

## ***ABSTRACT***

Creating of a digital densitometer consists of an LED and LDR integration process (LDR is configured with a reference resistor in the form of a voltage divider circuit) as a level sensor and strain gauge integration process with a differential amplifier as a mass sensor. Through the LDR and strain gauge characterization process, the dimensions of the measuring vessel are 10cm x 10cm x 13cm (l x w x h). LDR as a level sensor has a standard error of 0.0234. While the strain gauge as a mass sensor has a standard error of 7.77 with a linear correlation value of 99.85%. Based on the characterization that has been done, the LDR resistance when the optimum distance is reached is 23.53 kOhm and LDR resistance when the minimum distance is reached is 3.05 kOhm. Based on this value, the reference resistor value is 10 kOhm. Then in order for the strain gauge can be used in mass measurement, the strain gauge configured into a load cell form with an output signal conditioned by a signal amplifier element with a gain constant of 5000 times. Tests carried out in a room at temperature of 24 °C, pressure of 1 bar, and with light intensity ranging from 120 to 160 Lux. Through the testing process with water, alcohol, and copper as the sample, the average error value of the measurement of liquid density was 6.03%. While the average error value for solid density measurement is 8.87%.

***Keywords:*** *digital densitometer, strain gauge, LDR, measurement.*