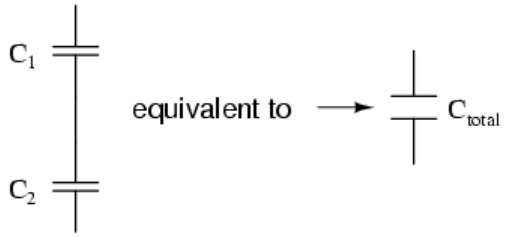
CAPACITOR Industries

MOTOR Capacitors, Inc. | Chicago CONDENSER CORP | SEI · CAPACITORS

CAPACITORS WIRED IN SERIES CONNECTION

When capacitors are connected in **series**, the effect is similar to a single capacitor with increased distance between the two plates resulting to reduced capacitance. The total capacitance value is less than any of the initial value of the capacitors. Below is a schematic diagram showing the equivalent circuit of the combined capacitor:



To determine the total value of the connected capacitors in **series**, the equation is:

$$C_{total} = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \ldots \frac{1}{C_n}}$$

As an example, we can calculate the total capacitance when *two capacitors* with a value of *40 uF each* are connected in **series**. Using the equation, we will obtain a value of *20 uF*.

$$C_{total} = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2}} = \frac{1}{\frac{1}{40} + \frac{1}{40}} = \frac{1}{0.025 + 0.025} = \frac{1}{0.05} = 20 \text{ uF}$$

Below are images showing actual *40 uF* capacitors connected in **series**. The reading from the multimeter is the same as the value obtained using the equation, which is *20 uF*.

Two 40 uF capacitors wired in series.

The total capacitance is 20 uF.

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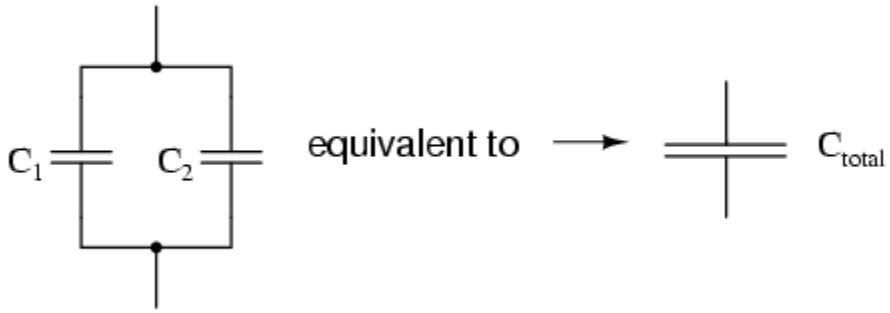
CAPACITORS WIRED IN PARALLEL CONNECTION

When capacitors are connected in **parallel**, the effect is similar to a single capacitor with wider plate surface area resulting to increased capacitance. Below is a schematic diagram showing the equivalent circuit of the combined capacitor:



Calculating the total capacitance of capacitors connected in **parallel** is much easier. It can be done by simply adding the capacitance of each capacitor connected:

$$C_{total} = C_1 + C_2 + \ldots C_n$$

As an example, to calculate the combined capacitance of *two capacitors* with *40 uF* each and connected in **parallel**, simply add the two capacitance for a resulting value of *80 uF*.

$$C_{total} = C_1 + C_2 = 40 + 40 = 80 \text{ uF}$$

Below are images showing actual *40 uF* capacitors connected in **parallel**. The reading from the multimeter, which is *80.1 uF*, is almost the same as the calculated value. The *0.1 uF* deviation is caused by the capacitance tolerance that each capacitor has.

Two 40 uF capacitors wired in parallel.

The total capacitance is 80.1 uF.