

Technical Info**Loudspeakers****POWER**

Always rate loudspeakers and amplifiers generously, even if there is no intention of using the the system at maximum power. The ears grow accustomed to the sound level throughout a performance and there is often a tendency to increase the sound level unwittingly. An amplifier driven into distortion will often destroy a loudspeaker, regardless of it's rating. Over the last year or so it has become possible to buy extremely efficient good sounding loudspeaker cabinets at modest prices, so if you can afford to spend a little more on a system use the money on loudspeakers to get the best improvement in sound.

LOUDSPEAKER POWER RATINGS

Loudspeaker power ratings can be very misleading with a proliferation of different rating systems. Generally there are four ways to define the maximum power a loudspeaker can handle. Two that are now in common use by professional suppliers are A.E.S. and R.M.S. The other two expressions are "Nominal" and P.M.P. Be especially suspicious of this last method.

RMS is a reliable rating since it indicates the continuous rating that the loudspeaker will handle at a given frequency, usually within it's normal operating band. The tests are usually made with a continuous sine wave signal. This rating or measurement is conservative since no music or voice is a continual tone. AES is a defined power test standard, with the driver mounted in free air and tested with pink noise at the rated power for two hours. This noise is filtered over one decade of the audio frequency range, say 40Hz-400Hz, which is most applicable to the driver. Pink noise is a type of random audio signal more in keeping with what a loudspeaker is likely to experience in a real operating environment. Go for the safe option if the loudspeaker is to be used with a lot of bass input. Using RMS loudspeaker ratings will leave you on the safe side. Nominal is another rating often used. Although it is a rather vague term it usually indicates about twice the RMS rating. As mentioned above, be suspicious of P.M.P. ratings since it can mean almost anything.

This term is often used in specifications for computer loudspeakers and produces some amazing claims.

LOUDSPEAKER SYSTEMS

Loudspeaker systems can be organised in many ways which can often prove confusing, especially when confronted with all the options at the system design stage. Here is a brief review of some of their relative merits. Although this information need not necessarily influence a buying decision, it is often helpful to understand a loudspeaker design so that future upgrading can be considered.

a] Simple cabinet with single bass driver and piezo horn: Economic and portable, but lacking true full range sound.

b] Cabinet with bass driver, separate mid-range loudspeaker, two-way passive crossover and piezo horns: More effective sound response while retaining reasonable cabinet size, but often too heavy for one person to lift.

c] Cabinet with bass driver, separate mid-range loudspeaker, compression driver horn and three-way passive crossover. Punchy sounding cabinet, but considerably more expensive than basic types.

d] Split cabinet system with bass/sub-bass driver in one unit, together with a mid-top unit with at least two mid-range loudspeakers and compression driver horn. High end system, minimum requirement for club or large venue work.

e] A similar system to [d], but with an active crossover and separate amplifiers driving each loudspeaker section. Ultimate loudspeaker configuration with complete audio spectrum control.

CROSSOVER CONFIGURATIONS

The various crossover options are shown in diagrams 2-5. Piezo's are often used as high frequency drivers in loudspeaker cabinets since they do not require a crossover. A combination of piezo's and conventional voice coil drivers can be used. This is often one of the most cost effective ways to get good results. The crossovers shown in this catalogue are designed for use with 8 ohm loudspeakers or horns. If they are wired correctly the impedance presented to the amplifier will also be eight ohms.

LOUDSPEAKER IMPEDANCE

A mismatch between the loudspeaker system and amplifier is the biggest cause of failure and poor sound quality. The amplifiers in this catalogue are given a rating for four and eight ohm loads, so you can judge the true power going to your loudspeaker system. Make sure your loudspeakers are wired in phase, ie: + to - when in series, + to + when in parallel.

Diagram 1 shows different loudspeaker wiring configurations and the resulting load impedance presented to the amplifier. The loudspeaker symbol can either represent one drive unit or a complete cabinet as long as that cabinet impedance is 8 ohms. The load impedance presented to an amplifier by loudspeakers connected in parallel can be calculated by the following formula: where 'Z total' is the impedance presented to the amplifier and Z1, Z2 etc are the individual loudspeaker or cabinet impedances. If you are unsure about your requirements, give us a call and ask one of our technical staff for advice.

$$Z \text{ total} = \frac{1}{\frac{1}{Z1} + \frac{1}{Z2} + \frac{1}{Z3} + \dots}$$

Series connection is simply the sum of the loudspeaker impedances:

$$Z \text{ total} = Z1 + Z2 + Z3 + \dots$$

100 VOLT LINE SYSTEMS

Using a line system to supply remote loudspeaker cabinets is often the best way to solve sound distribution problems, especially if distances between amplifiers and loudspeakers are large. Transformers are required at each end of the line which adds cost, but this is often more than outweighed by other cost advantages, such as being able to use smaller amplifiers and thin interconnecting cable. Each loudspeaker can have it's level controlled individually without upsetting the overall load impedance. If the driving amplifier requires an external transformer, it is often wise to connect a large non-polarised capacitor between the amplifier and transformer. This will save unwanted low frequencies saturating the transformers. Diagram 6 shows a typical 100 Volt line system. If you require help in designing a system please call us for assistance, or e-mail us on support@terralec.com