



TAVIS Corporation

3636 Highway 49 South
Mariposa, California 95338
(209) 966-2027
Fax (209) 966-4930
www.taviscorp.com

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LIQUID LEVEL MEASUREMENT USING TAVIS PRESSURE TRANSDUCERS

Today's competitive business environment places a high demand on accurate, reliable inventory and process controls. This demand can be especially true with liquid inventories and products, because these materials are typically stored and used in high volumes. In addition, many liquids are becoming very valuable, such as synthetic chemicals, hydrocarbons, food products, pharmaceuticals, and even water. Small errors in liquid level measurement accuracy can result in huge losses, large inventory misplacements and even legal battles over material custody.

Because of the importance of liquid level accuracy and reliability, the use of pressure transducers (pressure sensors) to measure liquid level has become increasingly more desirable and practical throughout industry. Where material balances or weight-based inventory control is important, these transducers are ideal, since their measurements are usually based on the mass of the liquid. Mass can be equated to the level or volume when the density of the liquid and the shape of the storage vessel is known. Pressure transducers also offer easy system interfacing (both electronically and mechanically) as well as outputs that are easy to record and transmit.

Tavis Corporation variable reluctance transducers are used in a wide range of liquid level measurement applications, including a variety of mild to extremely hostile environments. Tavis transducers can provide outputs in analog (voltage, current, simulated strain gage) or digital (SDI-12 or RS-232) form. Tavis pressure transducers offer the following advantages:

- ◆ All-welded, stainless steel construction
- ◆ Long term stability
- ◆ High reliability
- ◆ High accuracy
- ◆ High overpressure capabilities
- ◆ Submersible capabilities
- ◆ Level measurements with line pressure applied
- ◆ Wet/Wet differential measurements
- ◆ Temperature compensated
- ◆ Custom designs and performance characteristics

Tavis Pressure Transducer Models Suitable for Liquid Level Measurement

Differential Pressure/Vented Gage	Absolute/Sealed Gage/Submersible
P25	P110C
P4	P25
P8C	P4
DISI-1200/1210 (digital)	DISI-1200/1210 (digital)
Custom	Custom

Tank Level Measurement

The measurement of liquid level in a tank can be made with any of the Tavis pressure transducer types listed in the table above. Depending on the transducer type, it can be used inside the tank or outside the tank. In some applications it becomes advantageous or even necessary to use a submersible transducer. For simplified installations, an absolute or sealed gage transducer can be used, eliminating the need for a reference line to be plumbed.

Vented or Open Tanks

In these applications, the differential pressure transducer is installed with the low port reference to atmospheric pressure. The high port is plumbed to the bottom of the tank where it can measure the full pressure exerted by the mass of the liquid within the tank (See Figure 1). By referencing the low port to atmospheric pressure, the transducer effectively corrects for the atmospheric pressure being exerted on the surface of the liquid in the open or vented tank. The output of the transducer will be proportional to the pressure that the liquid is exerting on the bottom of the tank.

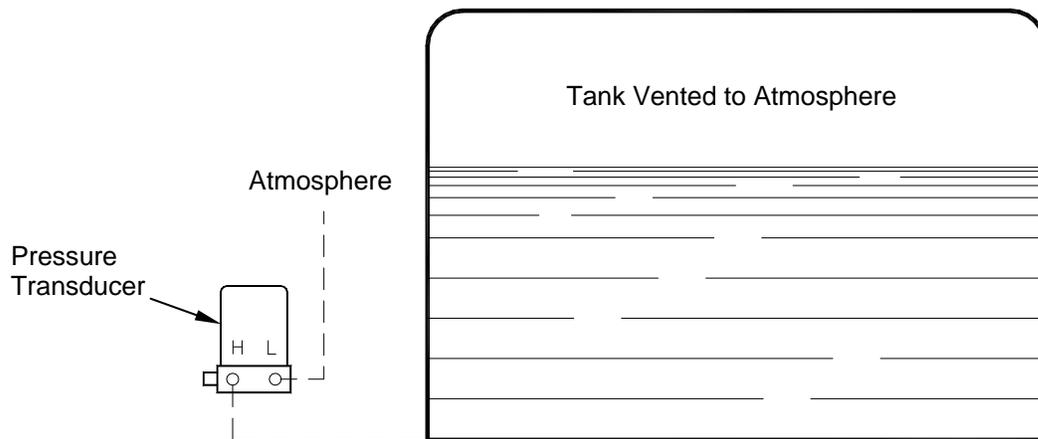


Figure 1
Vented or Open Tank Measurement Installation

Sealed Tanks

In these applications the tank is sealed from influence of the outside atmosphere. Often pressure is applied within the tank as part of the required process. The differential pressure transducer must measure the pressure exerted by the mass of the liquid while adjusting for the pressure applied to the tank.

To accomplish this, the low port is plumbed to the top of the tank, where its reference is the pressure within the area between the liquid and the top of the sealed tank (See Figure 2). With the low port referenced in this way, the transducer output will reflect the pressure applied to the high port minus the low port gas pressure at the top of the tank. Thus the measured pressure is only that which is exerted by the liquid itself, giving an accurate indication of the tank level.

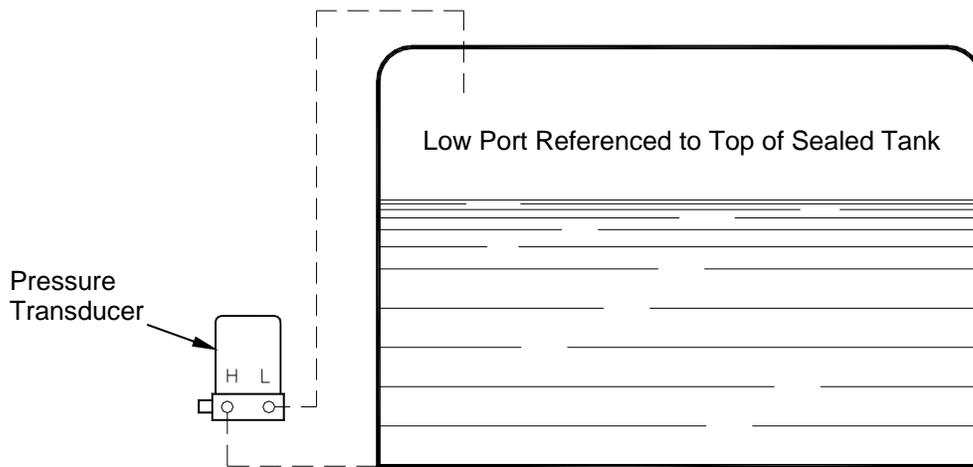


Figure 2
Sealed Tank Measurement Installation

Water Management

Water has become a precious commodity in recent years and accurate monitoring of water supplies is critical. However, this monitoring often involves making measurements in remote areas, harsh environments, with battery power, etc. Tavis Corporation manufactures a special line of submersible pressure transducers for these applications, including very high accuracy, addressable digital interfacing sensors. Typical installations for rivers, streams or reservoirs involve a submersible configuration (See Figure 3) or “bubbler” configuration (See Figure 4).

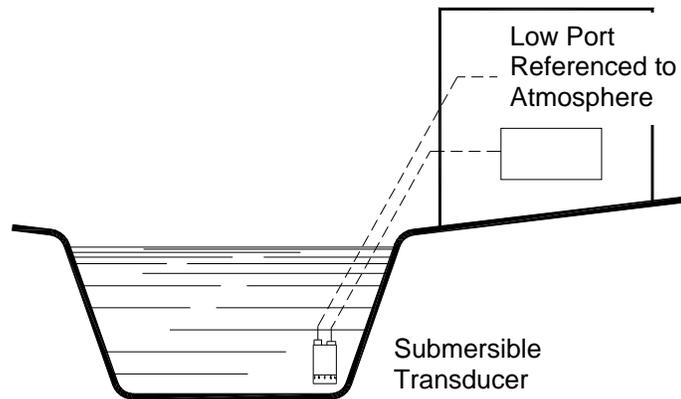


Figure 3
Submersible Water Level Measurement Installation

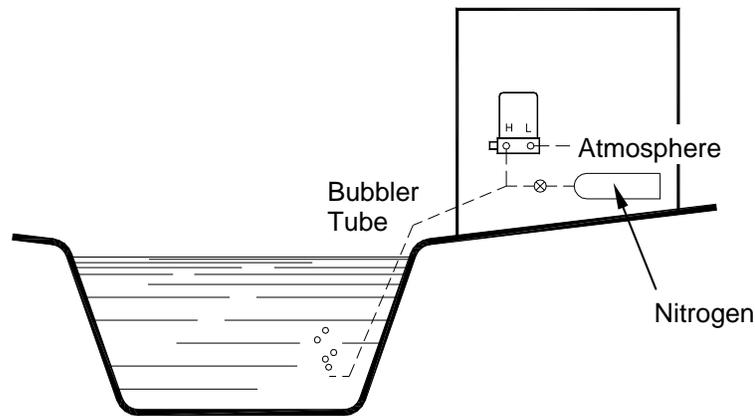


Figure 4
Bubbler Water Level Measurement Installation

Tavis Corporation can offer many other solutions for liquid level measurements that are not discussed herein. Difficult or custom transducer designs are a specialty of Tavis Corporation and an Application Engineering staff is ready to respond to all requests.