Learning Outcomes

After taking this course you will be able to:

- List the features of ReSound's Li-ion rechargeable solution
- Describe the battery life charge and display options
- Identify the benefits of ReSound's Li-ion rechargeable solution

Current Battery Options for Hearing Aids

ReSound GN

- Zinc-air

- Silver-zinc rechargeable: ZPower

- Lithium-ion rechargeable

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Zinc-Air Batteries

ReSound GN

- Traditional hearing aid batteries
- Activated by exposure to oxygen
- Factors influencing battery life
  - Chip technology
  - Amount of amplification
  - Use of wireless streaming
  - Environment being used
- Are replaceable
- Relatively short battery life

- Considerations
  - Affected by moisture, altitude and temperature
  - Can be difficult to handle
  - Batteries are toxic
  - Require regular replacement

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Silver-Zinc Rechargeable Batteries

- Hybrid rechargeable utilizing ZPower rechargeable cells
- Requires change to larger, ZPower battery door
- Galvanic charging – recharges via contacts
- Supports zinc-air batteries if needed
- Considerations
  - Requires external power source
  - Requires battery door change
  - Charges via physical contact points
  - Battery life, replacement

Lithium-ion Rechargeable Batteries

- Recently introduced to hearing aids
- Advantages
  - Lightweight and energy dense
  - Contained batteries
  - Lack of “memory effect”
  - Hold charge
  - Long life
- Induction charging possible
- Considerations
  - Contained batteries
  - Temperature sensitive
  - Regulations shipping/travel

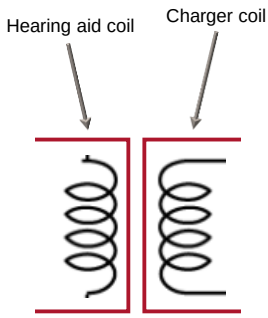
ReSound LiNX Quattro Induction Charging

Advantages
Induction Charging

Easy to Insert
- Ensures accurate device positioning

Robust – No Contacts Means:
- No moisture
- No corrosion
- No wear
- No debris

Induction Charging



Traveling with Lithium-ion Batteries

Battery type	Allowed in carry-on baggage?	Allowed in checked baggage?
Zinc-air	YES For personal/professional use	YES In appropriate packaging
Silver-zinc	YES For personal/professional use	YES In appropriate packaging
Lithium-ion	YES For personal/professional use	NO

Data shown is from: the Federal Aviation Administration Office of Hazardous Materials Safety August, 2018
http://www.faa.gov/Go/PackSafe

High Ease of Use Rating

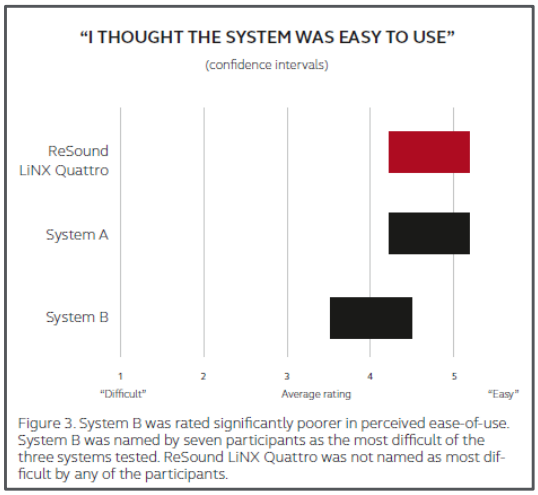


Figure 3. System B was rated significantly poorer in perceived ease-of-use. System B was named by seven participants as the most difficult of the three systems tested. ReSound LiNX Quattro was not named as most difficult by any of the participants.

Kirkwood B, Thyme P, Groth J. 2018

Design goals:

- Usability
- Utility

Internal usability study results:

- 3 rechargeable hearing aid systems
- Participants: 10 adult non-rechargeable hearing aid users
- Rated from 1 (Difficult) to 5 (Easy)
- ReSound LiNX Quattro was perceived as easy to use
  - No participants rated ReSound LiNX Quattro as most difficult to use

Ease of Charging Devices

- Measured on a 0-2 point scale
  - 2: No difficulty; task completed within 30 seconds
  - 1: With difficulty; task completed in 30-120 seconds
  - 0: Fail; task not completed or completed in more than 120 seconds
- ReSound LiNX Quattro & System A were equally easy for patients to place into the charger for charging
  - System B was induction charging
  - Design of the charger, not just charging type, can have an impact on ease of use

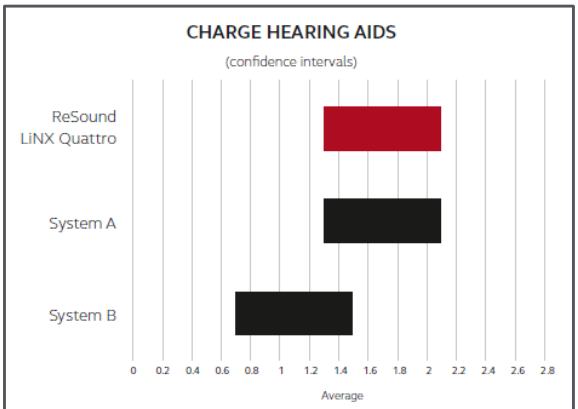


Figure 5. Participants had the most difficulty placing the hearing aids in the charger of system B.

Kirkwood B, Thyme P, Groth J. 2018

Benefits of ReSound Rechargeable Solution

- Easier use for patients with poor dexterity
- Easier use for patients with visual difficulties
- Reduces the environmental footprint
- Provides convenience, portability and freedom to charge anywhere!

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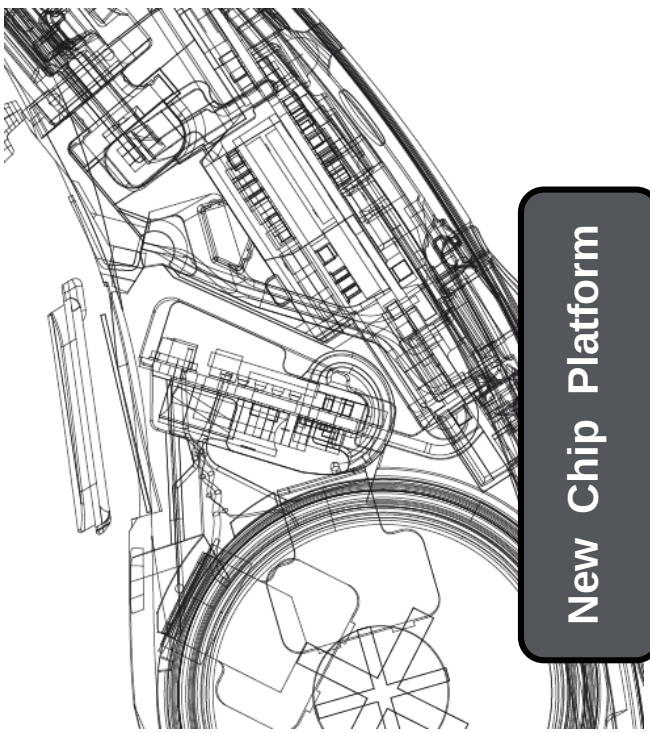

Enables Real Improvements in Audio Capabilities

ReSound GN

New Chip Platform

30%
More Computing Power

100%
Increased Speed

Lowest Battery Drain in the Industry!

20%
Reduced Power Consumption

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ReSound LiNX Quattro

RE62
Standard RIE

RE61
Rechargeable RIE

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ReSound LiNX Quattro

Rechargeable highlights:

- Lithium-ion batteries
  - Fully encased RIE body
  - Long battery life - lowest battery drain in the industry!
- Induction charging
  - No metal contacts
  - Muted while charging – activate automatically
- LED status indicators
- Charger with built-in battery
  - Power on the go

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Rechargeable Solution Battery Life

Full confidence

- Quick charge
- Long-lasting power

CHARGING TIME		BATTERY LIFE
3 hours	=	30 hours 24 hours With 50% of streaming time
1 hour	=	16 hours
30 minutes	=	8 hours
1 minute	=	16 minutes

Rechargeable 61 Push Button and LED

Push button functions

- Change program
- Volume control
- Streaming (initiate & cycle)
- Turn on/off
- Enter flight mode

LED indicators

- Turn on/off
- Enter flight mode
- Put into charger
- Identify hearing aid in fitting software

ReSound LiNX Quattro RE61 Push Button

Activity	Push Button
Turn on	5 second push
Turn off	5 second push
Change program	Programmable as short or long push
Volume up	Programmable as short or long push
Volume down	Programmable as short or long push
Streaming (initiate & cycle)	Programmable as short or long push
Enter flight mode	Turn off (5 second push), wait and Turn on with 9 second push
Exit flight mode	Turn off (5 second push), wait and Turn on (5 second push)

Completely sealed - No battery door

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ReSound LiNX Quattro RE61 LEDs

Activity	LED Pattern
Turn on	Single solid light that fades
Turn off	Three green flashes
Put into charger and charging	Blinks green
In charger and fully charged	Constant green
Identify hearing aid for ReSound Smart Fit	Flash six times
Enter flight mode	Four times double flash

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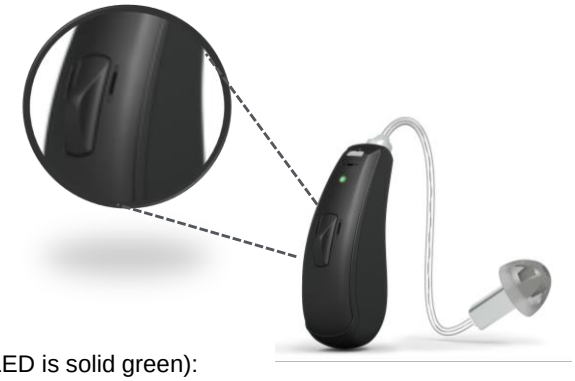
Rechargeable Pairing Process
Smartphone/Accessory

- ReSound LiNX Quattro hearing aids require discovery mode to pair a smartphone (Apple and Android platforms) or ReSound accessories
- RE61 rechargeable does not have a battery door



To enter RE61 discovery mode (LED is solid green):

Option 1

- Turn off hearing aid (5 second press of button) wait for power down
- Turn on hearing aid (5 second press of button)

Option 2

- Place hearing aid in charger for a few moments
- Remove hearing aid from charger

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Confidence in the Finer Details

Charging on the go!

- Simple, easy to use charger
  - Ease of use
  - Visual feedback
- Charges by induction, no contacts
  - Easy to insert
  - No issue with debris
- Charger doubles as a carrying case
  - Integrated rechargeable battery
  - 3 full wireless charges

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Ease of Use
ReSound LiNX Quattro Charger

- Ease of use critical for successful use of rechargeable device

Charger Usability Test Results

- Same methods as charging hearing aid usability testing
- ReSound LiNX Quattro and System B were completed at nearly identical rates
  - System A too more time on average
- Less variability in results for charger set up than in setting hearing aids to charge

ReSound LiNX Quattro best performance on each measure!

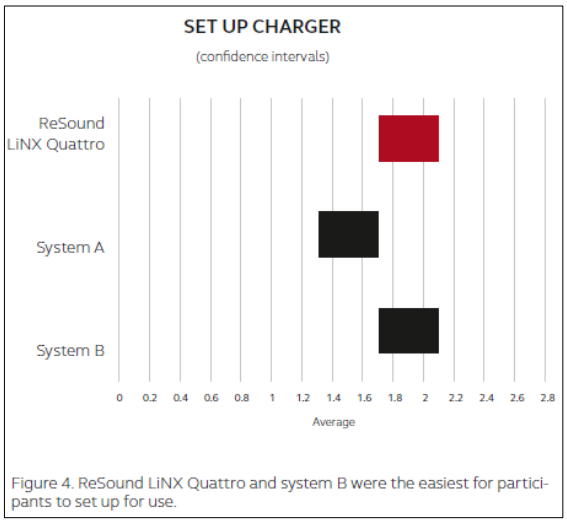

Figure 4. ReSound LiNX Quattro and system B were the easiest for participants to set up for use.

Kirkwood B, Thyme P, Groth J. 2018

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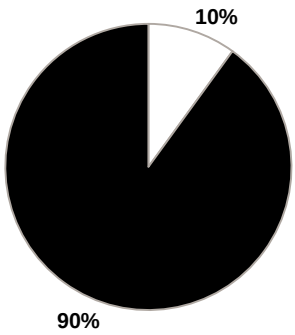
Easy, Intuitive Hearing Aid Charger



Kirkwood B, Thyme P, Groth J. 2018

"Can go two days on one charge and charger can go eight days without being plugged in"

"Charger is an excellent travel case for the aids"

"Love the charging unit"

90%
of users can set up and use the rechargeable system without instructions

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continued

Practical Know-How

Getting the Most Out of the ReSound LiNX Quattro Rechargeable Solution

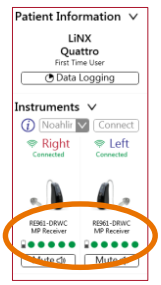
Never Caught Without Charge!

Ways a patient can check battery level:

- Status lights on the charging case
- Devices show charging/charge status
- ReSound Smart 3D app display

For the clinician:

- View battery status in ReSound Smart Fit sidebar



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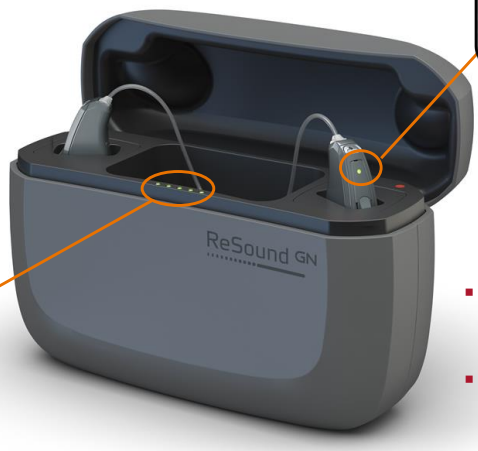
ReSound LiNX Quattro
Inside Charger LEDs

Hearing aid LED blinks when charging

Hearing aid LED solid green when charged



Upon insertion or removal of hearing aids current battery status is indicated for about 10 seconds

- **0 – 20% charged**
- **20 – 40% charged**
- **40 – 60% charged**
- **60 – 80% charged**
- **80 – 100% charged**

- Hearing aids **MUTED** while in the charger
- Automatically turn **ON** when removed from charger
- Indicator LEDs on charger will show lowest charged device of pair

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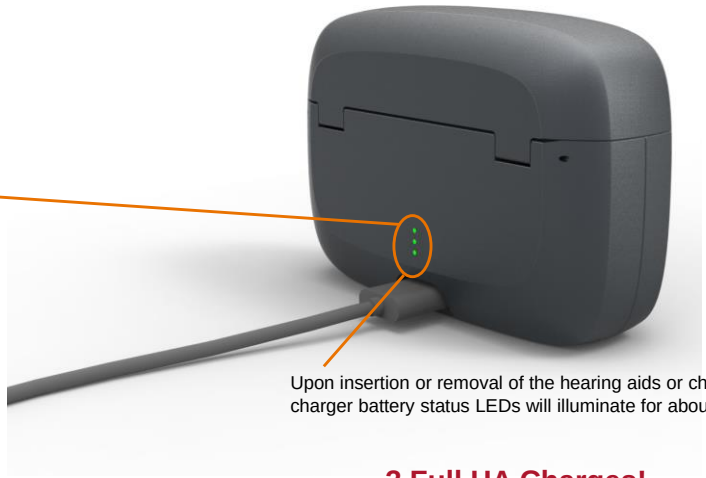
ReSound LiNX Quattro
Charger Integrated Rechargeable Battery LEDs

- **66% - 100% full**
- **33% - 66% full**
- **10% - 33% full**
- **<10% remaining**



Upon insertion or removal of the hearing aids or charger cable, current charger battery status LEDs will illuminate for about 10 seconds

3 Full HA Charges!

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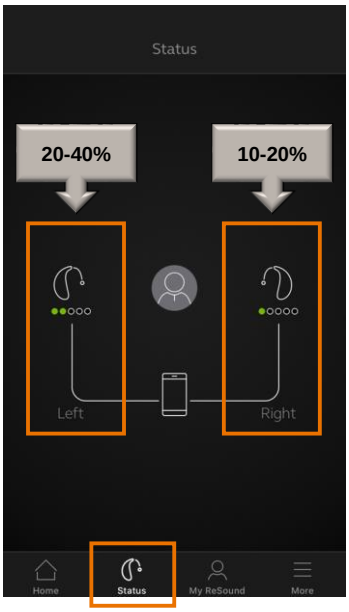
Rechargeable Battery Level in the App

Status screen: battery level display

5 circle indicators consistent across ReSound charger, ReSound Smart 3D app & ReSound Smart Fit

- Battery level display is up to 5 green dots with each dot an increment of 20% charge
- Left device: 20 – 40% charge
- Right device:10 – 20% charge



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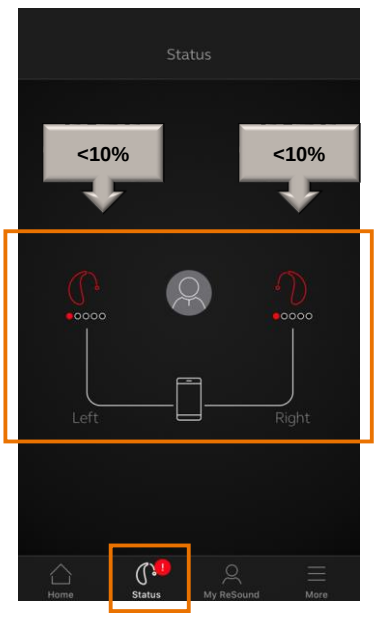
Rechargeable Low Battery

Status screen: red dot display when the hearing aid battery <10% charge

Status bar icon: red dot with exclamation mark

- Charging is recommended!
- <3 hours of charge remains (without streaming)



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Rechargeable Charging

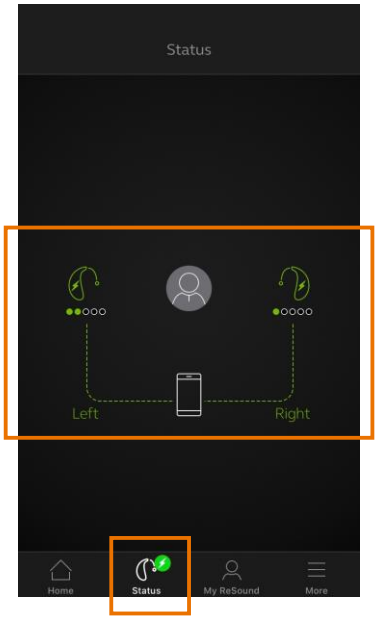
ReSound LiNX Quattro RE61 hearing aids communicate with the ReSound Smart 3D app while charging

ReSound Smart 3D app status screen: green hearing aid with charging symbol

Status bar icon: green dot with charging symbol

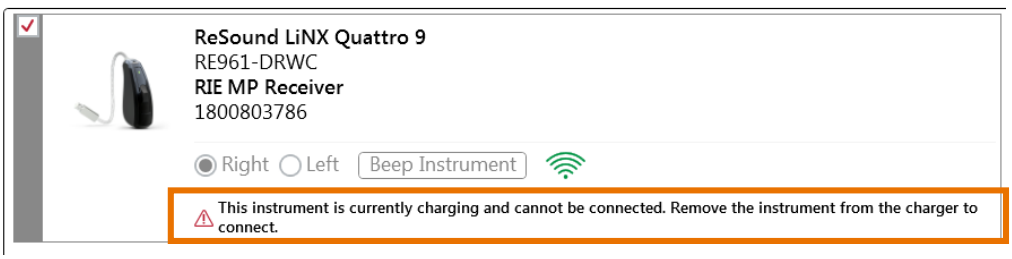
Remove hearing aids from the charger:

- Boot sequence occurs
- ReSound Smart 3D returns to normal non-charging display



Connecting to ReSound Smart Fit

- Wireless connection only via NOAHLink wireless
- **CANNOT** connect with devices in the charger!
- Fitting software provides charging warning message
  - 1 minute of charge = 16 minutes of use
  - 30 minutes of charge = 8 hours of use



Best Practice
ReSound Smart Fit Connection

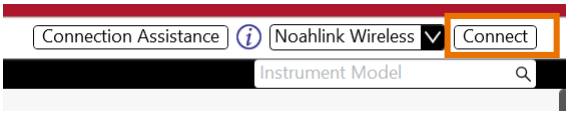
Charger

First - remove hearing aids from charger!

- Listen for delayed activation beeps or wait several seconds
- Connect to hearing aids

No Charger

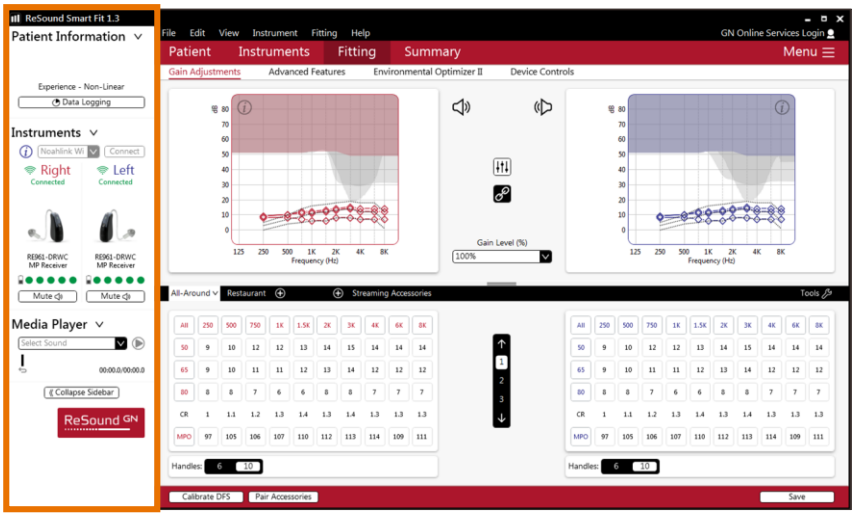
- Turn hearing aid on with 5 second button push
- Listen for delayed activation beeps or wait several seconds
- Connect to hearing aids



Rechargeable Battery Level Display

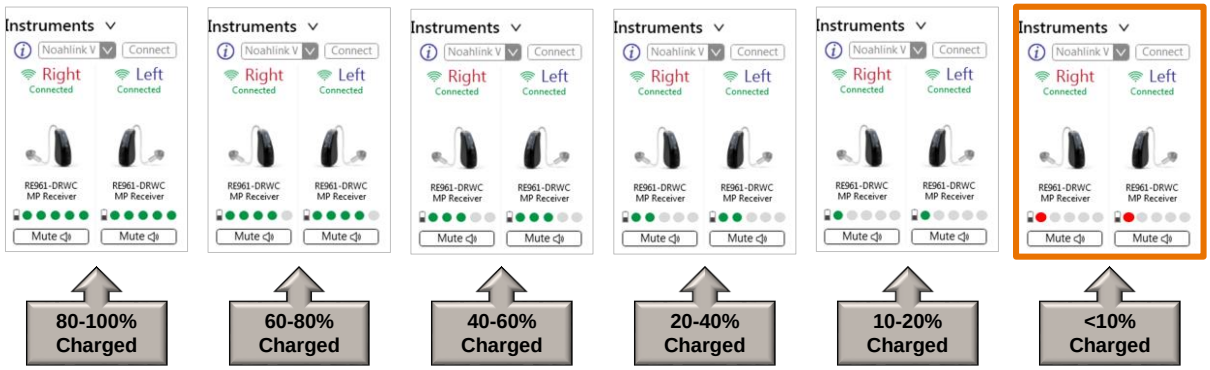
Battery Display Level

5 Circle Indicators



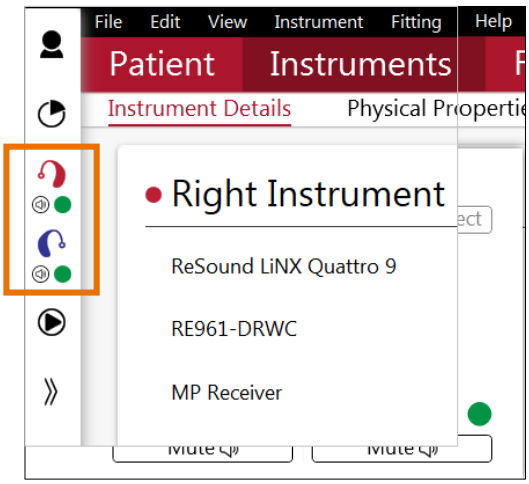
Rechargeable Sidebar Battery Level Display

- Battery level display is up to 5 green dots with each dot an increment of 20% charge
- One red dot indicates <10% charge remaining



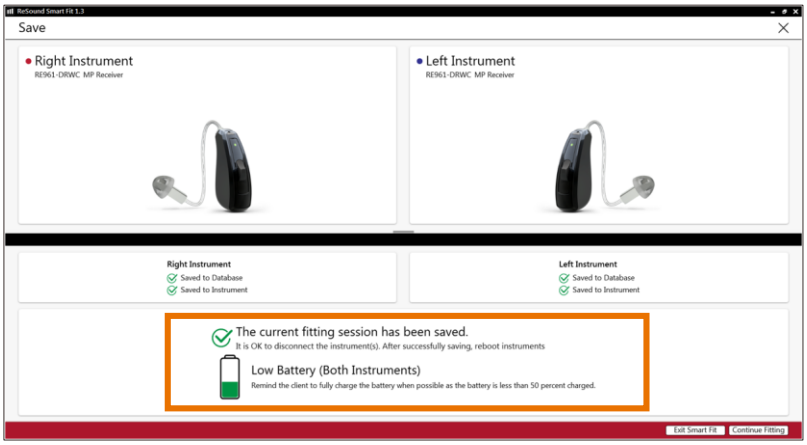
Rechargeable Battery Level Collapsed Sidebar

- Collapsed sidebar only shows hearing aid connection status…unless:
- Click/hover over hearing aid icons to show status pop-out window
- Provides battery charge level & additional hearing aid information



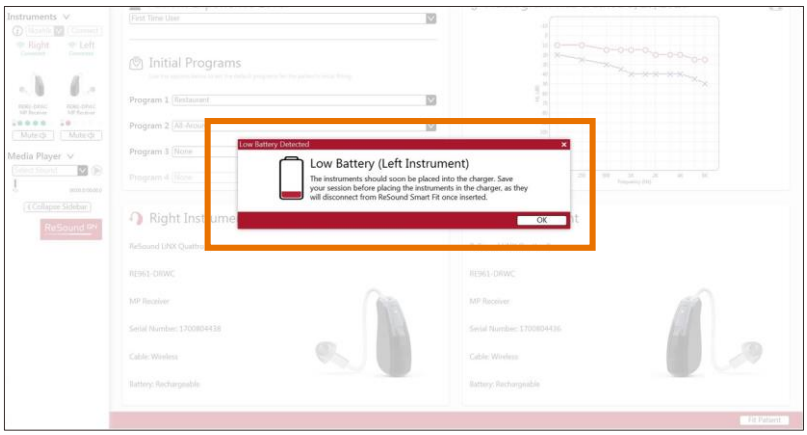
Rechargeable Low Battery Status

- A low battery information appears when saving and batteries are <50% charged
- Reminder for patients to recharge the batteries



Rechargeable Low Battery Warning

- Low battery warning appears as hearing aid gets close to turning off due to low power
- ReSound Smart Fit session should be saved and hearing aids put into charger
- Sudden hearing aid turn off when battery depleted



ReSound LiNX Quattro
Rechargeable Use Case

Reliability and confidence on the go

ReSound GN

ReSound LiNX Quattro Rechargeable Use Case

Patient Profile

- Age: 64
- Gender: Male
- Occupation: Consultant
- Travels routinely for work
- Spends a lot of time on his cell phone
- Listens to podcasts regularly

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ReSound LiNX Quattro Rechargeable Use Case

Audiological Information

- Bilateral, sloping mild-to-moderately severe SNHL
- Previous devices: bilateral ReSound LiNX^2 62 RIE devices
- Enrolled in internal trial
- Fit with ReSound LiNX Quattro RE61 RIE for 2 months
- Devices paired to his iPhone for call streaming, audiobooks

ReSound LiNX Quattro Rechargeable Use Case

- Datalogging daily use: ~ 13 hours
  - Datalogging showed 16% streaming time
- Reports device batteries never dropped below 3-4 LED indicators per daily use
- Attempted to use devices for as long as possible with charger unplugged from the wall
  - Was able to go 8 days without plugging charger into wall

"I wasn't sold on rechargeable devices, but these won me over!"

Quick Tips

- If the hearing aids sit in the unplugged charger for more than 24 hours straight, the charger will turn the hearing aids OFF
  - Power-saving measure
  - Hearing aids will need to be manually turned ON with push button
- Hearing aids can charge in either Left or Right position
  - Receivers must face inward for charge
- Hearing aid LEDs active ONLY in the charger or when detected in fitting software
- Internal battery has 4-year lifespan
  - After 4 years – battery life/capacity only reduces by ~20% (24 hours on a full charge)

ReSound Rechargeable Advantages

- Quick charge
- Long battery life
- Portable, aesthetic charger
- Charger doubles as carrying case
- Charger has an integrated rechargeable battery
- Induction charging
- Hearing instruments completely sealed
- LED indicators on hearing aids
- LED indicators on charger
- Confidence without compromise

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Questions?

ReSound Government Services
1-800-392-9932
gs.resound.com

Thank You

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