OPTICAL FIBER SENSOR MEASURING INSTRUMENT

AND SIGNAL CONDITIONING

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ABSTRACT

Optical fiber sensor measuring instrument has been developed to detect color variation and micrometer displacement. Many applications can be derived from the measurements. The use of a single core optical fiber cable is an advantage in order to extend the length of transmission signal, compared to the previous projects. The additional switch has been added to select the red LED or blue LED for various applications. The selection LED is depended on the reaction of chemical pesticide in vegetables or fruits. Red oxide is only reacted with red light. The instrument employed opto-electronics devices such as light emitting diodes as a light source and semiconductor photodiodes as a photodetector. Signal amplification and conditioning has been developed to interface the instrument with panel meter and computer. The instrument uses regulated power supplies +/-12 V and 0 to +5 V. Promising results for colors and displacements measurement have been obtained.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The new revolution in technology needs the instruments to be robust, low cost, precision and accurate. The instruments can be used for the field applications. It is simple to operate. Fiber optic measuring instrument is one of the low cost instruments that have the characteristics that mention above. Fiber optic cable has been used, as signal link between measured variable to detector. One of the advantages when using the fiber optic cable rather than the metal cable is that the fiber optic cable has some unique properties associated with it, for example large bandwidth, small size, freedom from electromagnetic pulses, signal confinement and low cost. Another advantages of fiber optic cable over microwave systems and conventional wiring (twisted wires, coax, copper cable) is the information-carrying capacity of fiber optics. The amount of data can be transferred through the cable in a given period or information bandwidth. It is called information-carrying capacity [1]. Potential bandwidth is a function of the transmission frequency.

The characteristics of the optical fiber cable are it has a greater bandwidth, the cable is small, the signal is confined and free from electromagnetic interferences, low cost and security. These all characteristics give advantage to the optical fiber such as it can be used at high data rates, can be installed in existing conduit, there would no be cross talked or hummed, there would be no interference from lightning or grounds loop, easy to maintain and it hard to tap without detection.

The optical fiber cable does not have many disadvantages. The disadvantage of using fiber optic cable is that difficult to slice. The fiber optic probes or end terminator need to be glued and polished. Another disadvantage of using optical fiber cable is difficulty to design the bifurcation with small light loss. The signal must be amplified up to several