

Instruction Sheet

Pressure Transducers: PXD-261 & PXD-461

In-Situ's PXD-261 and PXD-461 are fully submersible pressure transducers for monitoring pressure or water level. They can be used with In-Situ's HERMIT® data loggers to collect fast, accurate time-drawdown data from pump and slug tests. Small diameter permits access to 1" wells. Removable nosecone and NPT threading allows use in piping or conduit. Quick-Connect cable is easy to install, and long cable lengths do not compromise accuracy.

Your transducer was carefully inspected before shipping and is ready to operate out of the box. Check for any physical damage during shipment. Notify In-Situ and file a claim with the carrier if there is any such damage. If your transducer didn't come as ordered, please contact In-Situ immediately.

Operating Principle

A pressure transducer senses changes in pressure, measured in pounds per square inch (PSI), exerted by a column of water or other fluid above an internal strain gauge. This is translated electronically to a 4-20 mA signal sent to a data logger. Software calibration coefficients unique to each transducer enable the logger to convert the 4-20 mA output to meaningful results in the desired units.

PSIA and PSIG

PSIA stands for "pounds per square inch absolute," measured with respect to zero pressure. PSIA transducers measure all pressure forces detected by the strain gauge, including atmospheric pressure.

PSIG stands for "pounds per square inch gauge," measured with respect to atmospheric pressure. PSIG transducers thus exclude the atmospheric pressure component.

This difference may be represented by a simple equation:

$$P_{\text{gauge}} = P_{\text{abs}} - P_{\text{atmos}}$$

Calibration Documentation

Documents provided with the transducer describe In-Situ's calibration process and list the transducer's calibration coefficients (Linearity, Scale, and Offset), which are also printed on the backshell dust cap.



The only removable parts of the transducer are the nose cone and cable. Do not take the body apart, as this may severely damage the transducer and will void the warranty.

Installation

Installation requires four steps, which may be performed in any convenient order:

- Attach the cable
- Connect the cable to the data logger
- Install the transducer in the water
- Program the data logger to identify the transducer

Attach the Cable

- 1 Remove the protective caps from the backshell and the Quick-Connect connector on the cable.



Don't discard the caps. Set them aside for later use to protect the contacts when the probe and cable are not in use, and for convenient reference to the coefficients.

- 2 Slide back the sleeve of the Quick-Connect connector.
- 3 Align the tab in the transducer backshell with the slot inside the cable connector.
- 4 Slide the two parts together and press tightly. They should slip together easily, without forcing.
- 5 Tighten the locking sleeve hand-tight.

PXD Pressure Transducers (PXD-461 shown)

Stainless steel nose cone, removable for cleaning or for installation using NPT threads

Stainless steel body, engraved with model & serial number

Quick-Connect cable connector



*Backshell
Protective dust cap lists calibration coefficients*

Cable

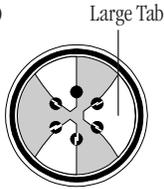
Connect to the Data Logger

To connect to In-Situ's HERMIT data loggers:



Proper operation of a transducer depends upon a clean, dry connection. Be sure the connectors are clean and dry before installing them.

- 1 Remove the protective caps from the logger and cable connectors.
- 2 Orient the connector patterns so that the large tab in the cable connector aligns with the V-shaped notch in the data logger connector.
- 3 Gently press the connector halves together. Excessive force should not be required.
- 4 Tighten the connector's lock ring to establish a tight connection and water-resistant seal.



Program the Data Logger

The process of collecting data from the PXD series transducers and In-Situ's HERMIT data loggers is referred to as "running a test." This has three steps:

- Enter the transducer characteristics into the data logger
- Enter the test conditions into the data logger
- When the logger is programmed and the transducer is in place, the test can be started

How you carry out these steps depends on the model of data logger you are using. For specific information, please refer to the data logger Operator's Manual.

Installation Guidelines

- For best results, install the transducer about an hour prior to test setup or data collection. This will insure that the transducer is stabilized to the water temperature and allow time for the cable to stretch or relax.
- To conserve battery power, don't put the transducer any deeper than necessary for the test.

The pressure reading is calculated by In-Situ's HERMIT data loggers using the quadratic formula

$$P = LX^2 + SX + O$$

where

P	=	Pressure in PSI
X	=	Normalized* transducer value (0-1)
L	=	Linearity value from probe data tag
S	=	Scale value from probe data tag
O	=	Offset value from probe data tag

**Transducer reading (in milliAmps) minus 4 divided by 16*

- The transducer will not read past its designated range. If the range is exceeded, the displayed value will remain constant.



Do not submerge the PXD-261 more than two times its range. Do not submerge the PXD-461 more than 1.5 times its range. Overpressuring will permanently offset, damage, or destroy the transducer.

- To verify operation, raise and lower the transducer and check that readings are reasonable and showing change before collecting data.
- Be sure that the transducer is attached securely to the wellhead or other stationary object and will not slip during operation.
- Don't set a pressure transducer below the level of the pump in a pumping well. The pressure transients generated by the pump will cause false level readings. Large pumps can swallow the transducer and cause permanent damage to both the transducer and the pump.
- Keep the vent tube in the cable unobstructed. Avoid kinks in the cable. Minimum recommended bend radius is one inch.

Piping Installations

With the nosecone removed, the transducer can be installed in any 1/4" NPT threaded pipe to monitor flow. Always remove the cable before screwing the transducer body into the NPT.



To install the transducer in a pipe fitting:

- 1 If the cable is attached, remove it. To do so, unscrew the locking sleeve and gently pull the transducer and cable connector apart.
- 2 Unscrew the nosecone by hand and remove it.
- 3 Using an open end wrench (7/8" for PXD-261, 5/8" for PXD-461) and the wrench flats on the transducer body, screw the transducer onto any 1/4" NPT threaded nipple, tee, or elbow.



Apply your wrench to the wrench flats, not to the spanner holes at the back end of the transducer. Thread sealing compound or tape may be used if necessary.

- 4 Reattach the cable.

Accuracy of the electronics may be affected by temperature fluctuations. For long-term tests (several weeks), we recommend you insulate the transducer to ensure a thermally stable environment.



When replacing the nose cone, first position the o-ring (PXD-461) or wavy spring washer (PXD-261), if removed, then screw on the nose cone hand-tight.

Using the Transducer with Other Equipment

The transducer provides a current output that is proportional to the applied pressure. This output is a 4-20 mA change corresponding to a full-scale change in pressure. The voltage required by the transducer is 11.6–40 (maximum) VDC.

Any data logger that provides the necessary voltage and can read the 4-20 mA current output can be used with the transducer. To insure accuracy, power should be applied for a minimum of 50 milliseconds prior to any reading.

Transducer wiring is shown in the table below by cable type.



In-Situ Inc. does not warrant the transducer against damage caused by use with devices not provided by In-Situ.

Mating connectors must be ordered separately from In-Situ, Inc. A kit with wiring diagrams is available. *Do not use any other type of connector* as this will compromise the integrity of waterproof operation. Also, remember that the vent tube in the cable must remain unobstructed to assure that the transducer is insensitive to barometric pressure changes.

Maintenance

Filter

A small mesh filter protects the pressure sensor from dirt and other foreign objects. It is held in the end of the NPT threads by a small star washer and can be seen when the nosecone is removed. The filter appears opaque when clean. If it becomes clogged with silt, try flushing it gently with a couple of squeezes from a water bottle. If this doesn't do the trick, contact Customer Service.

Nose Cone

If the holes in the nose cone become plugged, take the nose cone off and clean the holes with a swab or brush. To replace the nose cone on the PXD-261, first put the wavy spring washer over the threads, then screw on the nose cone hand-tight.

Cable

The transducer's Quick-Connect cable connector permits easy cable removal when changing to a different cable, installing the transducer in a pipe fitting, or storing the probe. Cable is available in standard and custom lengths of vented polyurethane or FEP*, or non-vented HDPE.

Take care to protect the cable from the sharp edges of well casings.

All cables are internally sealed to protect the transducer in the event that the cable is cut. Don't attempt to repair, splice, or seal any cuts without first consulting In-Situ Technical Support personnel.

Vent Tube (Vented Cable)

PSIG pressure sensors are designed to be insensitive to barometric pressure changes. A vent tube in the cable assures that atmospheric pressure is the reference pressure to the sensor diaphragm. *For proper operation the vent tube should not be bent, kinked, or blocked.* Such obstructions will cause barometric pressure fluctuations to appear in measurements, and may also introduce large, varying errors due to thermal expansion and contraction of air within the vent tube and probe body.

Calibration

Accuracy can be adversely affected by improper care and handling, exceeding operating pressure and temperature limits, physical damage or abuse. Annual recalibration is recommended.

Contact In-Situ Customer Service for information on recalibration.

Warranty Provisions

In-Situ Inc. warrants the PXD-261 and PXD-461 for one year from date of purchase by the end user against defects in materials and workmanship under normal operating conditions. To exercise this warranty contact Technical Support at the phone or e-mail address below for a return material authorization (RMA) and instructions. Complete warranty provisions are posted on our website at www.In-Situ.com.

Cable	Source (+)	Return (-)	Ground	Source Double Connector (+)	Return Double Connector (-)
4-conductor Non-vented	Yellow (Pin 6)	Brown (Pin 5)	Shield (Pin 4)	Yellow & Orange	Brown & Red
6-conductor Poly Vented (RuggedCable™)	Brown (Pin 6)	Black (Pin 5)	Shield (Pin 4)	Black & White	Brown & Red
6-conductor FEP Vented (RuggedCable™)	Yellow (Pin 6)	Black (Pin 5)	Shield (Pin 4)	Yellow & Orange	Black & Brown

How to Contact Us

Technical Support: 800 446 7488
Toll-free 24 hours a day in the U.S. and Canada
Address: In-Situ Inc.
221 East Lincoln Ave.
Fort Collins, CO 80524 USA
Phone: 970 498 1500
Fax: 970 498 1598
Internet: www.in-situ.com
e-mail: support@in-situ.com

To Obtain Repair Service (U.S.)

If you suspect the transducer is malfunctioning and repair is required, you can help assure efficient servicing as follows:

- 1 Call or e-mail In-Situ Technical Support (support@in-situ.com). Have the product model and serial number handy.
- 2 Be prepared to describe the problem, including how the instrument was being used and the conditions noted at the time of the malfunction.
- 3 If Tech Support determines that service is needed, they will ask that your company pre-approve a specified dollar amount for repair charges. When the pre-approval is received, Tech Support will assign an RMA (Return Material Authorization) number.
- 4 Clean the probe and cable. Decontaminate thoroughly if it has been used in a toxic or hazardous environment.
- 5 Pack the transducer in its original shipping box, if possible.
- 6 Mark the RMA number clearly on the outside of the box.
- 7 Send the package, shipping prepaid, to
In-Situ, Inc.
ATTN: Repairs
221 East Lincoln Ave.
Fort Collins, CO 80524

The warranty does not cover damage during transit. In-Situ recommends the customer insure all shipments. Warranty repairs will be shipped back prepaid.

Outside the U.S.

Contact your international In-Situ distributor for repair and service information.

Specifications

Wetted materials	316 Stainless steel, Viton®
Transduction principle	Integrated silicon strain gauge bridge
Voltage input	11.6 – 40 (absolute maximum) VDC
Signal current	4 – 20 mA (typical throughout pressure range)
Operating temperature	5° to 30°C (41° to 86°F)
Storage temperature	-40° to 125°C (-40° to 257°F)
Min. warmup time	50 milliseconds

PXD-261

Dimensions	0.86" dia., 8.5" long (2.2 x 21.6 cm)	
Weight	1 lb. (0.45 kg)	
Accuracy	±0.05% of full scale at 15°C (59°F)	
Ranges	Pressure	Max. Usable Depth
	15 PSIG/PSIA	35 ft /11 m water
	20 PSIG/PSIA	46 ft /14 m water
	30 PSIG/PSIA	69 ft /21 m water
	50 PSIG/PSIA	115 ft /35 m water
	100 PSIG/PSIA	231 ft /70 m water
	250 PSIG	577 ft /176 m water
Overpressure tolerance	2X full range	

PXD-461

Dimensions	0.7" diameter, 8.5" long (1.78 x 21.6 cm)	
Weight	0.5 lb (0.22 kg)	
Accuracy	±0.04% of full scale at 15°C (59°F)	
Ranges	Pressure	Max. Usable Depth
	500 PSIA	1153 ft / 352 m water
	1000 PSIA	2307 ft / 703 m water
Overpressure tolerance	1.5X full range	

Cable

Wetted materials	316 Stainless steel, Viton® Vented: FEP* or polyurethane Non-vented: high-density polyethylene (HDPE)
Size	0.25" (6.7 mm) OD nominal
Max. length	4500 ft (1372 m)
Reels	Plastic: up to 350 ft (106 m) capacity Small Steel: up to 450 ft (137 m) capacity Large Steel: up to 1500 ft (457 m) capacity

** FEP = fluorinated ethylene propylene, the generic equivalent of DuPont Teflon®.



1 800 446 7488

(toll-free, US and Canada) or 970 498 1500 **www.in-situ.com**

