceplate, as shown in Figure 3-3.

1. Press both span and zero buttons simultaneously for 10 seconds.
2. Apply the 4 mA-point pressure.
3. Press the zero button for five seconds.
4. Verify that the output is 4 mA.

FIGURE 3-3. External Zero and Span Buttons.



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CALIBRATE THE 4–20 MA OUTPUT

Digital to Analog Converter Trim

It may be necessary to calibrate the 4–20 output. The 4–20 mA output trim function can also be used to make adjustments to allow for calibration differences of a particular readout device in the loop.

4–20 mA Output Trim

HART Comm.	1, 2, 3, 2, 1

A 4–20 mA output trim adjusts the transmitter milliamp output to match your plant's standard. This procedure is used if you want to trim the transmitter using a current meter.

4–20 mA Output Trim Using Other Scale

HART Comm.	1, 2, 3, 2, 2

This procedure is used if you want to trim the transmitter and your readout device is in something other than milliamps (e.g. volts).

SECTION
4

Commissioning the Analog Transmitter

EN

OVERVIEW

This section summarizes procedures needed to commission the Analog Model PX750 Transmitter.

⚠WARNING

Failure to follow safe commissioning guidelines can cause death or serious injury. Please review the following safety messages before commissioning a Model PX750 Pressure Transmitter.

- To avoid explosions, do not remove the instrument cover or make electrical connections in explosive atmospheres when the circuit is alive. Make sure the instrument is installed in accordance with intrinsically safe or nonincendive field wiring practice.
- To meet explosion proof requirements, make sure that both transmitter covers are fully engaged.

The following tasks are described in this section:

CALIBRATION

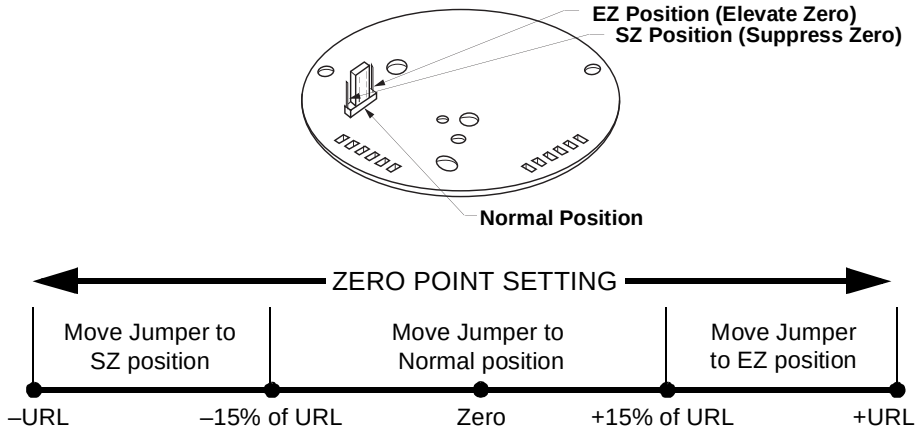
Basic calibration involves these steps:

1. **Set the user-selectable jumper pins.**
2. **Adjusting zero and span.**
3. **Adjusting damping.**

Setting the EZ/SZ Jumper Pin

When the zero point setting is greater than ±15 percent of the transmitter upper range limit (URL), it is necessary to move the user-selectable jumper pin, located on the component side of the amplifier board, as shown in Figure 4-1.

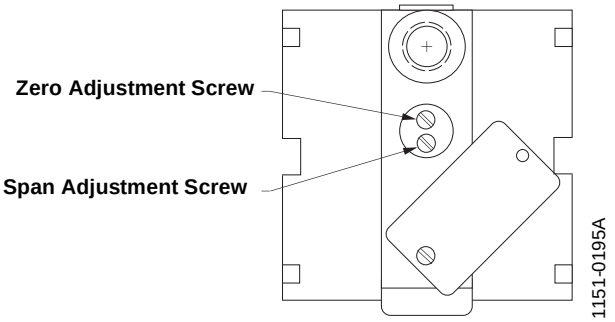
FIGURE 4-1. Analog Transmitter Jumper Positions.



Adjusting for Zero and Span

Figure 4-2 shows the zero and span adjustment screws, located beneath the nameplate on the electronics housing.

FIGURE 4-2. Zero and Span Adjustment Screws.



NOTE
The transmitter output increases with clockwise rotation of the adjustment screws.

NOTE
The zero and span adjustments are interactive. For applications requiring large elevated or suppressed values, refer to “Setting the EZ/SZ Jumper Pin” on page 1.

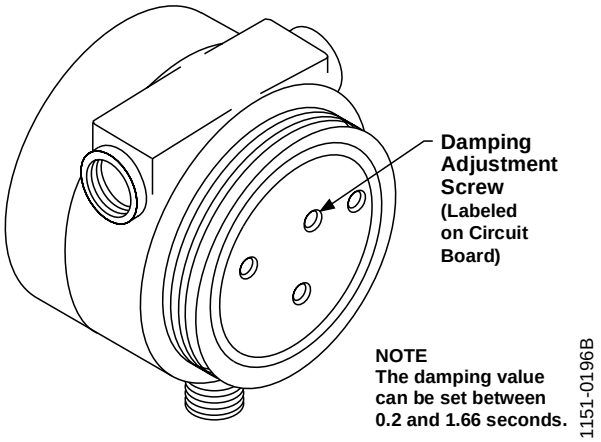
1. Apply 4 mA-point pressure and turn zero screw to output 4 mA.
2. Apply 20 mA-point pressure.
3. Subtract actual output from desired output.
4. Divide difference by 5.
5. Turn span screw above or below desired output by value in Step 4.
6. Repeat Steps 1 through 5 until calibrated.

Adjusting Damping

To change the damping setting, locate the damping adjustment screw, shown in Figure 4-3, and turn the damping adjustment screw clockwise to increase the damping to the desired value.

The damping value can be set between 0.2 and 1.66 seconds. The factory default damping position is set to the transmitter minimum of 0.2 seconds.

FIGURE 4-3. Damping Adjustment Screw.



Adjusting Linearity

The transmitter linearity is factory set for optimum performance over the calibrated range of the instrument and is normally not readjusted in the field.

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SECTION
5

Troubleshooting

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TROUBLESHOOTING

Tables 5-1 and 5-2 provide summarized troubleshooting suggestions for the most common operating problems.

⚠WARNING

Failure to follow safe operating practices can cause death or serious injury. Please review the following safety messages before troubleshooting the Model PX750 Pressure Transmitter.

- Using improper procedures or parts can affect product performance and the output signal used to control a process. To ensure safe transmitter performance, use only new parts and follow Omega documented procedures. Questions regarding these procedures or parts should be directed to Omega's customer service dept.
- Isolate a failed transmitter from its pressure source as soon as possible. Pressure that may be present could cause death or serious injury to personnel if the transmitter is disassembled or ruptures under pressure.
- To avoid explosions, do not remove the instrument cover or make electrical connections in explosive atmospheres when the circuit is alive. Make sure the instrument is installed in accordance with intrinsically safe or nonincendive field wiring practice.
- To meet explosion proof requirements, make sure that both transmitter covers are fully engaged.
- To avoid process leaks, use only the O-ring designed to seal with the corresponding flange adapter. Omega supplies two unique styles of O-rings for Omega flange adapters: one for Model PX750 flange adapters and another for Model PX751 flange adapters. Each flange adapter is distinguished by its unique groove.

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TABLE 5-1. Model PX750 Smart Troubleshooting Chart.

Symptom	Corrective Action
Milliamp Reading is Zero	• Check if Power Polarity is Reversed • Check for Bad Diode in Housing by Jumpering Test Terminals • Replace Transmitter Housing
Transmitter not in Communication	• Check Power Supply Voltage at Transmitter (Minimum 10.5 V) • Check load resistance (250 Ohm minimum) • Replace Electronics Board
Milliamp Reading is Low or High	• Check Pressure Variable Reading • Perform 4–20 mA Output Trim • Replace Electronics Board
No Response to Changes in Applied Pressure	• Check Power Supply Voltage at Transmitter • Check Test Equipment • Verify Calibration Settings (4 and 20 mA points) • Replace Electronics Board • Replace Sensor Module
Low Reading for Pressure Variable	• Check Impulse Piping for Blockage • Check Test Equipment • Perform Full Sensor Trim • Replace Sensor Module
High Reading for Pressure Variable	• Check Impulse Piping for Blockage • Check Test Equipment • Perform Full Sensor Trim • Replace Sensor Module
Erratic Reading for Pressure Variable	• Check Impulse Piping for Blockage • Check Damping • Check for EMF Interference • Replace Sensor Module

TABLE 5-2. Model PX750 Analog Troubleshooting Chart.

Symptom	Corrective Action
Milliamp Reading is Zero	• Check if Power Polarity is Reversed • Check for Bad Diode in Housing by Jumpering Test Terminals • Replace Transmitter Housing
Milliamp Reading is Low	• Check Test Equipment • Check Jumper Pin Position • Adjust Zero • Check Calibration • Replace Sensor Module
Milliamp Reading is High	• Check Test Equipment • Check Calibration • Replace Sensor Module
Transmitter does not Respond to Changes in Pressure	• Close Drain/Vent Valves • Check Power Voltage • Check Test Equipment • Replace Electronics Board • Replace Sensor Module
Spikes in Output	• Check Mounting Location (avoid power lines or motors)

SECTION
6

Reference Data

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OVERVIEW

This section contains the following reference data for the Model PX750 Transmitter:

- Transmitter Range Limits
- Bolt Torque Values
- Model Structure

MODEL PX750 UPPER RANGE LIMITS (URL)								
Range Code	bar	mbar	kg/cm^2	psi	kPa	inH_20 @20 °C	mmH_2O @20 °C	inHg @0 °C
3	0.075	75	0.076	1.082	7.461	30	762	2.203
4	0.373	373	0.380	5.409	37.305	150	3810	11.013
5	1.865	1865	1.901	27.045	186.505	750	19050	55.065
6	6.90	6895	7.031	100	690	2773	70434	204
7	21	20685	21	300	2069	8319	211302	611
8	69	68950	70	1000	6895	27730	704340	2036
9	207	206850	211	3000	20685	83190	2113020	6108

Transmitter Part	Torque Value n/m (in-lb)
Flange Bolts	37 ±3 (325 ±25)
Flange Adapter Bolts	40 ±6 (350 ±50)
Drain/Vent Seat	28 ±6 (250 ±50)
Drain/Vent Stem	7 ±1 (60 ±10)

APPENDIX

A

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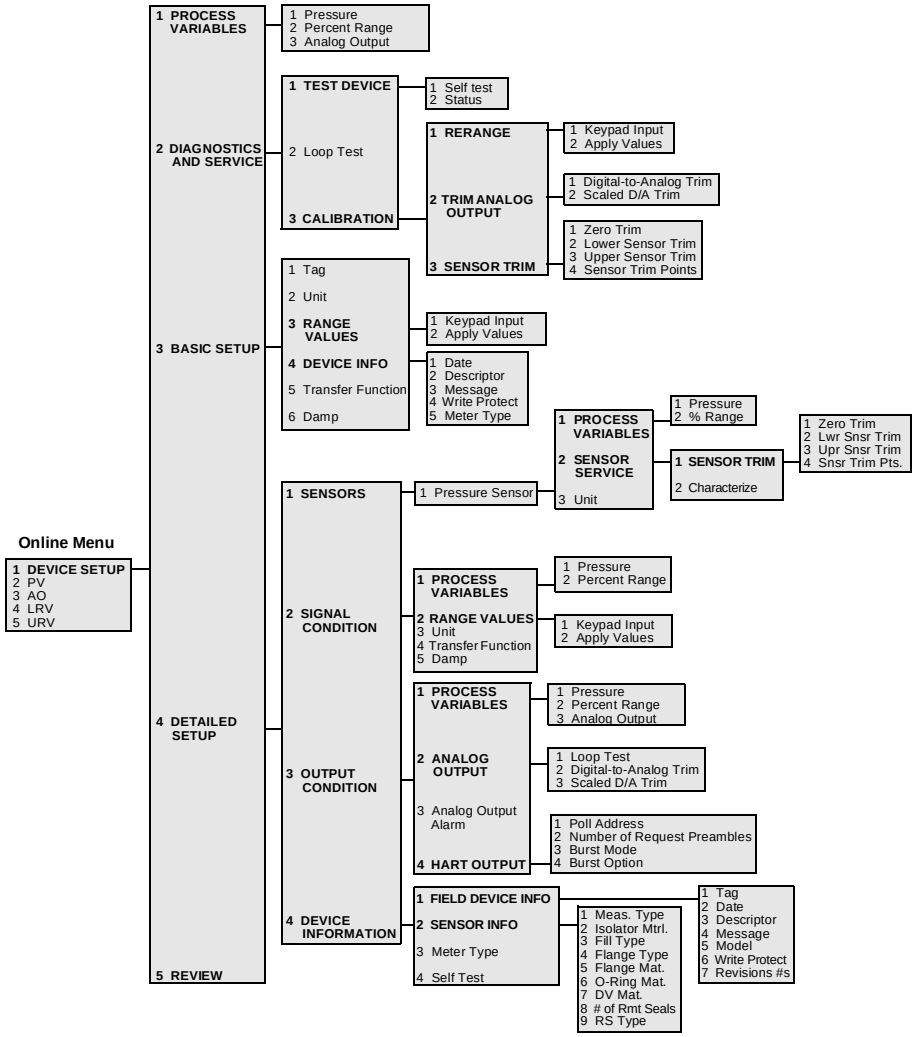
HART®Communicator

FIGURE A-1. HART Communicator Menu Tree for the Model PX750 Smart.



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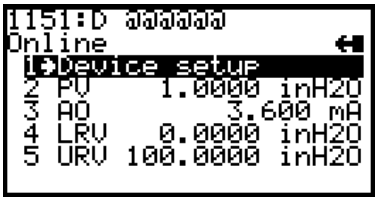
HART COMMUNICATOR

The HART Communicator provides communication capabilities for Model PX750 Smart Pressure Transmitters. The HART Communicator menu tree provides a schematic overview of configuration functions, and the fast key sequences provide direct access to software functions.

Online Menu

The Online menu appears automatically if the HART Communicator is connected to an active loop with an operating transmitter. From the Online menu, press the appropriate key sequence to access the desired function. Follow the on-screen instructions to complete the function.

FIGURE A-2. HART Communicator Online Menu.



HART Fast Key Feature

The fast key sequences for the HART Communicator use the following convention for their identification:

1 through 9–Refer to the keys located in the alphanumeric keypad located below the dedicated keypad.

NOTE
HART fast key sequences are operational only from the Online menu.

Begin fast key sequences from the Online menu. Press **HOME** (normally function key F3) to return to the Online menu from within a function.

HART Fast Key Example

The following example shows how to change the **Date**.

Following the menu tree, press 1 to reach **Device Setup**, press 3 for **Basic Setup**, press 4 for **Device Info**, press 1 for **Date**.

The corresponding HART fast key sequence is 1,3,4,1.

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TABLE A-1.
HART Communicator Fast Key Sequences for
Model PX750 Transmitters.

Function	HART Communicator Fast Keys
Analog Output	3
Analog Output Alarm	1, 4, 3, 3
Burst Mode Control	1, 4, 3, 4, 3
Burst Operation	1, 4, 3, 4, 4
Calibration	1, 2, 3
Characterize	1, 4, 1, 1, 2, 2
Damping	1, 3, 6
Date	1, 3, 4, 1
Descriptor	1, 3, 4, 2
Digital To Analog Trim (4–20 mA Output)	1, 2, 3, 2, 1
Field Device Info	1, 4, 4, 1
Full Trim	1, 2, 3, 3
Keypad Input	1, 2, 3, 1, 1
Loop Test	1, 2, 2
Lower Range Value	4, 1
Lower Sensor Trim	1, 2, 3, 3, 2
Message	1, 3, 4, 3
Meter Type	1, 3, 4, 5
Number Of Requested Preambles	1, 4, 3, 4, 2
Percent Range	1, 1, 2
Poll Address	1, 4, 3, 4, 1
Pressure	2
Range Values	1, 3, 3
Rerange	1, 2, 3, 1
Scaled D/A Trim (4–20 mA Output)	1, 2, 3, 2, 2
Self Test (Transmitter)	1, 2, 1, 1
Sensor Info	1, 4, 4, 2
Sensor Trim Points	1, 2, 3, 3, 4
Status	1, 2, 1, 2
Tag	1, 3, 1
Transfer Function (Setting Output Type)	1, 3, 5
Transmitter Security (Write Protect)	1, 3, 4, 4
Trim Analog Output	1, 2, 3, 2

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TABLE A-1.
HART Communicator Fast Key Sequences for
Model PX750 Transmitters.

Function	HART Communicator Fast Keys
Units (Process Variable)	1, 3, 2
Upper Range Value	5, 2
Upper Sensor Trim	1, 2, 3, 3, 3
Zero Trim	1, 2, 3, 3, 1

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