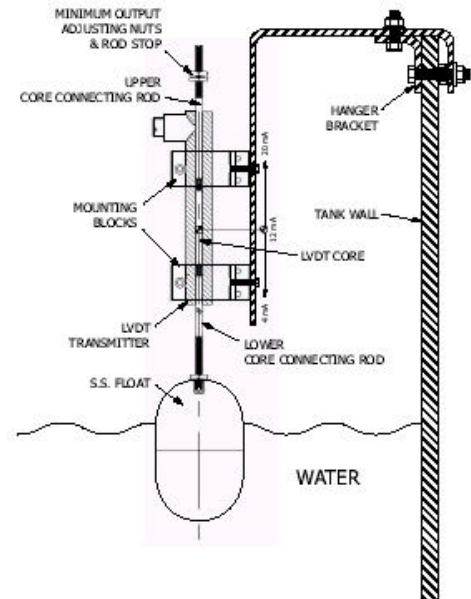


## Water Level Measurement Using A Float With An LVDT Transmitter

There are many methods of measuring water level. This need extends to measuring levels of potable water in a storage tank, waste water in a settling or digester tank, quenching water in a pond for heat treating steel, cooling water for power or chemical process plants, and rain water in a reservoir basin. For tanks and similar structures, a common method is to use a low pressure sensor at the bottom of the tank to measure the height of the water, where the indicated pressure is the product of water column height times the density of the water. Assuming the water's density is constant, the indicated pressure is proportional to the water level. This method to measure level also works for other low-vapor-pressure, low viscosity liquids like vegetable oils, alcohols, kerosene, fuel oil, diesel fuel, and some solvents.

However, to measure changes in water level from the top of a tank or basin, it may be difficult to insert a pressure sensor in the right location to make the level measurement, or to find a low enough range pressure sensor. In such a case, a good way to measure small level changes is to use a float with an LVDT friction-free position sensor. The illustration below shows a stainless steel float coupled with a non-magnetic stainless steel rod to the high permeability free-moving armature core of a 4-20 mA loop-powered LVDT position transmitter. Such LVDT transmitters are available to measure water level changes ranging from 0 - 2 inches (0 - 50 mm) to 0 -12 inches (0 - 300 mm), and even up to 20 inches (500 mm).

The float moves up or down as the water level changes, moving the LVDT's core along with it. A second stainless steel rod is coupled to the other end of the LVDT's core. It has two jam nuts on its end to adjust the position sensor's current loop output at the desired low water level. The nuts also prevent the float from falling out of the assembly if the water level drops too low. The LVDT's hermetically sealed stainless steel body is attached to the wall of the tank using clamp blocks of non-magnetic material. The clamp blocks can also be attached to a flat hook that hangs the level sensor assembly over the tank's edge, as in the illustration.



The LVDT's core has no mechanical connection to the LVDT's body; all action is magnetic. All of the LVDT's transmitter electronics are built inside of its hermetically sealed stainless steel body. The inside bore of the LVDT has a Teflon liner to minimize any friction to core movement. These features make the this 2-wire, loop-powered LVDT position transmitter an ideal solution to the measurement of water level changes up to 20 inches (500 mm). It is constructed of stainless steel, has no springs or fatigue-prone parts to wear out, uses fully sealed, self-contained loop-powered electronics, and has the well known reliability of an LVDT.

This method to measure level also works for other liquids having densities or specific gravities near that of water like vegetable oils, alcohols, kerosene, fuel oil, diesel fuel, gasoline, and some organic solvents. For flammable or volatile liquids, LVDT transmitters are available in agency-listed versions for use in Class 1, Div. 1 or Div. 2, or Zone 2 hazardous locations.

Note: An enlarged view of the illustration above can be seen on the page following.

