



## Sx100

### 200-Watt Two-Way Portable Speaker System

- Compact and lightweight (32 lb)
- Very durable structural-foam enclosure with integral handle
- Stand mountable and arrayable
- High efficiency (99.5 dB, 1 W/1 m)
- High power handling (200 watts continuous, 800 watts short term)
- 12-inch EVG-12 woofer and DH2005 compression driver with a titanium diaphragm
- Molded-in HF horn, with 65° x 65° constant-directivity coverage, increases intelligibility in noisy, reverberant rooms
- Four molded-in attachment points (metric M8 x 1.25) for secure suspension
- Available in black (Sx100) or white (Sx100W)

#### Description

The Electro-Voice Sx100 is a 200-watt, 12-inch two-way, high-efficiency, constant-directivity portable speaker system. Through the extensive use of computer-aided design and modeling, Electro-Voice engineers have developed a state-of-the-art professional loudspeaker system.

The high-frequency section of the Sx100 utilizes a molded-in, 65° x 65° constant-directivity horn. This unique pattern contributes to high intelligibility. Vocals sound natural yet “cut through” in reverberant, noisy rooms. In addition, the coverage pattern is unusually uniform over its range of operation. Sound quality off-axis is very well maintained, even at 45° off axis (a 90° total coverage angle), well beyond the rated coverage angle.

The horn’s unique, Varipath™ throat geometry<sup>2</sup> helps direct driver output to the corners of the room, areas which are not described in the usual specifications of horizontal and vertical coverage angles. This results in more uniform coverage throughout, even to those parts of the audience that typically do not receive the strongest coverage.

One of the many other unique features of the Sx100 is the cabinet. Constructed of high-

impact polypropylene structural foam, it provides a stiff and extremely durable enclosure. Molded into the cabinet are an integral carrying handle and a stand socket for mounting on 1<sup>3</sup>/<sub>8</sub>-inch stands such as the Electro-Voice model 100BK. Rubber feet that are attached to the bottom of the cabinet and mating sockets that are molded into the top provide a means of stacking systems. The trapezoidal-shaped cabinet, in combination with the uniform, 65° x 65° directivity characteristics, make the Sx100 ideal for use alone or in arrays.

In situations requiring additional bass output, the Sx100 can be used in combination with the Electro-Voice Xp200A system controller. The Xp200A includes a low-frequency enhancement circuit that is tailored to match the low-frequency characteristics of the Sx100. Up to 12 dB of additional bass output can be obtained from the system when used with the Xp200A system controller. The amount of low-frequency enhancement can be adjusted to suit the user’s personal preference.

For the most demanding situations, two bass-module models are available to complement the Sx100: the Electro-Voice Sb121 nonpowered bass module and the Electro-Voice Sb121a powered bass module. Both bass modules were designed to be

used with the Sx100 and are constructed in similar structural foam enclosures. The Sb121a includes a 300-watt power amplifier that is built into the speaker cabinet. The Xp200A system controller provides a sub-woofer output that is a monaural summation of the left and right channels.

The Sx100’s high-frequency horn is driven by the DH2005, a one-inch-throat, wide-bandwidth, titanium-diaphragm driver. The DH2005 uses a unique, convex-drive Time Path™ phasing plug structure (U.S. Patent #4,525,604) for smooth and extended high-frequency performance. The voice coil is coupled to the diaphragm with EV’s exclusive Resonant Drive™ technology. This increases and smooths the high-frequency response and reduces the amount of internal equalization required for flat frequency response. Driver output extends to 25,000 Hz. A self-resetting high-frequency protection circuit, EV’s PRO™ circuit, is included with the Sx100 to prevent against accidental overdrive and improve system reliability. If the input power to the high-frequency driver exceeds the nominal rating, the protection circuit is activated and reduces the power delivered to the driver by 6 dB. The system will remain in this mode of operation until the input power is reduced to a safe level.

The bass section of the Sx100 is designed

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using Thiele-Small parameters for efficient performance to below 80 Hz. The woofer is a 12-inch EVG-12 featuring beryllium copper lead wires, a low-mass, edge-wound voice coil and high-temperature materials. The system combines professional-quality components, arranged in a time-coherent vertical array, with an unusually durable Thiele-Small-aligned vented enclosure. The result is clear and articulate, high-quality sound.

## Frequency Response

The combination of a 12-inch woofer, wide-bandwidth high-frequency driver and an equalized crossover results in the wide and smooth overall response shown in Figure 1. This response was measured at 10 feet, using a 4-volt input in an anechoic chamber, and was measured using a swept sine-wave input. No external equalization was used. Figure 1 has been averaged and corrected for 1 watt at 1 meter.

## Constant-Directivity Speaker System

The crossover frequency and speaker component geometries have been selected so that the directional characteristics of the woofer and constant-directivity horn match at the crossover frequency to create a special system type—the constant-directivity system. Response within the 65° rated coverage angle is uniform, which means dependable audience coverage without “hot spots” or dead zones at certain frequencies. The 65° dispersion characteristic also helps avoid early reflections from nearby floor or side-wall surfaces which could degrade performance. The controlled directivity of the high- and low-frequency transducers also eliminates response irregularities caused by diffraction off nearby enclosure edges and, in combination with an essentially flat on-axis frequency response, produces a total acoustic power output that is uniform with frequency.

## Directivity

A unique feature of the Sx100 is the constant-directivity dispersion provided by the 65° x 65° horn. The polar response of the system at selected one-third-octave bandwidths is shown in Figure 2. These polar responses were measured in an anechoic environment at 10 feet using one-third-octave pink-noise inputs. The frequencies selected are fully representative of the polar response of the system. Beamwidth of the system uti-

lizing the complete one-third-octave polar data is shown in Figure 3.  $R_0$  and directivity index ( $D_i$ ) are plotted in Figure 4.

## Suspending Sx100 Enclosures

**WARNING: Suspending any object is potentially dangerous and should only be attempted by individuals who have a thorough knowledge of the techniques and regulations of rigging objects overhead. Electro-Voice strongly recommends that the Sx100 be suspended taking into account all current national, federal, state and local regulations. It is the responsibility of the installer to ensure the Sx100 is safely installed in accordance with all such regulations. If the Sx100 is suspended, Electro-Voice strongly recommends that the system be inspected at least once a year. If any sign of weakness or damage is detected, remedial action should be taken immediately.**

A manual entitled *Suspending System 200™ Loudspeakers* is included with every Sx100 system. It gives a summary of the suspension kits available and an idea of how each kit is used. A brief overview, which illustrates some approaches for single and multiple suspension, is given here for the benefit of the system designer. Please refer to individual suspension kit engineering data sheets for full details and safety information.

The first approach is to suspend an **individual** Sx100 enclosure. The four metric M8 x 1.25 inserts (see Figures 5 and 6) which are built into the enclosure allow the system to be suspended using eyebolts (Mb100 Eyebolt Attachment Kit). Typically it will be necessary to attach two cables to the top eyebolt and “pull up” on the rear. The Mb200 bracket (see Figure 7) encompasses the top and bottom of the enclosure and has additional features to make suspending the Sx100 easier and more flexible. Electro-Voice recommends the use of the Mb200 in all but the simplest situations. The Mb200 has supplementary holes to allow the Sx100 to be attached to a wall or ceiling and aimed at an audience.

The Mb200 Installation Kit also allows the use of OmniMount® Series 100 mounting hardware by providing three-hole-pattern groups compatible with these support systems. When OmniMount® Series 100 mounting hardware is specified, the Mb200 Installation Kit must first be attached to the speaker enclosure.

The second approach is to suspend **multiple** Sx100 enclosures. The Sx100 enclosure is not designed to suspend multiple enclosures from itself. If an “array” is required, then multiple Mb200’s must be used. Arrays may be constructed vertically by “daisy chaining” two Mb200’s from each other. The Mb300 array bracket allows the easy and secure construction of horizontal arrays, using Mb200’s to support the enclosure.

## Power-Handling Capacity

To our knowledge, Electro-Voice was the first U.S. manufacturer to develop and publish a power test closely related to real-life conditions. First, we use a random-noise input signal because it contains many frequencies simultaneously, just like real voice or instrument program. Second, our signal contains more energy at extremely high and low frequencies than typical actual program, adding an extra measure of reliability. Third, the test signal includes not only the overall “long-term average” or “continuous” level—which our ears interpret as loudness—but also short-duration peaks which are many times higher than the average, just like actual program. The long-term average level stresses the speaker thermally (heat). The instantaneous peaks test mechanical reliability (cone and diaphragm excursion). Note that the sine-wave test signals sometimes used have a much less demanding peak value relative to their average level. In actual use, long-term average levels exist from several seconds on up, but we apply the long-term average for several hours, adding another extra measure of reliability.

Specifically, the Sx100 is designed to withstand the power test described in the ANSI/EIA RS-426-A 1980. The EIA test spectrum is applied for eight hours. To obtain the spectrum, the output of a white-noise generator (white noise is a particular type of random noise with equal energy per bandwidth in Hz) is fed to a shaping filter with 6-dB-per-octave slopes below 40 Hz and above 318 Hz. When measured with the usual constant-percentage bandwidth analyzer (one-third-octave), this shaping filter produces a spectrum whose 3-dB-down points are at 100 Hz and 1,200 Hz with a 3-dB-per-octave slope above 1,200 Hz. This shaped signal is sent to the power amplifier with the continuous power set at 200 watts into the 7.1-ohm EIA equivalent impedance (37.6 volts true rms). Amplifier clipping sets

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instantaneous peaks at 6 dB above the continuous power, or 800 watts peak (75.3 volts peak). This procedure provides a rigorous test of both thermal and mechanical failure modes.

## Amplifier Power Recommendations

As noted in the Power-Handling Capacity section, above, the Sx100 has a random-noise power capacity of 200 watts long term (800 watts peak) per ANSI/EIA Standard RS-426-A 1980. The following guidelines will help relate this number to an appropriate power amplifier output rating.

1. To use the Sx100 to full capacity, skilled experts in sound system installation and operation will obtain the best results if the power amplifier is 2.0 to 4.0 times the long-term average noise power rating of the speaker system. For the Sx100 this is 400 to 800 watts.

The **caution** cannot be made strongly enough, however, that **this arrangement is only for experts** or for those who can discipline themselves against “pushing” the system for ever-higher sound levels and who can avoid “accidents” such as catastrophic feedback or dropped microphones.

2. A more conservative, “normal” amplifier size, which will produce audible results nearly equal to those of the “expert” recommendation, is 1.0 to 1.4 times the long-term average noise power rating of the speaker. For the Sx100 this is 200 to 280 watts.
3. To be very conservative, one can use an amplifier rated at 0.5 to 0.7 times the long-term average noise power rating of the loudspeaker. For the Sx100 this is 100 to 140 watts.

Request P.A. Bible Addition No. Two (“Power Handling Capacity”) for more background on these recommendations.

## Architects’ and Engineers’ Specifications

The loudspeaker shall consist of a 305-mm (12-inch) low-frequency transducer in a vented, trapezoidal-shaped enclosure; a high-frequency compression driver with a pure titanium diaphragm coupled to a 65° x 65° constant-directivity horn molded into the

front baffle of the enclosure; and a passive crossover-equalizer network with protection for the high-frequency driver. Up to 12 dB additional bass output can be obtained with the Electro-Voice Xp200A speaker-system controller. The loudspeaker shall meet the following performance criteria: frequency response of 80 to 25,000 Hz, -3 dB; power handling of 200 watts long term and 800 watts short term, with a shaped random-noise input per ANSI/EIA RS-426-A 1980; sensitivity of 99.5 dB SPL at 1 meter with a 1-watt, 300- to 2,000-Hz pink-noise input; 6-dB-down horizontal coverage angle of 65° ± 15° in the 2,000- to 20,000-Hz range; 6-dB-down vertical coverage angle of 65° ± 15° in the 2,000- to 20,000-Hz range; crossover frequency of 1,500 Hz; nominal impedance of 8 ohms and minimum impedance of 6 ohms. Input connections shall be two paralleled 1/4-inch phone jacks. The enclosure shall be constructed of black (Sx100) or white (Sx100W) polypropylene structural foam and fitted with a black (Sx100) or white (Sx100W) steel grille, an integral handle, a stand socket for mounting on 1 3/8-inch stands, rubber feet and mating sockets to facilitate stacking. Dimensions shall be 586 mm (23.1 in.) high x 429 mm (16.9 in.) wide x 312 mm (12.3 in.) deep. Net weight shall be 14.5 kg (32 lb).

The loudspeaker system shall be the Electro-Voice Sx100 (black) or Sx100W (white).

## Limited Warranty

Electro-Voice products are guaranteed against malfunction due to defects in materials or workmanship for a specified period, as noted in the individual product-line statement(s) below, or in the individual product data sheet or owner’s manual, beginning with the date of original purchase. If such malfunction occurs during the specified period, the product will be repaired or replaced (at our option) without charge. The product will be returned to the customer prepaid.

**Exclusions and Limitations:** The Limited Warranty does not apply to: (a) exterior finish or appearance; (b) certain specific items described in the individual product-line statement(s) below, or in the individual product data sheet or owner’s manual; (c) mal-

function resulting from use or operation of the product other than as specified in the product data sheet or owner’s manual; (d) malfunction resulting from misuse or abuse of the product; or (e) malfunction occurring at any time after repairs have been made to the product by anyone other than Electro-Voice or any of its authorized service representatives. **Obtaining Warranty Service:** To obtain warranty service, a customer must deliver the product, prepaid, to Electro-Voice or any of its authorized service representatives together with proof of purchase of the product in the form of a bill of sale or receipted invoice. A list of authorized service representatives is available from Electro-Voice at 600 Cecil Street, Buchanan, MI 49107 (616/695-6831 or 800/234-6831). **Incidental and Consequential Damages Excluded:** Product repair or replacement and return to the customer are the only remedies provided to the customer. Electro-Voice shall not be liable for any incidental or consequential damages including, without limitation, injury to persons or property or loss of use. Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation or exclusion may not apply to you. **Other Rights:** This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

**Electro-Voice Speakers and Speaker Systems** are guaranteed against malfunction due to defects in materials or workmanship for a period of five (5) years from the date of original purchase. The Limited Warranty does not apply to burned voice coils or malfunctions such as cone and/or coil damage resulting from improperly designed enclosures. Electro-Voice active electronics associated with the speaker systems are guaranteed for three (3) years from the date of original purchase. Additional details are included in the Uniform Limited Warranty statement.

Service and repair address for this product: Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan 49107 (616/695-6831 or 800/234-6831).

Specifications subject to change without notice.

# Sx100 200-Watt Two-Way Portable Speaker System

## Specifications

### Versions Available:

**Sx100** Lightweight, 200-watt, 12-inch, two-way system, black

**Sx100W** Lightweight, 200-watt, 12-inch, two-way system, white

**Axial Frequency Response (swept sine-wave input, 4 volts at 10 feet on axis, anechoic environment, normalized for 1 watt/1 meter; see Figure 1):**  
80-25,000 Hz

**Low-Frequency 3-dB-Down Point:**  
80 Hz

**Usable Low-Frequency Limit with Xp200A Controller (10-dB-down point):**  
55 Hz

**Half-Space Reference Efficiency:**  
3.9%

**Long-Term Average Power-Handling Capacity per ANSI/EIA RS-426-A 1980 (see Power-Handling Capacity section):**  
200 watts

**Maximum Woofer Acoustic Output:**  
7.8 watts

**Sensitivity (SPL at 1 meter, 1 watt input, anechoic environment, band-limited pink-noise signal, 300-2,000 Hz):**  
99.5 dB

**Dispersion Angle Included by 6-dB-Down Points on Polar Responses, Indicated One-Third-Octave Bands of Pink Noise (see Figure 3),**  
**2,000-20,000 Hz, Horizontal:**  
65° ±15°  
**2,000-20,000 Hz, Vertical:**  
65° ±15°

**Directivity Factor  $R_0$  (Q), 800- to 16,000-Hz Median (see Figure 4):**  
14.3 (+7.9, -9.3)

**Directivity Index D, 800- to 16,000-Hz Median (see Figure 4):**  
11.1 dB (+2.4 dB, -4.1 dB)

**Distortion, 0.1 Full Power Input, Second Harmonic,**

**100 Hz:** 1.0%

**1,000 Hz:** 1.0%

**10,000 Hz:** 10%

**Third Harmonic,**

**100 Hz:** 0.2%

**1,000 Hz:** 0.5%

**10,000 Hz:** 2.5%

**Distortion, 0.01 Full Power Input,**

**Second Harmonic,**

**100 Hz:** 0.3%

**1,000 Hz:** 0.3%

**10,000 Hz:** 3.0%

**Third Harmonic,**

**100 Hz:** 0.2%

**1,000 Hz:** 0.3%

**10,000 Hz:** 0.2%

**Transducer Complement,**

**High Frequency:**

DH2005 driver

**Low Frequency:**

EVG-12 woofer

**Box Tuning Frequency:**

65 Hz

**Crossover Frequency:**

1,500 Hz

**Crossover Slope,**

**Low Pass:**

18 dB per octave

**High Pass:**

6 dB per octave

**Impedance,**

**Nominal:**

8 ohms

**Minimum:**

6 ohms

### Input Connections:

Two paralleled 1/4-inch phone jacks (allows paralleling of multiple speakers)

### Enclosure Materials and Colors:

Black or white polypropylene structural foam

### Supplied Accessory:

*Suspending System 2000™ Loudspeakers* instruction manual

### Optional Accessories:

100BK mounting stand

Mb100 eyebolt attachment kit

Mb200 installation kit

Mb200W installation kit, white

Mb300 horizontal array kit

Mb300W horizontal array kit, white

OmniMount® Series 100 mounting hardware<sup>1</sup>

VPCSx protective cover

PDSx padded cover

F200 monitor foot

### Other Products Available for

### Enhancement of Sx100 Performance:

Xp200A system controller

Sb120 nonpowered bass module

Sb120a 400-watt powered bass module

### Attachment Points:

Four metric inserts (M8 x 1.25)

(see Figure 5 and Suspending Sx100 Enclosures section)

### Dimensions (see Figure 5),

#### Height:

586 mm (23.1 in.)

#### Width:

429 mm (16.9 in.)

#### Depth:

312 mm (12.3 in.)

### Net Weight:

14.5 kg (32 lb)

### Shipping Weight:

15.9 kg (35 lb)

<sup>1</sup> Available through OmniMount Systems, Inc. OmniMount® is a registered trademark of OmniMount Systems, Inc.

# Electro-Voice®

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