

## Voltage Drop

Voltage drop is the decrease in voltage in a circuit between the load and the source. This also occurs because the circuit cannot provide sufficient voltage due to the load being a remote distance from the source. Excessive voltage drop will result in substandard operation of electrical equipment, and represents energy wasted in the wiring system in addition to damage to electrical motors. Voltage drop decreases the consistency and the potential of the equipment that is being powered.

A solution to an extreme voltage drop is to make the size of the conductors larger which will result in smaller resistance. The wires should be sized so that there is no more than 5% voltage drop at the load.

Figure 1 and Figure 2 below shows how to calculate the Voltage Drop.

- Example) A 480V, three phase, 25A motor is located 150ft. from the electrical panel.

- $\text{VoltageDrop} = \left( \frac{1.732 \times 2 \times 12.9 \times 150 \text{ ft} \times 25 \text{ A}}{10380} \right) = 16.1436$

- $\text{VoltageDrop\%} = \left( \frac{16.1436}{480 \text{ V}} \right) \times 100\% = 3.363$

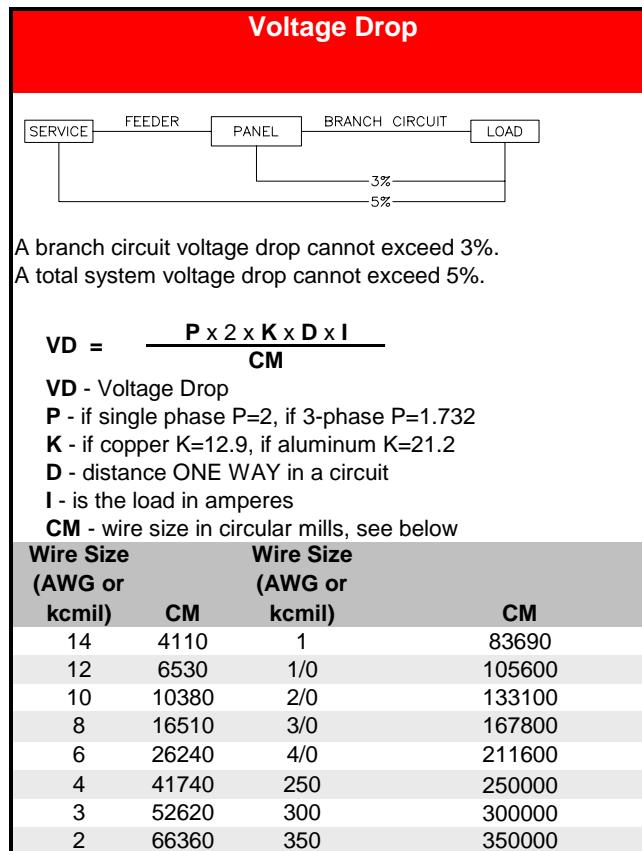


Figure 3 - Voltage Drop

- Example) There is 208V, 15A, single phase equipment located 193ft from the panel board. Follow these steps to make sure that the voltage drop does not exceed 3%.
  - Step 1: Type in the voltage
  - Step 2: Type in
    - 1 for Three Phase to Balance Neutral
    - 2 for Single Phase, 2-Wire Circuit
    - 3 for Three Phase Balance Circuit
  - Step 3: Type in the temperature
  - Step 4: Pick Wire Size, Wire Type, Conduit Type, Amps, and Distance in Feet.
  - If more loads exist proceed to type in 2<sup>nd</sup> load, 3<sup>rd</sup> load, etc.
  - Make sure Voltage Drop does not exceed 3% (Shown in Figure 3)

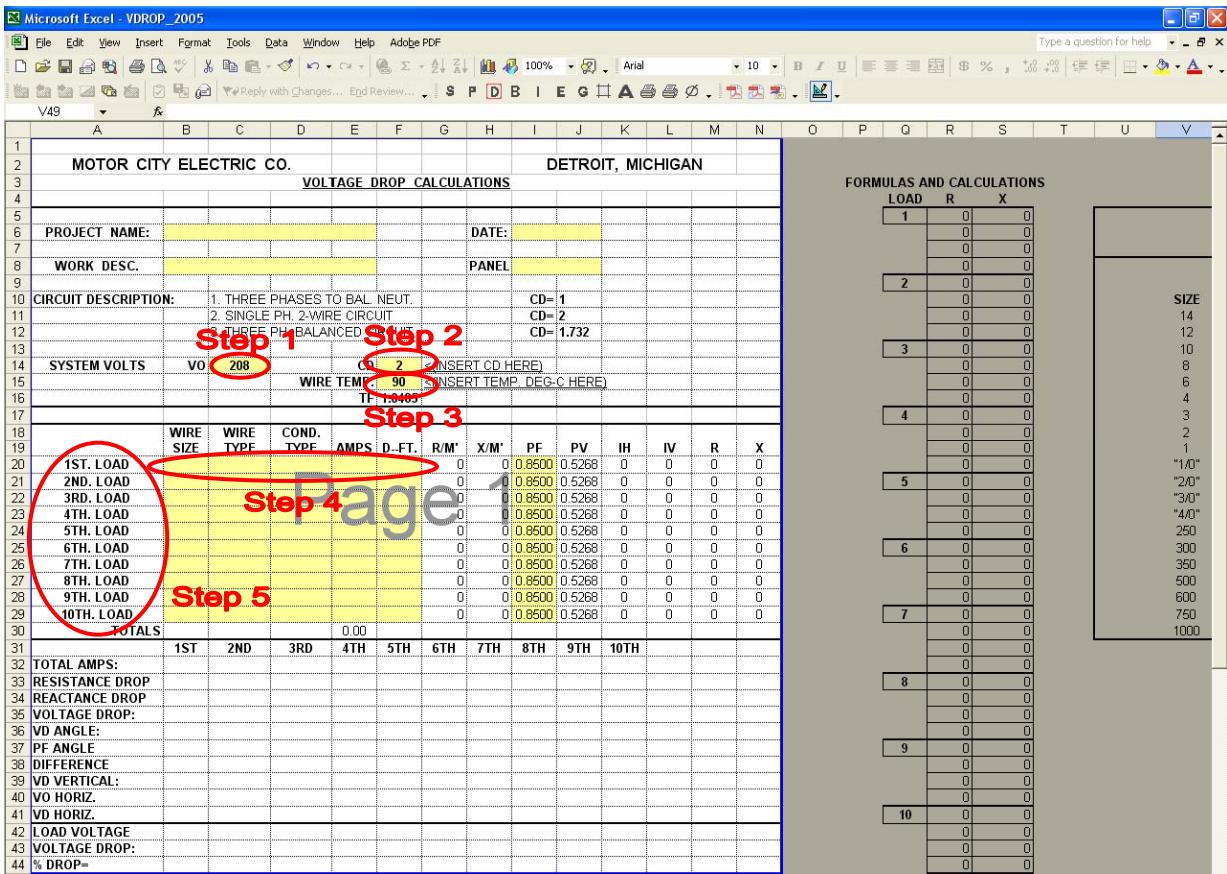


Figure 4 - Voltage Drop Calculation

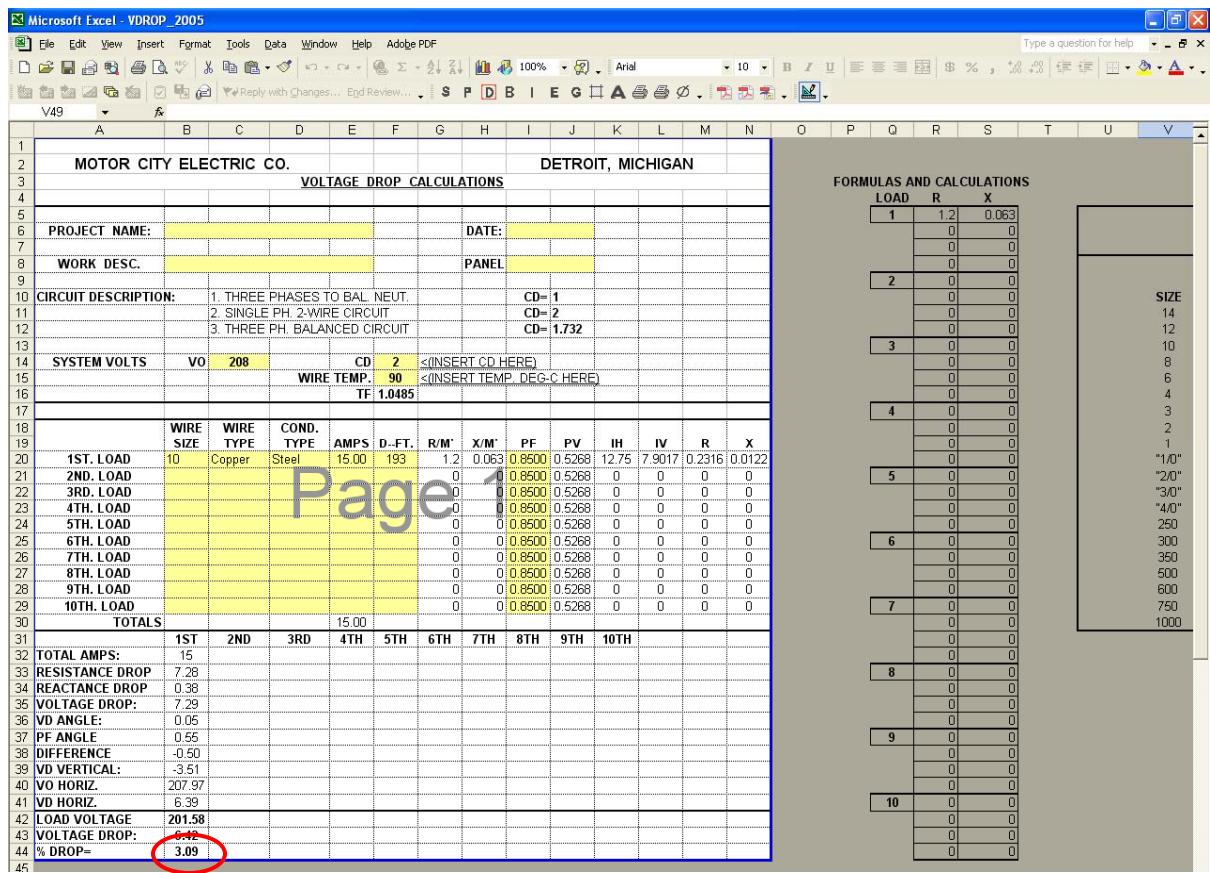


Figure 5 - Voltage Drop Calculation Within 3%