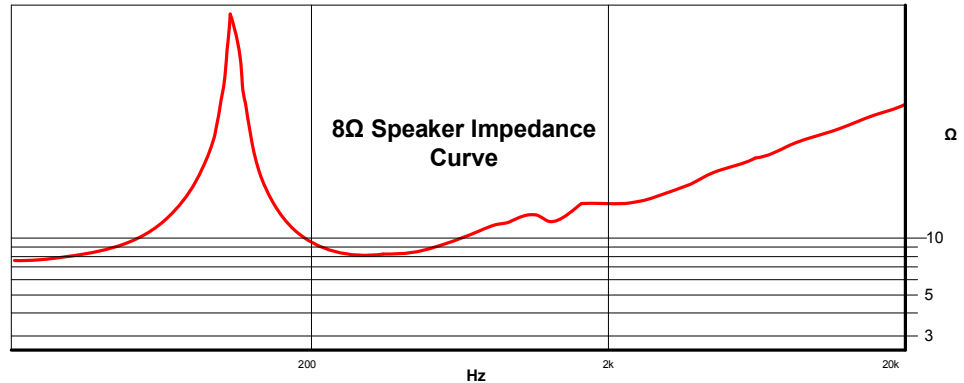


SPEAKER IMPEDANCE, POWER HANDLING AND WIRING

The speaker ohm rating is an indication of the speaker's AC impedance, which varies with the frequency of the input signal.

This variation of the speaker's impedance can be seen on the speaker's spec sheet impedance curve. This is why the spec sheet indicates this speaker to have an 8 Ω "nominal impedance".



Most of the speakers are available in alternative ohm ratings (usually 4, 8 and 16 Ω versions). This variety allows for more flexibility in matching the overall equivalent impedance of your speaker(s) to the output impedance of the amplifier. It is important that the output impedance of your amplifier matches the overall equivalent impedance of your speaker(s) for maximum power transfer and so that you do not damage the amplifier.

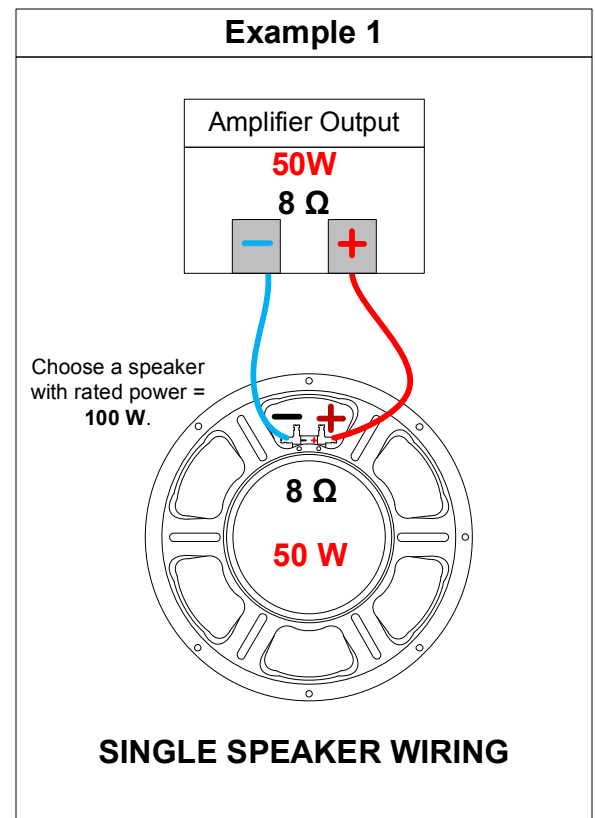
When using more than one speaker with your amp the equivalent overall impedance changes depending on how the speakers are wired. You can wire multiple speakers "in series", "in parallel", or a combination of the two wiring configurations ("series / parallel").

Speakers also have a wattage rating which indicates how much power from the amp they can handle before being damaged. When you use multiple speakers, the output power from the amplifier will be distributed among the speakers. We recommend using speakers with the same ohm rating in multi-speaker cabinets so that the power is evenly distributed to each speaker. (For guitar amplification, we recommend choosing a speaker rated for at least twice the maximum power it could experience from the amp).

In example 1, we have a 50W amp with an 8 ohm output impedance. It has been matched to one 8 ohm speaker.

Since there is only one speaker, it could experience the entire 50W from the amplifier.

In this case we recommend choosing an 8 ohm speaker with a rated power of at least 100W.



In example 2, we have a 50W amp with an 8 ohm output impedance. It has been matched to two 4 ohm speakers wired in series.

Since there are two speakers, each speaker could experience 25 W (half of the output power from the amp).

In this case we recommend choosing two 4 ohm speakers with rated power of at least 50W each.

Formula for calculating the equivalent overall impedance of speakers wired in series.

$Z(\text{total}) = \text{Equivalent Overall Impedance}$

$Z(1) = \text{Impedance of speaker one}$

$$Z(\text{total}) = Z(1) + Z(2) + Z(3) + \dots$$

In example 3, we have a 50W amp with an 8 ohm output impedance. It has been matched to two 16 ohm speakers wired in parallel.

Since there are two speakers, each speaker could experience 25 W (half the output power from the amp).

In this case we recommend choosing two 16 ohm speakers with rated power of at least 50W each.

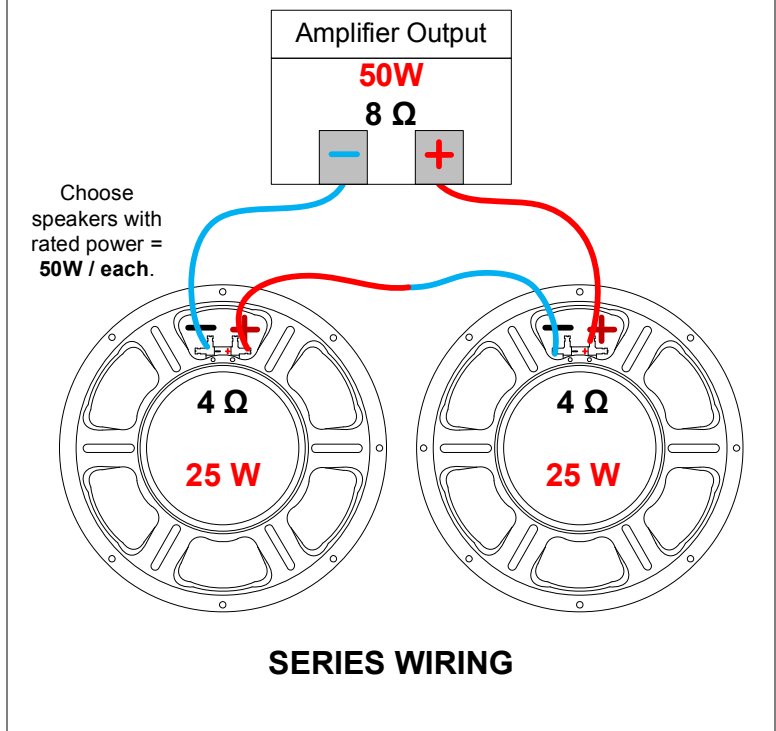
Formula for calculating the equivalent overall impedance of speakers wired in parallel.

$Z(\text{total}) = \text{Equivalent Overall Impedance}$

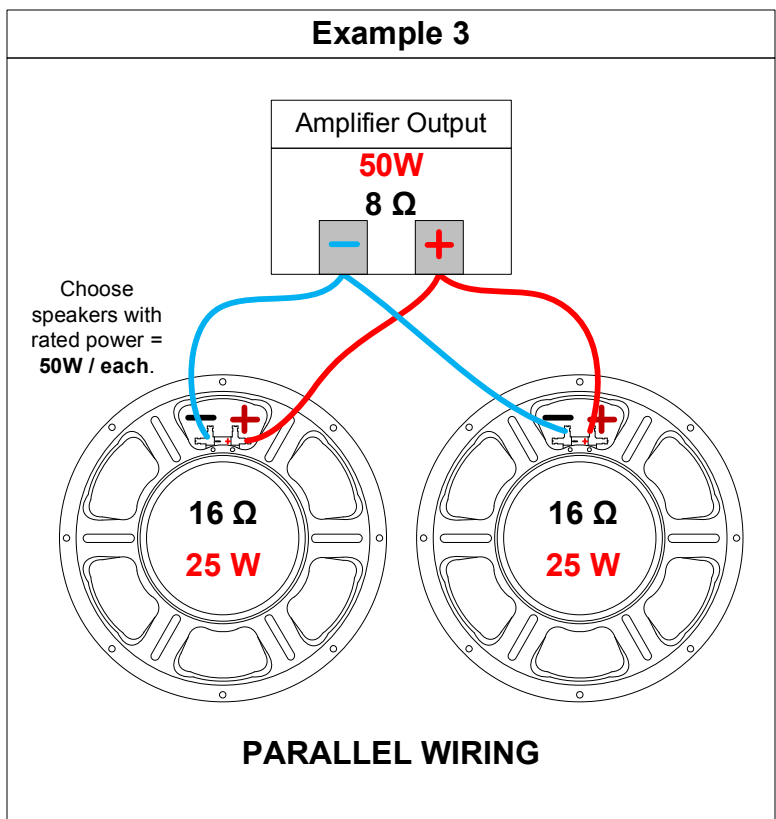
$Z(1) = \text{Impedance of speaker one}$

$$Z(\text{total}) = \frac{1}{\frac{1}{Z(1)} + \frac{1}{Z(2)} + \frac{1}{Z(3)} + \dots}$$

Example 2



Example 3



In example 4, we have a 50W amp with an 8 ohm output impedance. It has been matched to four 8 ohm speakers wired in series / parallel.

Since there are four speakers, each speaker could experience 12.5 W (one fourth of the output power from the amp).

In this case we recommend choosing four 8 ohm speakers with rated power of at least 25W each.

For this configuration, it is easiest to calculate the equivalent overall impedance in two steps.

Step 1: two 8 ohm speakers wired in series have an equivalent overall impedance of 16 ohms.

Formula for calculating the equivalent overall impedance of speakers wired in series.

$Z(\text{total})$ = Equivalent Overall Impedance

$Z(1)$ = Impedance of speaker one

$$Z(\text{total}) = 8 + 8 = 16$$

Step 2: two 16 ohm speakers wired in parallel have an equivalent overall impedance of 8 ohms.

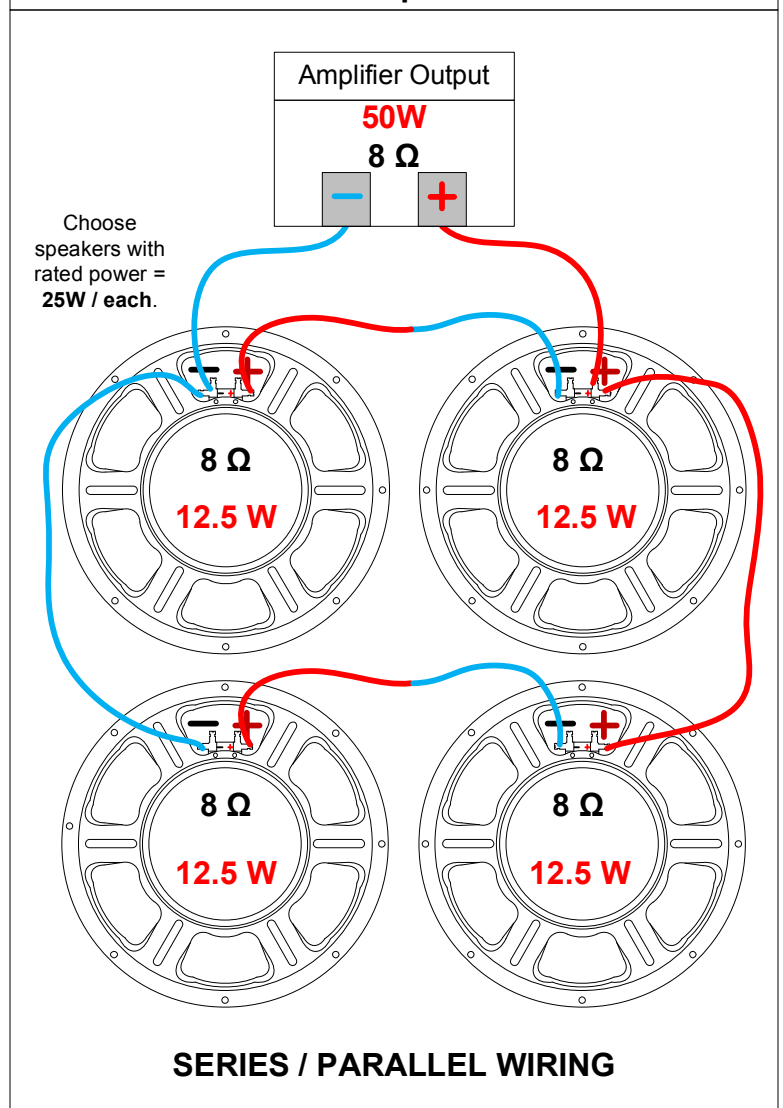
Formula for calculating the equivalent overall impedance of speakers wired in parallel.

$Z(\text{total})$ = Equivalent Overall Impedance

$Z(1)$ = Impedance of speaker one

$$Z(\text{total}) = \frac{1}{\frac{1}{16} + \frac{1}{16}} = \frac{1}{\frac{2}{16}} = \frac{16}{2} = 8$$

Example 4



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