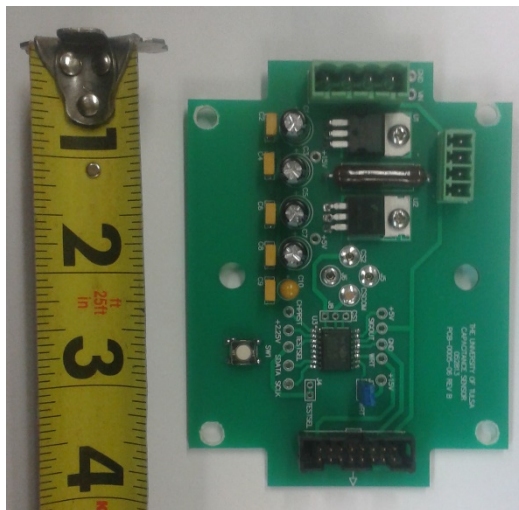




### CONDUCTIVITY / CAPACITANCE PROBES

Conductivity / Capacitance probes are intrusive instrumentations used to measure the liquid film height in a two-phase flow configuration. These devices can be facilitated for conducting (conductivity probes) or non-conducting (capacitance probes) two-phase mixtures such as water/air and oil/air, respectively. The operation of the instrument requires calibration procedures to be employed. The data acquired from these sensors can be used in a variety of ways to calculate the average liquid holdup as well as wave/slug characteristics.

At TUFFP, various configurations of conductivity/capacitance probes are used for pipelines with different ID (2-in. to 6-in.) and project requirements. These probes are manufactured (Figure 1 and 2), calibrated and installed (Figure 3) on the facility by means of in-house capabilities. In Figure 4, a sample installation of a capacitance probe on the calibration bench is shown.



**Figure 1. PCB of a capacitance probe manufactured at the University of Tulsa.**



## Horizontal Well and Artificial Lift Projects



Figure 2. Sensor of a capacitance probe manufactured at the University of Tulsa.



## Horizontal Well and Artificial Lift Projects

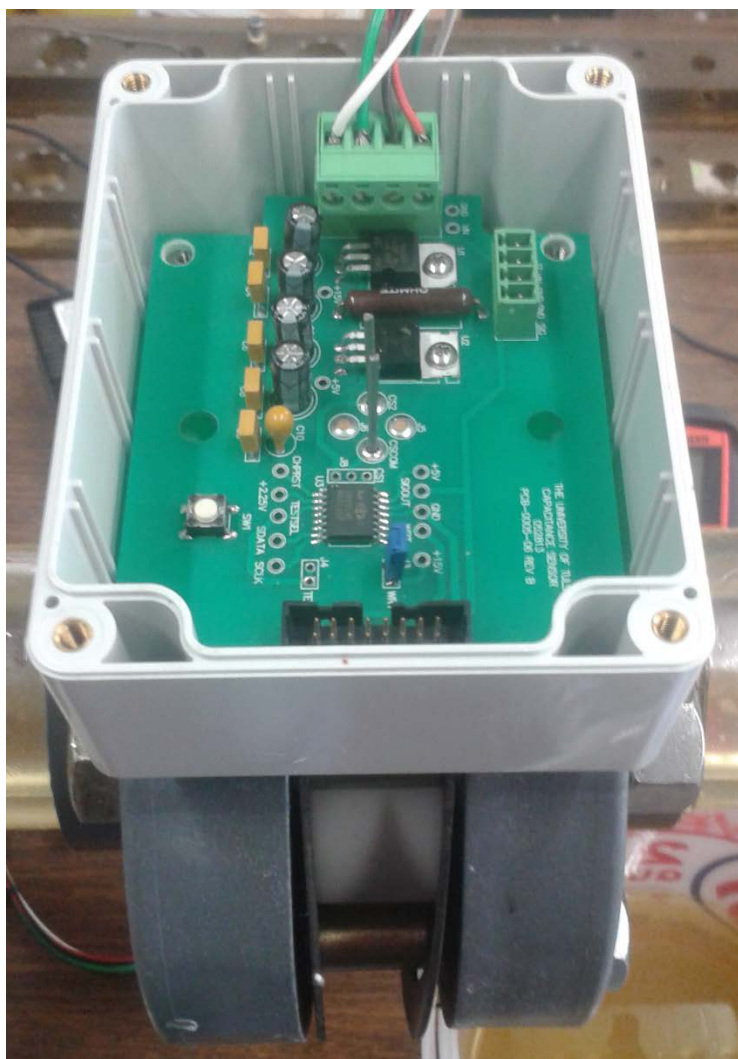


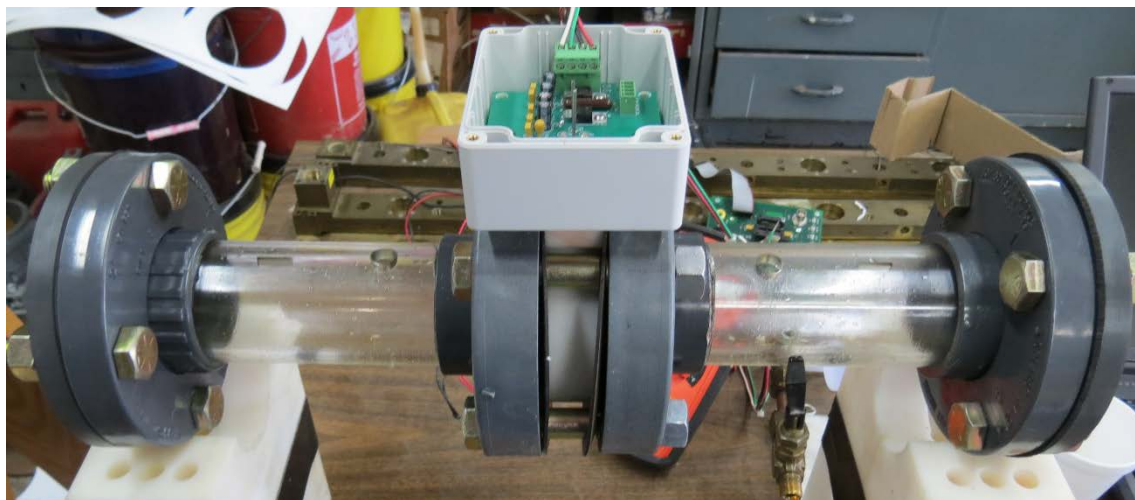
Figure 3. Capacitance probe with a close-up view on its PCB.

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## Horizontal Well and Artificial Lift Projects



**Figure 4. Capacitance probe installed on a calibration bench.**