

## **A new type of hearing-aid de-humidifier/drying box**

### **Introduction:**

Surface moisture or condensate is the enemy of hearing-aids and cochlear implant processors. Moisture can corrode or degrade delicate electronic components inside these precision hearing instruments. The effect is a slow but graduate degradation in sound quality. An inexpensive de-humidifier and normal maintenance can minimize this problem while maintaining peak performance.

ReNew™ is a new type of de-humidifier that is greener, more compact, more efficient, and less costly to operate than other traditional products on the market today. It gains these advantages because it eliminates the need for a fan and the use of a desiccant. It is quiet and has no moving part. It simply uses gentle dry heat and a powerful air convection current to remove moisture and refresh hearing instruments.

### **Traditional de-humidifier:**

Traditional hearing-aid de-humidifier houses a fan, a heating element and a moisture absorbing desiccant (brick) inside a closed chamber. During normal operation, the fan circulates warm air over the hearing-aids evaporating any surface moisture or condensate. Finally, the resultant moisture in the warm air gets absorbed by the desiccant. Desiccant must be discarded and replaced on a regular basis – a less than green approach in removing moisture. There are other disadvantages as well.

**First**, a mechanical fan could be noisy. A partner who is not hard-of-hearing may find this objectionable when the unit is placed bedside.

**Second**, a fan is a mechanical device with moving parts. It is inherent less reliable than other electronic parts and renders the entire device more fragile. If the fan breaks down, a hot spot can be created inside the closed chamber since there is no moving air to redistribute the heat.

**Third**, a desiccant has limited moisture absorbing capacity and must be replaced on a regular basis. This increases operating cost and creates unnecessary waste.

**Fourth**, the space required to house these major parts (fan, heating element, and desiccant) is quite large and this makes the overall size unnecessary big. Power requirement for both the fan and the heater demands a large power adapter. Therefore, the overall package size is not the most ideal for traveling.

### **The science behind ReNew™:**

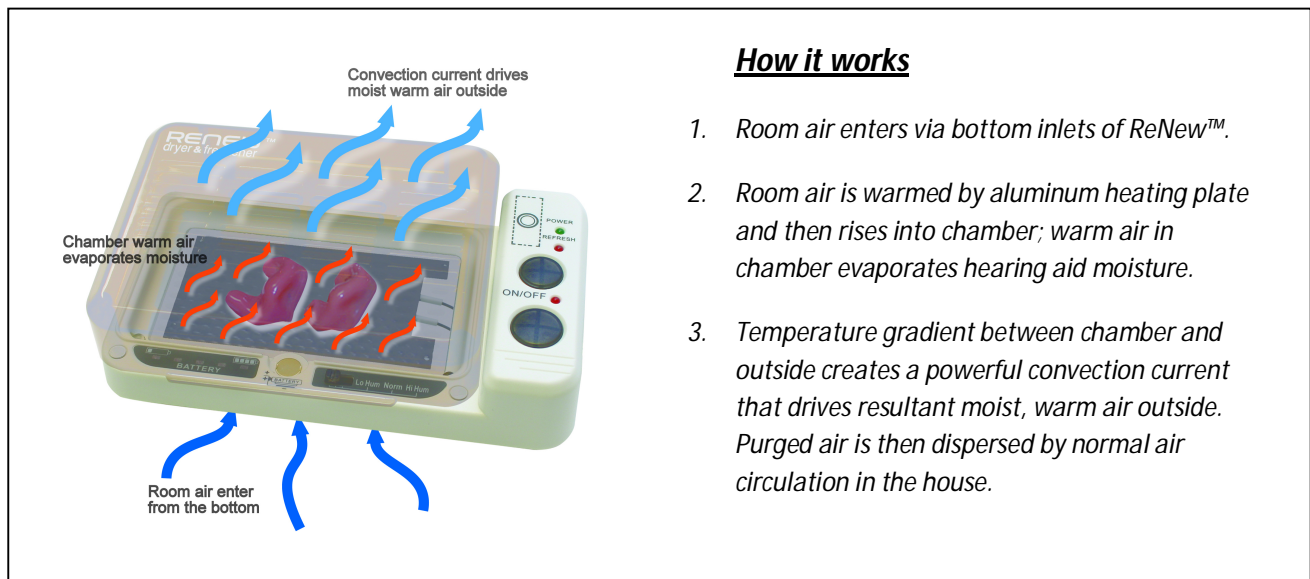
ReNew™ is a new type of de-humidifier that is greener, more compact, more efficient, and less costly to operate. It gains these advantages because it eliminates the need for a fan and the use of a desiccant. It has no moving part and is extremely quiet. It only needs gentle dry heat to evaporate any surface

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moisture or condensate. The resultant moist, warm air is then driven out of the chamber by a powerful air convection current due to temperature gradient. This is the same dynamic mechanism that drives the earth's weather system where moist, warm air rises upward while cooler and drier air returns to the ground.

Let's take a close look at ReNew™ and see why it is better and greener than the traditional de-humidifier. First, ReNew™ uses an open chamber design where small openings are incorporated into its cover so that resultant moist, warm air in the chamber can be purged outside. The purged air will be carried away (dispersed) by normal air circulation in the home. Since moisture volume is so small in relationship to the size of the home. Any dispersed moisture or water molecule is totally not noticeable.



Traditional de-humidifier uses a small heating element and a fan to distribute the heat into the chamber. In contrast, ReNew™ uses a large aluminum heater to generate gentle dry heat. The heating element is housed on a large piece of industrial grade aluminum plate that measures approximately 59 mm (wide) x 113 mm (Long) x 3 mm (thick). Since aluminum is an excellent heat conductor, it distributes heat evenly across its entire surface without the need for a fan.

This heated aluminum plate is placed slightly below the chamber so warm air can rise into it. This ensures heating consistency and uniformity. A precision electronic temperature controller maintains a constant 45 °C / 113 °F inside the chamber. This gentle dry heat evaporates surface moisture or condensate on the hearing aids.

The 20°C temperature gradient (difference) between the chamber and outside (25°C) creates a powerful air convection current that drives resultant moist, warm air outside via the small openings on top. Simultaneously, cooler and drier room air is being drawn back in via the bottom inlets and warmed by the aluminum plate before entering the chamber. Computer-aided design and analysis techniques were

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used to optimize both inlet and outlet openings for maximum air convection current.

This dynamic action is constantly repeating until the selected timer setting is reached. It shuts off automatically at the end of the timer setting. ReNew™ offers three timer settings (2, 4, or 8 hours) for optimal control and energy saving. The 4-hour setting is more than adequate even for the most demanding location such as a summer home in Florida or Hawaii.

The amount of energy consumed by ReNew™ is extremely small; it only consumes 48 watt-hours of energy during the entire 4-hour period. This is less than that consumed by a 60 watt bulb in 1-hour. At an average electricity rate of 13 cents per KW-hour, ReNew™ costs less than a penny per usage! This is much less costly than the use of a desiccant which must be replaced on a regular basis.

ReNew™ is about 30% smaller than other devices, and is made of high-impact polycarbonate plastic (bullet-proof window material). It is extremely durable and can withstand numerous drops from a nightstand or table. It boasts a large heating chamber and can accept two sets of hearing-aids for fast, even drying. Its compact power adapter can be stored inside the chamber when traveling. It is compatible with all international electrical systems (Asia, Africa, Europe, North and South America). All that's needed is the appropriate local plug adapter.

### **Built-in battery tester:**

ReNew™ is the only de-humidifier with a built-in battery tester. It provides a simple and reliable method of testing a battery before replacing. This saves money by eliminating the waste of good batteries. A user simply presses a battery against the two gold contacts on the tester to get a quick reading on the condition of the battery. Four or five-bar indication means the battery is good while one or two-bar means the battery is marginal, and should be changed before going out.

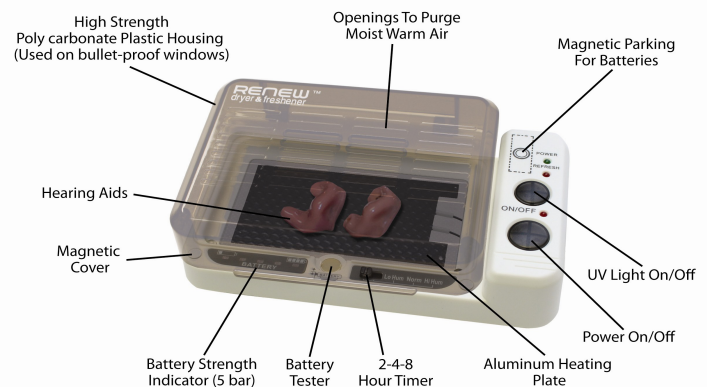
### **UV light:**

Two UV lights are provided in the heating chamber. They sanitize hearing aids and provides similar beneficial effect as UV light in sunlight. An independent ON / OFF control is provided for its operation.

### **Magnetic latch cover:**

ReNew™ uses a magnetic latch cover, and it can be open or close using one hand. Very little hand dexterity is required to open or close. It is a great relief for someone who has arthritis.

## DB-100 COMPONENTS



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### **Magnetic parking for batteries:**

Another unique feature is its magnetic parking spot for keeping the batteries at one place. Although we recommend leaving the battery in the hearing aid while using ReNew™ (with battery cover open for air circulation). Some users prefer to take the batteries out and place them on a nightstand overnight. Unfortunately, batteries tend to disappear from the nightstand the next morning. This magnetic parking spot is an elegant solution to a common problem.

### **Summary**

Why ReNew™?

**Effective:** Drying and sanitizing using precision heating, powerful convection air current and UV lights.

**Low cost:** Consumes very little energy and does not need to use a desiccant.

**Durable and Compact:** ReNew™ only measures 5.8"L x 3.5"D x 2"H and is 30% smaller than other devices; made of polycarbonate plastic (bullet-proof window material) and can withstand numerous drops without damage; power adapter can be stored inside the chamber when traveling.

**Other Convenient Features:** Built-in battery tester, magnetic parking spot for batteries, three drying timer settings, universal power adaptor, and ergonomic design for arthritis.