



Easier Level Measurement

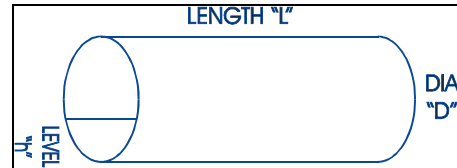
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APPLICATION BULLETIN 1309-01

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SUBJECT: Linearizing Horizontal Cylindrical Tank Level Measurement

Often it is desirable to convert the level of a horizontal cylindrical tank level measurement to the actual volume of the liquid inside the vessel. This bulletin addresses this application.



(a) $V_{\text{horizontal Cylinder}} = 7.481$

$$\left[\left(\frac{D}{2} \right)^2 \arccos \left(\frac{\frac{D}{2} - h}{\frac{D}{2}} \right) - \left(\frac{D}{2} - h \right) \left(Dh - h^2 \right)^{0.5} \right] L$$

where

$V_{\text{horizontal Cylinder}}$ is the volume of liquid in the tank in gallons

D is the tank diameter in ft.

h is the level of the liquid in the tank, measured from the bottom in ft

L is the length of the tank from end to end. This tank has a diameter of 8 ft and a capacity of 8000 gallons, so L is 21.275 ft long

The Levelese Smart sensor uses a digital technology to excite the load cell and to convert the value to a signal proportional to the volume in the tank.

The output signal of 4 to 20 mA has a 16 mA span, and the span follows the equation (a). When the tank is empty, the output signal is 4.00 mA. When the tank is full, the output signal is 20.00 mA. The intermediate values of h correspond to the volume inside the tank and follows equation (a).

The signal can be sent to a 4½ digit digital display or a bar graph which can be programmed to display the actual volume of product inside the tank

In addition, the Levelese Smart sensor includes an ambient temperature compensation feature which compensates for the sensor and electronics drifting with changes in the outside air temperature from -40 to +65°C and reduces such changes to less than 1% of the maximum change throughout the temperature range.

The instrument is fully calibrated at the factory for the dimensions of the tank and may be directly installed without field calibration. However, if the measured volume in the tank is slightly different from that displayed, the 4-20 mA output signal may be adjusted in the field using a HART® communicator from anywhere along the signal loop.

For more information about this application, contact Levelese sales at sales@levelese.com or call 303-586-1425.