

Electrical System Design Problem

Design Problem: Active and Passive Low-Pass Filter Design

Design two first-order, low-pass filters, one passive and one active, to meet the same performance specifications. The input signal comes from a temperature sensor (a resistance thermometer type with a nominal resistance of 100 ohms) designed to measure fluctuating temperatures of frequency content up to about 1 Hz. The sensors are located in a region of a factory that unavoidably has ac power lines and motors, and lab tests show that our desired temperature signals (about 0.200 volts) are contaminated with 60-Hz noise of about 0.10 volt amplitude. We want our filter, connected between the sensor and the input to our data-acquisition system, to reduce the noise to about 0.005 volts without disturbing the desired signals too much, i.e., 5% dynamic error. Consider loading effects in your designs.

