

P037 Series Pressure Transducer

Installation & Operation Manual



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A. Pressure Transducers – General Description

A transducer is a device, which provides a useable output in response to a specified physical condition. In the case of a pressure transducer, the useable output is an electric signal and the specified physical condition is an application of pressure.

Pressure transducers are able to convert applied pressure to an electric signal through various technologies. The technology used in all Trans Metrics P037 series of pressure transducer is bonded foil strain gage. The bonded foil strain gage transducer traditionally measures pressure by introducing a fluid into a simple low volume chamber (port) where it acts against a diaphragm. Proportional to the applied pressure, the resistance change is conditioned by integrated circuit devices to produce the transducers output (except P037M type transducers – no integrated circuit devices).

Unlike a traditional pressure transducer, the P037 has a flush mount diaphragm and no pressure port. Because there is no pressure port, fluids must be introduced to the diaphragm differently than described above. The first method is to tap directly into the system and clamp the transducer in place. The first method allows the transducer to be placed flush into the pipe thus reducing or eliminating a port that can trap material. The second method uses a threaded adapter assembly, which slips over the transducer and allows it to be used more like a traditional transducer. The second method allows the transducer assembly to be taken apart for an occasional cleaning.

B. Model Number Designation

Each P037 pressure transducer is designated by a model number, pressure range, units of measure, reference type, and serial number. This information is printed on the certificate of calibration. The serial number is etched on the front of the transducer.

The model number in its basic form, designates the mechanical configuration of the transducer. The P037 series is constructed of a single diaphragm and can be ordered in ranges from 70 through 5000 psi.

A typical part number might be P037DFC182 1000 psig. The 182 is considered a modification and alters the standard transducer in some way. For ease of discussion, we will call this modification number XXX. Over the past 20 plus years of business, Trans Metrics has assigned over 600 modification numbers.

A breakdown of the part number is as follows:

Part Number	<i>P037DFC182 1000 psig</i>
Location	<i>12345678910</i>
Modification	<i>182 represents 10 feet cable length</i>

The type of series is defined in location 1, 2, 3, and 4 of the part number (only one static error band option is offered +/- .5% max. BSL (Best Straight Line), and 7 designate the circuit type, pressure connection (flush mount only), and electrical connection respectively by way of letters, locations 8, 9, and 10 designate a three digit modification number (transducer has been altered from the standard part, the three digit number is our method of documenting this alteration), blank space, pressure range, blank space, units, reference (gage reference only).

Lets go through a typical part number in detail:

Example: **P037DFCXXX 1000 psig:**

P037: denotes the P037 series
D: denotes a 1 to 5 VDC output
F: denotes a flush mount pressure port
C: denotes a 1 meter #28 AWG PVC jacketed cable
XXX: denotes a modification number (assigned if nonstandard)
1000: denotes the pressure range

- psi:** denotes the units of measure
- g:** denotes gage reference.

The specification sheet details performance specifications, common connections, dimensional details, and available options. Reference options/pricing to derive a complete part number. Any questions, please call the factory.

A specification sheet is sent with your order. You may call the factory to request a copy, email a request to sales@trans-metrics.com, or access our website at www.trans-metrics.com.

C. Static Error Band

Trans Metrics uses Best Straight-Line approach when determining nonlinearity. Static Error Band is the combined effects of nonlinearity, hysteresis, and repeatability. The P037 is offered with one static error band and it is +/- .5% max BSL.

D. Circuit Type

At present there are 3 circuit types offered with the P037 series. They are designated by D, M, and T.

1) Circuit type D

Description: 3 wire, amplified, single ended output. The signal output is referenced to power supply common. The D circuit provides an elevated zero balance at zero psi. For example 1-5 VDC.

2) Circuit type M

Description: 4 wire, unamplified, differential output. The excitation may vary between 5 to 18 VDC. The output is a nominal 1.5 mV/V to 2.0 mV/V. In order to calculate the full-scale output, measure the excitation voltage at the transducer and multiply it by the mV/V rating as noted on the certificate of calibration.

3) Circuit type T

Description: 2 wire, current loop, 4-20 mA output.

E. Warm-up time

In general, P037 warm-up times are defined in minutes. The P037 uses a 1000-ohm impedance gage to reduce warm-up time.

F. Reverse Polarity Protection

All P037 pressure transducers are protected from reverse polarity.

G. Pressure Connection

Only one pressure fitting option is available.

1) Letter Designation Description

F..... Flush mount

- * Standard wetted material is 15-5 VAC CE. This material is a precipitation hardened stainless steel that offers good corrosion resistance. Detailed specifications are on file at factory.
- * The housing material is 300 series stainless steel.
- * Optional wetted material is 316L stainless steel.
- * Please call factory regarding questions, availability, and current pricing.

2) Pressure connection considerations

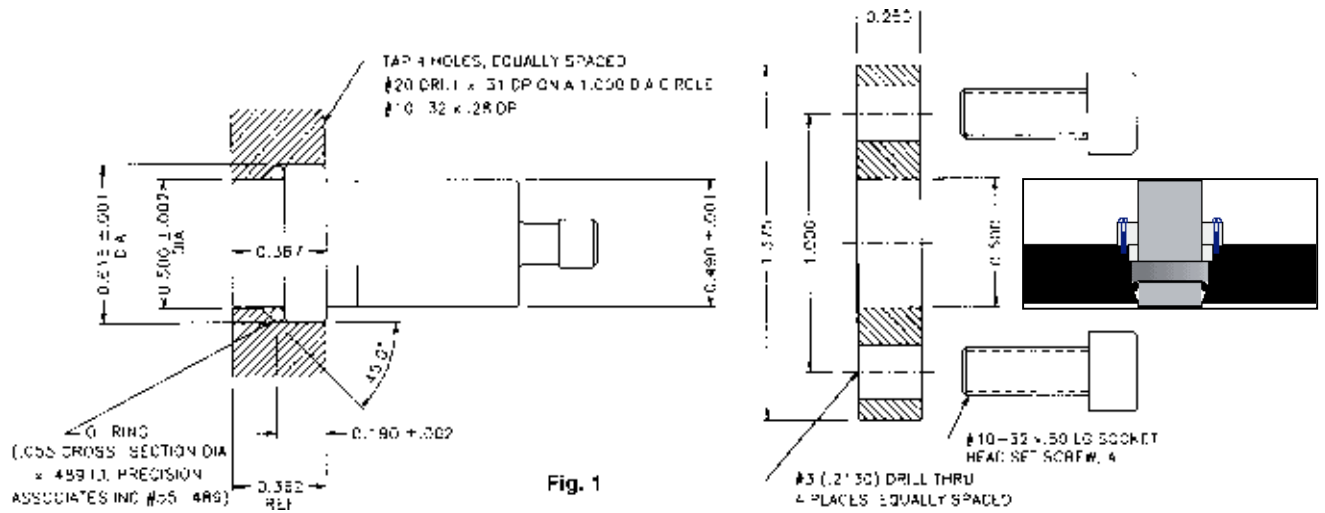


Fig 1: End user bores hole into area they desire to measure pressure and holds it in with bracket.

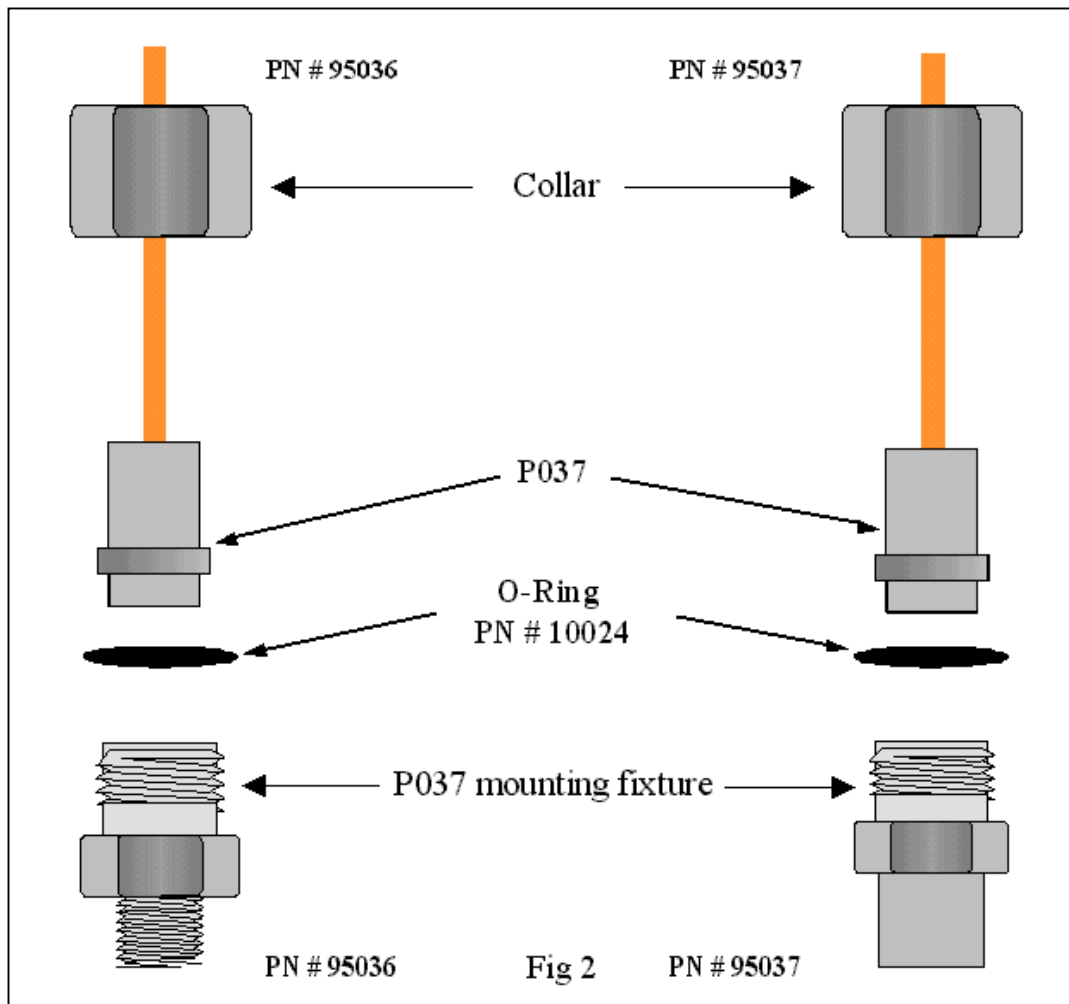


Fig 2: Mounting fixtures: # 95036 - 1/4-18 NPT male process connection, # 95037 – weldable tube stub Torque rating: Collar to fixture is 20 in lbs.

H. Electrical Connections

1) Letter Designation Description

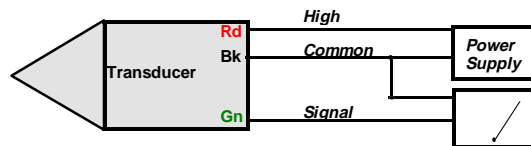
C	Cable 1 meter PVC jacket #24 AWG
D	1 meter Teflon® jacketed #24 AWG
F	Flying leads 1 meter #24 AWG Teflon® wires (individual)
M	Series EM12 Hirschman connector(or equivalent)
S	Special connector per customer request

- * The S represents special requests. For example, a connector not listed above.
- * Options C, D, and F can be ordered with additional lengths.
- * Option M requires a mating cable assembly. 30000163.15 15 feet fixed length. 3000164.XX XX specifies length of cable required. For example, 3000165.50 is 50 feet. Cable is PVC jacketed, # 28 AWG. Call factory for pricing information.
- * Please call our factory regarding any questions and current pricing. (888) 782-2229.

2) Circuit type D

Standard pin out configurations connector option C, D,&F below, are described on page 4

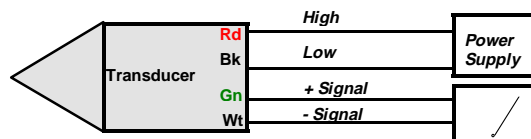
Connector option →	C	D	F
In(excitation)	Rd	Rd	Rd
Out (+Signal)	Gn	Gn	Gn
Comm(common)	Bk	Bk	Bk



3) Circuit type M

Standard pin out configurations connector option C,D,&F below, are described on page 4

Connector option →	C	D	F
In(excitation)	Rd	Rd	Rd
Out (+Signal)	Gn	Gn	Gn
Out (- Signal)	Wt	Wt	Wt
Comm(common)	Bk	Bk	Bk

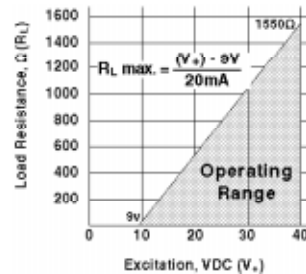
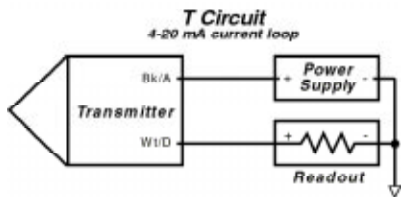


4) Circuit type T

Standard pin out configurations connector option C,D,F, and M below, are described on page 4

Connector option →	C	D	F	M*
In(excitation)	Bk+/Wt-	Bk+/Wt-	Bk+/Wt-	Bk+/Wt-
Out (+Signal)				

*M connector option with mating cable assembly 3000163.XX or 3000164.XX connected.
XX denotes cable length in feet.



Load vs. Excitation curve

The T circuit must be supplied with the appropriate excitation voltage. Reference the load versus excitation curve to select the appropriate excitation voltage.

I. Calibration

All Trans Metrics pressure transducers are calibrated in direct comparison to pressure and voltage standards traceable to the National Institute of Standards and Technology. Each transducer is supplied with a certificate of calibration verifying its compliance.

1) To re-calibrate a transducer

1. Allow the pressure transducer to warm-up for 15 minutes with the appropriate calibration voltage applied to the excitation inputs. See calibration sheet for this value.
2. With zero pressure applied (vent to local atmosphere for psig), note the zero balance of the transducer. The specification for zero balance is +/-3% fso. (fso = full scale output)

** *Important* Step 3 should only be performed with a NIST traceable pressure source.

3. With full scale pressure applied, note the output of the transducer. The specification for span is +/-2% fso.

The pressure transducer can be returned to Trans Metrics for a re-calibration. If the transducer is out of tolerance, it will need returned for an internal calibration.

2) Recommended calibration interval

A commonly asked question is how often should I calibrate this pressure transducer? Each pressure transducer is aged to minimize drift. If your transducer is being used as a primary standard, a quarterly calibration is recommended. If your transducer is being used as a secondary standard, a semi annual to annual calibration is recommended.

3) Shunt Calibration

The shunt calibration is not available on the P037D or P037T. The P037M can have an external shunt.

J. Certificate of Conformance

At present, a calibration certificate is sent with each transducer. If a certificate of conformance is required, please specify at time of order. After May of 1998, all record information will be stored electronically; therefore, we can provide a five-point certificate of conformance after the unit is shipped. (the five points are 0%, 50%, 100% increasing and 50%, 0% decreasing)

An eleven-point certificate of conformance can be requested at time of order. Please specify number 199904 at \$75.00. (The eleven points are 0%, 20%, 40%, 60%, 80%, 100% increasing and 80%, 60%, 40%, 20%, and 0% decreasing).

K. Pressure Reference

The P037 is offered in gage, sealed gage, or absolute reference.

1) Gage

Gage pressure measurements reference applied pressure relative to local atmospheric pressure. To be a true gage pressure transducer, the case must be vented in order to track atmospheric pressure changes. (Venting must be done to a clean, dry, non-corrosive gas).

2) Sealed gage

Sealed gage pressure measurements reference applied pressure to standard atmospheric pressure at sea level. No venting is required.

3) Absolute

Absolute pressure measurements reference applied pressure to a vacuum. Because an absolute transducer's zero is set with a vacuum, the output will equal local atmospheric pressure if the pressure source is disconnected from the transducer.

L. Proof Pressure

Proof pressure is the maximum pressure that can be applied to a transducer without changing specified tolerances. The proof pressure ratings are listed below:

P037 series 1.5x rated range.

Continued application of pressures higher than the rated pressure may reduce the life of the transducer.

M. Surge and Hammer Protection

Surges (when fluid is suddenly introduced into the pressure port) and hammers (when fluid is suddenly removed from the pressure port) should always be avoided. Surges in excess of the proof pressure can cause the transducer to operate out of tolerance, and surges in excess of the burst pressure can completely destroy it.

To avoid surges and hammers, keep fluid lines full at all times (if possible), bring pumps up to power and down to rest slowly, and open and close valves slowly. As further precautions, install a surge chamber on the system and install a pressure snubber on each transducer. Snubbers are available from Trans Metrics.

N. Cleaning Considerations

Please use extreme caution when cleaning the diaphragm surface. Avoid scraping, pushing, banging or any other detrimental action to the exposed diaphragm surface.

O. Repair and Re-calibration

Units may be returned to Trans Metrics for re-calibration or repair.

Trans Metrics will re-calibrate pressure transducers with our standard five point NIST traceable calibration for \$80.00 each.

Units requiring repair will be repaired and re-calibrated for 50% of the cost of a new unit; except Trans Metrics reserves the right to declare units non-repairable that have been over-pressured, corroded, have mechanical damage to sensor or housing, or that have been "struck by lightning"

Send units to: Trans Metrics, Division of United Electric Controls.,
5325 Naiman Pkwy. Solon, Ohio 44139.

ATTN: Repair department. (No RMA Number required)

P. Warranty (New Items)

All products manufactured by Trans Metrics are warranted by Trans Metrics to be free from defects in materials and workmanship under normal use for a period of one year, provided however, that Trans Metrics liability will be limited to the repair or replacement of such products returned to Trans Metrics, transportation prepaid. There is no liability for consequential or incidental damages. Any claims with respect to products will be waived by customer unless Trans Metrics is notified within one year after shipment. If inspection of the product by Trans Metrics does not disclose any defect of workmanship or materials, our regular repair charges will apply.

Q. Repaired Items

All products repaired by Trans Metrics are warranted by Trans Metrics to be free from defects in materials and workmanship under normal use for a period of 90 days, provided however, that Trans Metrics liability will be limited to the repair or replacement of such products returned to Trans Metrics, transportation prepaid. There is no liability for consequential or incidental damages. Any claims with respect to products will be waived by customer unless Trans Metrics is notified within 90 days after shipment. If inspection of the product by Trans Metrics does not disclose any defect of workmanship or materials, our regular repair charges will apply.

R. Return Policy

Trans Metrics will consider the return of new, unused, standard models if notified within 30 days after shipment. A 20% restocking fee will be applied to all returned transducers. Orders for non-standard items are not cancelable.

Information furnished herein by Trans Metrics is believed to be accurate and reliable. However, no responsibility is assumed for its use.

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