

# LCT-2-FDL DISPLACEMENT LEVEL TRANSMITTER

## GENERAL DESCRIPTION

The LCT-2-FDL Displacement Level Transmitter (*FDL*) was developed for interface level measurement in mining flotation cells. The unit consists of a load cell transmitter and a load cell in a housing from which a displacer probe is suspended vertically by a nylon covered stainless steel cable. It is a rugged and low maintenance transducer which has uses in many and various level, interface and density applications in liquids and slurries.

The *FDL* is a field mounted unit with a proportional current, voltage or (optional) frequency output, and may be supplied with or without inbuilt local LCD indication. The first uses were to measure the slurry level under foam, in dirty, wet and turbulent environments. Many other methods used suffer from buildup on their probes, are unreliable and require constant maintenance. The *FDL* has proved superior in performance when compared to methods such as float and bubble tube, conductivity and capacitance. During the flotation process, accurate level measurement is essential to ensure efficient foam and slurry separation, and so effective mineral recovery. The solid PTFE probe minimises buildup due to its non-stick characteristics. Mines usually hose down the complete probe and cable assembly weekly when they hose down the cell walls. Over 650 of these units are in use in the gold, platinum and phosphate industries in flotation cells alone.

The transmitter uses a small capacity load cell to measure the small changes in weight and for this reason overload protection is provided. Pulling on the cable or dropping the displacer activates a bump stop which prevents the load cell being overloaded, to maintain its accuracy and repeatability. Signal damping of 4 seconds is provided for agitated tanks.

The amplifier used is the exceptionally stable load cell amplifier from the LCT-2 series, more than 2,300 of which have been sold and are currently in use. The LCT-2 can tare off (offset) large amounts of deadweight, and also invert the measured signal. This inversion is necessary because as the level rises so the weight of the displacer reduces - but the output signal is required to increase. For level measurement, density changes will affect the reading, but, in most cases this change is negligible. For example, in flotation cells the measuring range is usually -100mm to +100mm and a density change of as much as 10% will only result in a level error of 10mm in a 1.5m deep tank. Level measurement in water, soaps or sewerage does not have much density variation.

The LCT-2-FDL Displacement Level Transmitter is used in many types of applications, including, but not limited to, the examples listed :

## SETTLERS

In settlers the *FDL* displacer is suspended at a depth where a mine wants to detect a mud level rising so that they can open outlet valves at the correct levels. Since the mud is a lot denser than water, it adds buoyancy to the displacer when it rises up to reach the probe,

changing the output from 4mA at an SG of 1.0 to 20mA at an SG of, say, 1.6. This system must be kept operational; if the mud builds up beyond the displacer and hardens the system will no longer work, since the displacer is no longer in a liquid. For settler and other density measurement applications, these displacers are usually made of solid PTFE or stainless steel, hollow and ballasted so that the displacer will just sink at the highest density.

## BULK LIQUIDS

In bulk liquid applications, the *FDL* is being used for determining levels, and thus also volumes, in storage tanks. Displacers of 4m in length, screwed together in sections, are being used by detergent manufacturers in very deep liquid soap tanks which produce a lot of surface foam.

## SUMP LEVELS

In sump level measurement *FDL* units have proved very reliable in dirty, hot, deep and agitated environments. At steel mills, the *FDL* is used to measure the level in 6m deep sumps of rotary kiln cooling water. The transmitters are mounted above the sump out of the steam and spray, and the cable hangs down 5m into the sump with a 1m long PTFE rod at the end of the cable. All the sump pumps are controlled from the *FDL* output signals.

## INTERFACE

Rolling mill sumps collect a combination of oil from the bearings and water from the cooling sprays. The operators need to know where the interface is between the two, so that they do not pump water into the bearings, and spray oil onto the red hot steel. The *FDL* measures and transmits the interface between the oil and water.

## INTRINSIC SAFETY

Where the *FDL* unit is not accessible, or for intrinsically safe installations, the displacer unit and electronics may be supplied in two separate housings. Suitable barriers are required between the electronics and the displacer in IS applications.

## SEWERAGE

The *FDL* is used in sewerage plants as these often have foam from detergents on the liquid surfaces which prevents the use of ultrasonic systems. The *FDL* is used for density and level measurement. The PTFE displacer discourages buildup and is not affected by foreign objects. The probe can be hung in a stilling well next to a weir, or flume, for open channel flow measurement. When coupled with a digital indicator, the level signal can also be linearised to give a flow reading (models 4001 or 5001), or totalised flow reading (model 5001-T or 8001-T).