



## Tech Note

## ES-100 Electronic Stethoscope

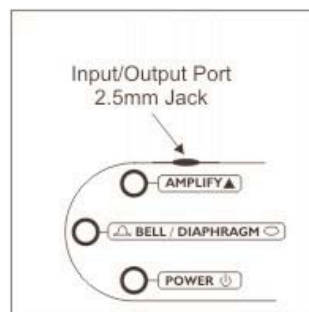
### Background

The ES-100 Electronic Stethoscope is an instrument that reproduces body sounds with low-noise and high-amplification, providing a new level of clarity. It provides control of the listening process, the ability to see and hear heart sounds while recording an ECG or other cardiac parameters. The ES-100 has a variety of modes to make listening to body sounds simple and easy to use.

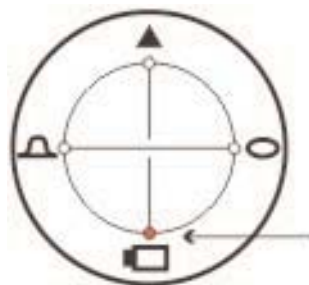
Three easy-to-use controls provide Power on/off, Amplify on/off, and Bell/Diaphragm selection, with mode changes at the push of a button. Additional features are available and provide useful functions when needed, but do not interfere with the easy-to-use main functions of the ES-100.

### Features

- **Amplification:** The Amplify mode with adjustable volume provides low distortion and high power amplification. The Acoustic mode allows the user to hear the familiar sound of a conventional stethoscope
- **Patented Transducer:** The ES-100 uses an electromagnetic diaphragm™ that senses and converts body sounds to electronic signals right at the diaphragm, eliminating signal degradation and ambient noise coupling through air-borne transducers or tubing.
- **Noise Rejection:** The ES-100 Stethoscope has a 2nd-stage Noise Rejection (NR) function for increased noise suppression in high-noise environments. NR can be turned on and off in noisier or quieter office environments to provide high auscultation sensitivity.
- **User-programmable Presets:** You can preset the ES-100 to power-up in mode settings to match your needs in the lab or clinic. The ES-100 Stethoscope can simply power up in the previous mode settings, or in specific modes suited to your preferences.



- **Audio Port:** An Input/Output port provides an audio line-level output signal or use of the ES-100 as headphones suited to listening to recorded heart or other body sounds. Plug the Phono-DIN8 cable that comes with the ES-100 into this port and into Channel 3 of the IX/214 to be able to both see and hear auscultation (heart) or other body sounds.



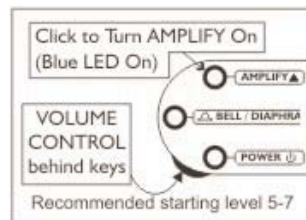
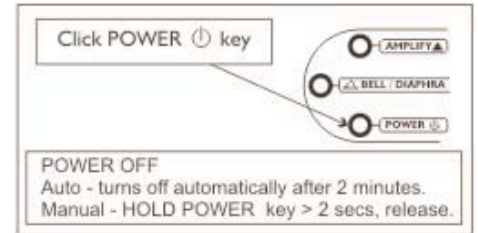
### Battery Life and the Low Battery Indicator

- Use Alkaline Batteries only.
- The Low Battery Indicator on the display will show when the batteries require replacement. A red LED in the Low Battery Indicator signifies a low battery condition.
- After a Low Battery indication initially occurs, the ES-100 Stethoscope will provide only a few additional hours of operation.
- When the batteries have become depleted the ES-100 will not power up, preventing further use. **The unit cannot be used in any mode without battery power.**

## ES-100 Electronic Stethoscope

### Power On/Off Control:

- Click the **Power** button firmly to activate the unit. All the LEDs will light up momentarily to confirm that the unit is on and ready to use.
- **Power Off:** Push and hold the Power button for a few seconds until all LEDs light up, then release.
- **Auto Shut-Off:** The ES-100 will power down automatically after 2 minutes. This automatic shut off period can be programmed to 2, 3, 4, or 5 minutes. The shutoff time will automatically extend beyond the set time if you click any button, but will shut off after a maximum of 5 minutes in operation.
- **Mode Settings on Power Up:** The Power button is also used for saving preferences. The ES-100 can be programmed to power up in specific modes that are preset and saved by the user, or simply power up in the same modes that were active when the ES-100 was last used.

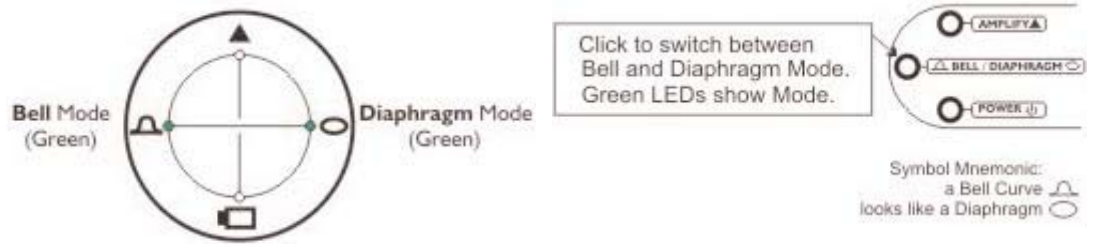


- **Amplify, Volume Control, Mute:** To alternate between Amplify and Acoustic modes click the "Amplify" button. To mute the sound, hold the "Amplify" button.
- **Amplify mode:** This mode provides augmented sound with adjustable volume. A blue LED indicator light turns on. Volume Control is located near the Power button.
- **Acoustic mode:** Volume is pre-set and the blue LED light is off. This mode provides pre-set volume similar to a conventional acoustic stethoscope. The ES-100 still performs electronic signal processing in Acoustic mode, however, the sound characteristics in this mode are set to be similar to an acoustic stethoscope, so that users can compare standard and boosted sounds.
- **Mute function:** Push and Hold the "Amplify" button to mute the sound. This may be needed in situations when the patient might begin to speak, or when listening to pediatric patients.

# ES-100 Electronic Stethoscope

## Bell and Diaphragm Modes

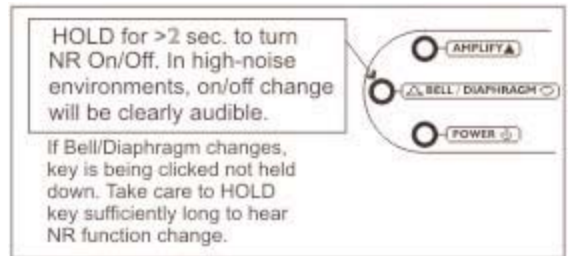
To Alternate between Bell and Diaphragm Modes, click the "Bell/Diaphragm" button:



- Diaphragm Mode: provides frequency response suited to both valve and breath sounds. Diaphragm Mode will remove low frequencies, making it easier to discern higher frequencies that may be masked by the louder low frequencies.
- Bell Mode: provides boosting of very low frequencies to facilitate listening to heart murmurs.
  - Due to the substantial low frequency energy in some heart sounds, Bell Mode has significantly higher signal power than Diaphragm Mode. The choice of Mode for any given diagnostic situation is a matter of listener preference, and alternating between modes helps to discern the nuances of body sounds.

## Noise Rejection (NR)

- The NR function is turned on or off by Holding the "Bell/Diaphragm" button for at least 2 seconds. There is no visual indicator, however if there is ambient noise, the on or off state should be clearly audible. When ambient noise is decreased, NR is active.
- Since both the Bell/Diaphragm and NR functions use the same button, the ES-100 interprets which function is being addressed by the length of time the button is down. A click will change the Bell/Diaphragm mode which will be visible. Holding the "Bell/Diaphragm" button for more than 2 seconds will change the noise reduction mode.



## Recent Modes on Power-up:

To set the ES-100 to power up in the most recent mode settings, perform the following steps:

1. Turn on the ES-100 by clicking the Power button.
2. Hold the Power button for about 5 seconds until the red LED (Low battery indicator) flashes, then Release.
  - All modes are memorized from the last use (Amplify, Bell/Diaphragm, Noise Rejection). Note that Recent Modes will default to a 2-minute auto shutoff. However, auto shutoff time is extended another minute when any button is clicked, up to a maximum of 5 minutes.

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### Preset Modes on Power-up:

To set the ES-100 to power up in specific modes, regardless of the mode settings when it was last used, perform the following steps:

1. Turn on the ES-100 by clicking the Power button.
2. Set all ES-100 Modes to your preferences. These include:
  - Amplify/Acoustic mode
  - Bell/Diaphragm mode
  - Noise Rejection On/Off
3. Set the Auto ShutOff time - Click the Power button once for each minute you'd like the ES-100 to stay on before auto shutoff. Click twice for 2 minutes, 3 times for 3 minutes, etc. up to 5 clicks for 5 minutes. The minimum setting is 2 minutes, the maximum is 5 minutes.
4. Hold the Power button for at least 10 seconds. After 5 seconds, the red LED (Low Battery indicator) will begin to flash slowly. Continue to hold the button for 10 seconds. The red LED will flash more quickly, indicating the Preset Mode is programmed.
5. Release the Power button. The new settings are stored. When performing this final step, hold the button power button to turn off stethoscope.

To cancel Preset Modes power-up, simply follow the instructions for Recent Modes Power-up.

### General Maintenance and Cleaning:

- Do not immerse the ES-100 in any liquid. If the ES-100 is inadvertently immersed in liquid, do NOT turn on the unit. Completely dry out the inner spaces before trying to use the ES-100 again.
- Do not sterilize the ES-100 using any sterilization process.
- Wipe the ES-100 diaphragm with alcohol swabs or a soft cloth moistened with alcohol. Do not use abrasive cleaning agents, and do not allow fluids to enter the device.
- Without removing the eartips, use an alcohol swab to wipe the eartips. Never allow fluids to enter the speaker housings.
- Avoid extreme heat, cold or humidity for either storage or use of this device. Room temperature is recommended for both storage and use of the stethoscope.
- Wearing the ES-100 on the shoulders is preferable to tightly folding the device and placing it in a jacket pocket.
- Avoid excessive force applied to any part of the device. Damage could result. Avoid dropping the ES-100 on hard floors, especially concrete. Damage could result.
- Remove the batteries if the ES-100 is not to be used for a period of a few months.



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