

# Differential Pressure Transducer

## Model PR-282

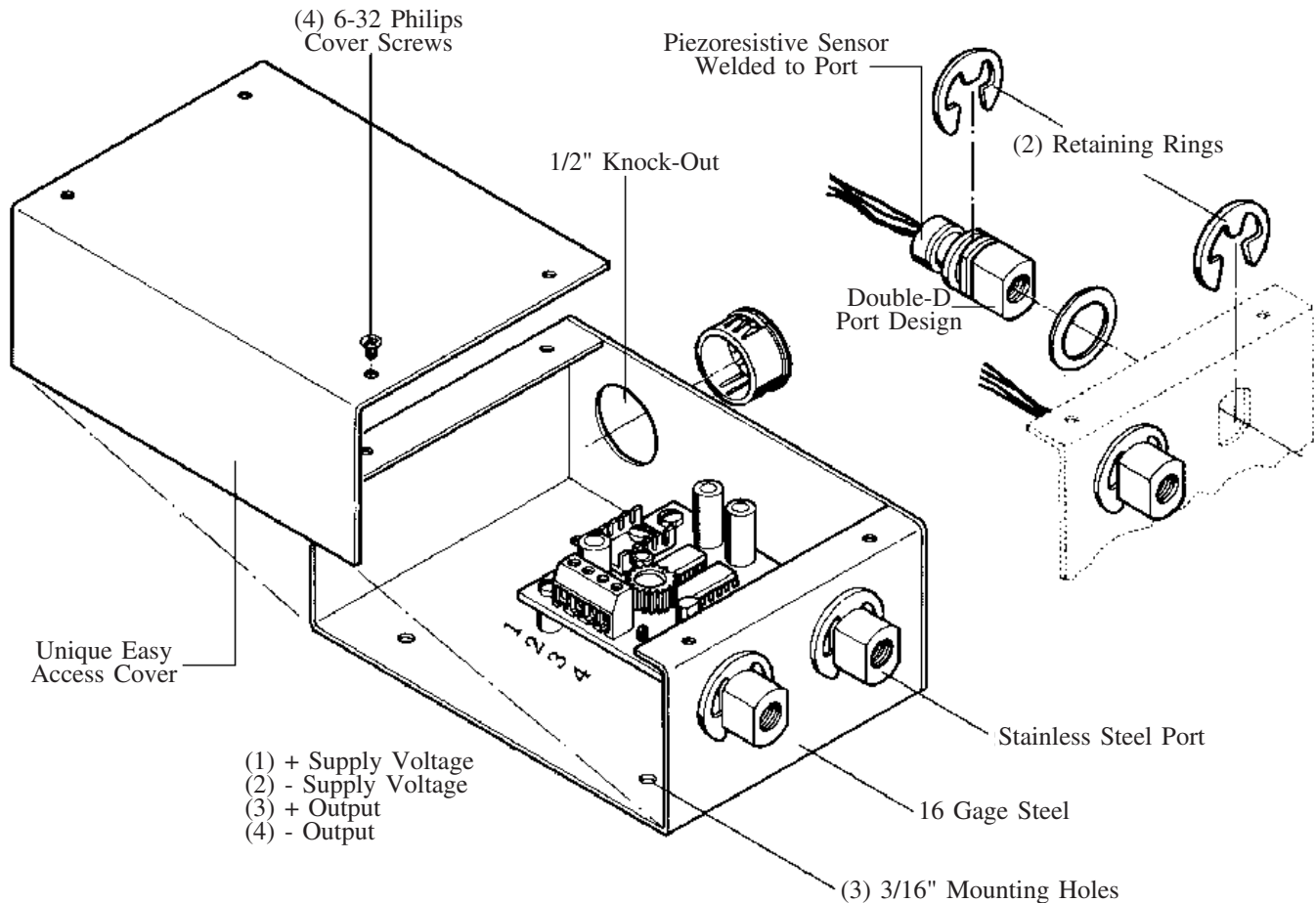


The PR-282 is an all stainless steel, 100% solid state wet/wet differential pressure transducer incorporating dual diffused piezoresistive sensing elements with stainless steel media isolation. The unit is compatible to all media encountered in HVAC applications including freon, ammonia, treated water and steam. PR-282 is designed to monitor and control pump differential pressure, CW/HW system differential pressure, chiller/boiler differential pressure drop, among other applications.

- **100% solid state diffused piezoresistive silicon wafers**
- **Rugged all stainless steel pressure cavities • Unique "Double D" port design**
- **No nulling valve required • Extremely stable and sensitive**
- **More than four supply voltage and output options • Direct or reverse output option**
- **Electronic averaging/snubbing option • Precision output clipping option**
- **Easy access NEMA 1 enclosure • Immune to thermal shock, surge or vibration**
- **All welded dual sensor assembly • Two year warranty**
- **Guaranteed compatible to all control systems**



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The PR-282 incorporates a unique dual sensor design with an electronic differentiation to eliminate the nulling/equalizing valve and to offer a rugged and reliable transducer for wet/wet differential pressure applications. This dual sensor assembly enables the PR-282 to handle thermal shock, water hammer, surges and other destructive conditions. System static pressure, pump surges or steam/water hammer may far exceed the rated range of a differential pressure transducer. Other units, due to design constraints, require a nulling valve to equalize the pressure between the high and low pressure ports prior to start up. This nulling valve manifold is expensive to fabricate in the field. Also, each time the system is turned off the nulling valve has to be opened prior to start up and then closed off once the system has stabilized. This may not be feasible or practical in most of the applications. The PR-282 dual sensor assembly eliminates the nulling valve, its related costs and start up problems.

The PR-282 sensing elements are 100% solid state diffused piezoresistive silicon wafers featuring low hysteresis, excellent repeatability, and long term stability. The sensing elements are connected as four-active-element bridge circuits for optimum linearity and sensitivity. Signal conditioning, temperature compensation and pressure differentiation are performed by industrial quality integrated circuits to provide an accurate, linear, and high level output that requires no additional signal conditioning.

MAMAC PR-282 also has "on card" regulation which enables it to accept nonregulated DC or AC power. MAMAC Systems has available a reliable PS-200 power supply and TR-201 power transformer at competitive pricing. We highly recommend using our power sources to eliminate any start up problem and to retain single source accountability for all peripherals.

MAMAC PR-282 has unique "Double D" design all stainless steel ports. The sensing elements are welded to the ports and both have stainless steel isolation between the sensor and media. In HVAC applications, thermal shock has always been a problem. A rapid change in temperature may cause epoxy seals to break and O-rings to blow out. The coefficient of thermal expansion of epoxy, neoprene and Buna-N is not the same as steel. A rapid temperature change will cause the ports and sensor to expand and the dissimilar coefficient of thermal expansion will result in the epoxy seals breaking and the O-rings loosening resulting in a leak. The PR-282 with welded construction and all stainless steel pressure cavities performs reliably under thermal shock conditions.

Another problem well known in our industry is that if a bulkhead fitting is used to secure the sensor to the enclosure, overtightening the fitting will result in the sensor twisting and the lead wires may break or the calibration may shift. To eliminate this problem, our engineers have incorporated a unique Double D design

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port which is secured to the enclosure with two retaining E-rings. The Double D shape of the ports eliminates any possibility of the sensor twisting due to overtightening and the E-rings provide a rugged means to securely attach the sensing elements to the enclosure. The ports have wrench flats on each side to assist in tightening the pipe fitting to the ports.

The dual all stainless steel pressure cavities enable our PR-282 to be compatible to all media encountered in HVAC applications including freon, ammonia, steam, chilled/hot water, among others. This feature enables one unit to be compatible for all applications.

Pressure measurement in pipes, across pumps and compressors, and other HVAC equipment has always been a problem due to the fact that pressure surges, water hammer and turbulence cause the output of any pressure transducer to fluctuate rapidly. This phenomenon not only makes controlling the medium difficult, but it may also result in false alarm conditions. In order to address this problem, our PR-282 is available with optional electronic snubbing. With this feature, the highs and lows of the output are stabilized over time and an average measurement is provided. The averaging rate can be adjusted by a trimmer from 0 to 10 seconds. After installation, this option allows any fluctuation in the output to be removed by merely increasing the averaging time until the output is stable. The PR-282 is also equipped with a reverse output option allowing the output of the unit to decrease as the sensed pressure increases.

## SPECIFICATIONS:

**Accuracy:**  $\pm 0.1\%$ \*      **Max Diff Pressure:** 200% of rated range  
**Linearity:**  $\pm 0.1\%$       **Max Static Pressure:** 200% of DP range  
**Repeatability:**  $\pm 0.1\%$       **Media:** Liquid/gases compatible to 304SS  
**Hysteresis:**  $\pm 0.1\%$       **Enclosure:** 16 gage steel  
**Port:** 1/8" NPT      **Finish:** Painted Gray PMS2GR88B

\*Includes Linearity, Repeatability, Hysteresis, Stability and Temp Compensation

The majority of the control systems do not have input limiting capability. If the transducer's output exceeds the specified controller input range due to the transducer being over-ranged or a malfunction, some systems lock up. In other cases, the excess voltage/current may bleed over other inputs. This results in erroneous decisions, false alarms or total loss of control. To address this shortcoming, our PR-282 is available with a precision output clipping feature. With this option, the transducer's output is precisely clipped at 20.3 mA, 5.1 VDC or 10.2 VDC. This limiting feature does not in any way interfere with the linearity, repeatability, sensitivity or accuracy of the transducer. It is merely a secondary watchdog circuit which initiates limiting the moment the transducer's output exceeds the specified range.

The PR-282 is shipped fully calibrated and tested with a minimum 24 hours burn-in to provide trouble free start up. Easily accessible zero and span trimmers are provided if field calibration is needed. The PR-282 has a unique 16 gage steel NEMA 1 enclosure designed to facilitate installation and provide easily accessible wiring termination. The pressure ports have industry standard 1/8 inch NPT process connection to accommodate any pipe fitting.

With more than 4 output and supply voltage options, 6 pressure ranges, 2 output types, electronic snubbing option, and precision output clipping, our PR-282 not only guarantees compatibility to all control systems but also is the most reliable, stable and versatile differential pressure transducer available.

**Precision Output Clipping:** 20.3 mA/5.1 VDC/10.2 VDC  
**Compensated Temperature Range:** 0°-180°F  
**Max. Supply Voltage:** 24 VAC/28 VDC nonregulated  
**Mounting Orientation Error:** None (100% solid state)  
**Output Averaging:** 0-10 seconds

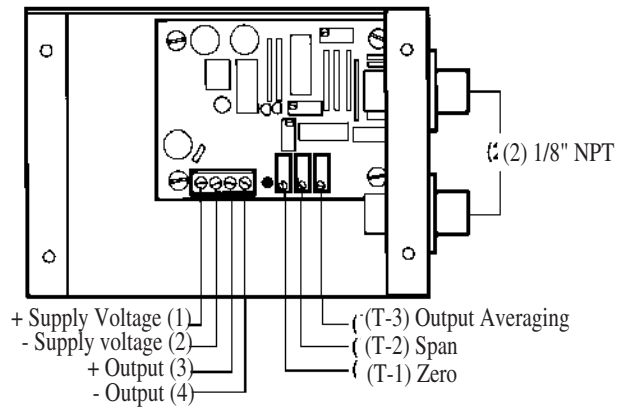
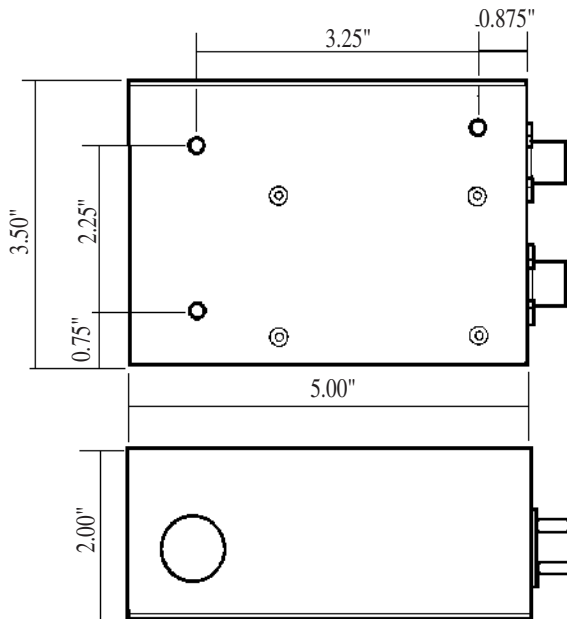
## ORDERING INFORMATION: PR-282

OUTPUT	PRESSURE RANGE	SUPPLY VOLTAGE	OUTPUT TYPE	OUTPUT AVERAGING	OUTPUT CLIPPING
1) 0-1VDC	1) 0-20 psid	A) 24VDC	1) Direct	1) With	A) With
2) 0-5VDC	2) 0-30 psid	B) 24 VAC	2) Reverse	2) Without	B) Without
3) 0-10VDC	3) 0-50 psid	C) 115VAC			
4) 4-20mA	4) 0-100 psid	D) 12VDC			
6) Custom	5) 0-200 psid	E) Custom			
	6) 0-300 psid				
	7) Custom				

Not available with 12VDC supply voltage.

The MAMAC Systems warranty covers parts and labor for 2 years from date of shipment. MAMAC Systems reserves the right to change any specifications without notice to improve performance, reliability, or function of our products.

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## CALIBRATION INSTRUCTIONS:

NOTE: All units are factory calibrated to meet or exceed published MAMAC specifications.

If field adjustment is needed, please perform the following steps:

- 1) Connect terminals 1 and 2 to appropriate power source.
- 2) For output options 1-3 connect the plus lead of an accurate voltmeter to terminal #3 and for output option 4 connect ampmeter plus lead to terminal #3. Connect common to terminal #4.
- 3) Apply low pressure to the unit and carefully adjust the zero trimmer (T1) to obtain desired low output.
- 4) Apply high pressure to the unit and adjust span trimmer (T2) to obtain desired high output pressure.
- 5) Repeat steps 3 and 4 until no further correction is needed.

**OUTPUT AVERAGING OPTION:** Factory set at 0.0 seconds. Turn trimmer T3 clockwise to increase averaging time coefficient. Maximum averaging time available is 10 seconds. Usually 3.0 seconds (8 turns CW T3) is sufficient.

## A Complete Line of Control Peripherals From a Single Source

**MAMAC Systems** is the only manufacturer offering more than fifty products to satisfy all temp, humidity, pressure, flow, light, speed or any other DDC controls application. MAMAC's complete line of control peripherals is available in over two thousand different configurations of supply voltage, output, range and enclosure type to make our products guaranteed compatible to all HVAC controls, industrial automation and COGEN systems worldwide.

Single source accountability, liberal 2 year warranty, worldwide service and technical support, competitive pricing, accumulated experience of more than 10,000 installations are some of the benefits offered by MAMAC Systems which are second to none in the HVAC DDC controls industry.



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