INTERFACE LEVEL MEASUREMENT AND CONTROL

INTRODUCTION

One of the unique capabilities of RF level measuring instrumentation is to indicate and/or control an interface between two immiscible liquids, each having a different dielectric constant.

Oil/water interface measurement is a common application of this type. The LV5900 series of continuous level transmitters provides an analog output proportional to the position of the interface on a vertically-mounted electrode.

It is important to note that a vertically-mounted electrode must be fully submerged at all times to provide correct interface detection. If it isn't, the electrode will be exposed to two interfaces; the first being between air or a gas and the upper phase material, and the second being between the low and high dielectric constant liquids.

The zero is calibrated when the probe is completely submerged in the low dielectric constant liquid. The 100% point is established using the span adjustment when the entire electrode is submerged in the high dielectric constant liquid. In the oil/water example, as the interface rises on the electrode, a greater percentage of it is submerged in the higher dielectric constant liquid. This causes an increase in the capacitance generated and a corresponding increase in the output signal.

To ensure that the measuring section of the electrode is always fully submerged, a metal sheath of sufficient length may be included on the probe. The sheath renders that portion of the electrode insensitive to capacitance change and variation and the top level is ignored. Another common approach is to arrange a control system and a tank overflow so that the upper level remains constant.

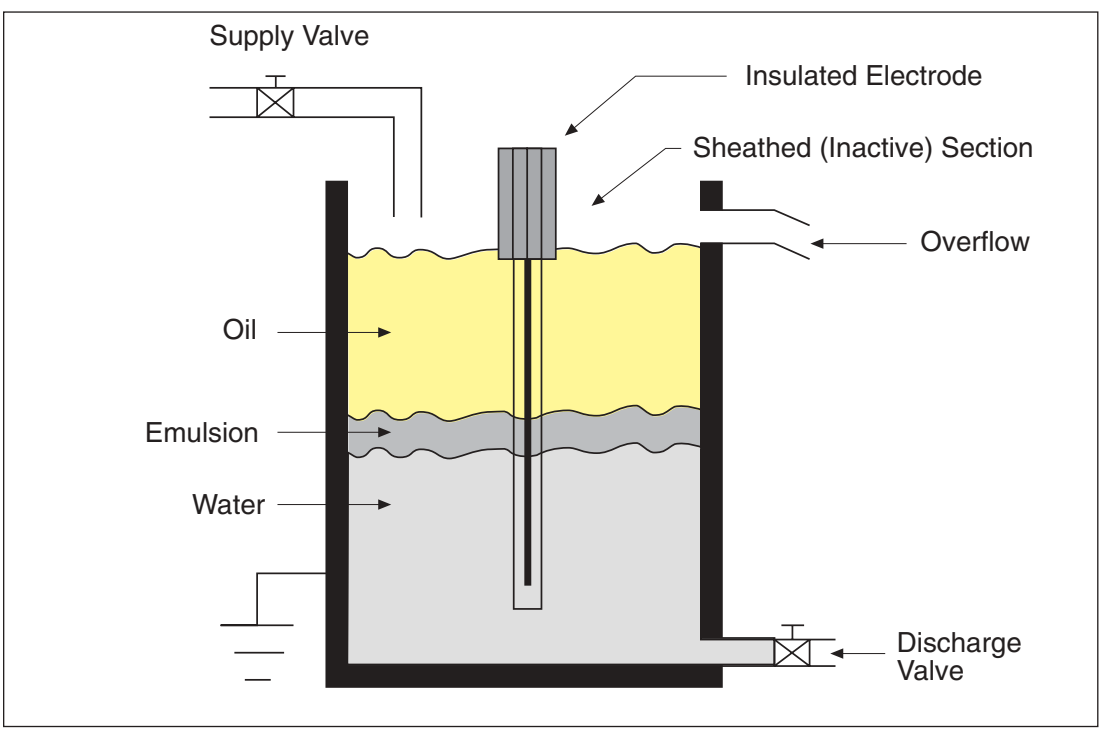

Figure 1- Continuous Level Interface Detection

IMPORTANT CONSIDERATIONS

1. Quality of the Interface

Some materials do not form a distinct interface, but instead form an emulsion layer between the two materials. Calibration of the 0% and 100% points can be made by establishing a desired position in the emulsion layer.

2. Agitation

No interface will occur if the material in the vessel is agitated. The use of a stilling well may be required. Allow the material to settle before performing calibrations.

3. Dielectric Constants

Usually the two immiscible materials forming an interface will have widely differing dielectric constants. Check Capacitance vs. Dielectric Constant charts for each material to ensure a total capacitance change of at least 10 pF, but not greater than 10,000 pF for transmitter applications.

4. Grounding

In plastic vessels, it is necessary to electrically ground the conductive phase.

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