



ReSound GN

Portfolio overview

Fall 2018

The ReSound portfolio

We believe in the power of sound to transform people's lives; whatever they are doing, and wherever they may be.

At ReSound, our purpose is to make life sound better, which is why we place people with hearing loss at the heart of everything we do, and have not stopped pioneering innovative new technologies for over 150 years to help them feel more involved, connected and in control, transforming their lives through the power of sound.

These four principles drive our product development – helping us deliver on our promises each and every time:

1. We deliver superior sound with consistent high quality

Our unique sound philosophy takes an intelligent approach to bringing people closer to the sounds they love. Emulating the natural functions of the human ear, ReSound hearing aids give wearers access to the most reliable, vibrant and natural sound possible.

2. Our intuitive solutions adapt to life

We understand that every word has meaning and every sound is precious, and this is why we believe in making intuitive technology that gives people the freedom to engage with the sounds they care about in previously unimaginable ways.

3. We design for individuals

No one is average. There is no standard listening day. So we continuously pioneer innovative new user-focussed technologies that look beautiful in the hand and work beautifully on the ear. We design them to disappear, yet with controls that are reassuringly distinct to touch.

4. Together we are stronger

At ReSound we understand how important it is for you to have a partner you can trust, one that not only has the latest technology, but also a shared commitment to go that extra mile to help people with hearing loss successfully adapt to life with hearing aids. So it's good to know we've been keeping our promise to help make life sound better for over 150 years, enabling you to help your clients hear more, do more and be more than they ever thought possible.

The ReSound portfolio includes unique solutions for your paediatrics, super power, tinnitus, and adult clients. All your clients can have a ReSound hearing aid, built to a consistently high standard and combining top-rated sound quality and intuitive ways to connect to the world.



Helen Ljungdahl Round
Senior VP, Global marketing & business development



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Portfolio overview

	RIE performance	BTE performance	Custom performance	Almost invisible	Super power	Pediatrics	
Premium	LiNX Quattro 9 LiNX Quattro 7 RIE 61 RHA RIE 62 	LiNX 3D 9 RIE 61Z RIE 62 	LiNX 3D 9 BTE 67/77/88 	LiNX 3D 9 CIC MIH-S MIH ITC ITE 	LiNX 3D 9 IIC 	ENZO 3D 9 BTE 88/98 	Up Smart 9 BTE 77/88/98 Up 9 BTE 67
Advanced	LiNX 3D 7 & 5 RIE 61Z RIE 62 	LiNX 3D 7 & 5 BTE 67/77/88 	LiNX 3D 7 & 5 CIC MIH-S MIH ITC ITE 	LiNX 3D 7 & 5 IIC 	ENZO 3D 7 & 5 BTE 88/98 	Up Smart 7 & 5 BTE 77/88/98 Up 7 BTE 67 	
Essential	Enya 4, 3 & 2 RIE 62 	Enya 4, 3 & 2 BTE 67/ 77 / 88 	Enya 4, 3 & 2 CIC ITC ITE 	Magna 4 & 2 BTE 90 			

2.4GHz connectivity

Sound Streaming	Made for Apple Micro Mic Multi Mic Phone Clip+ TV Streamer 2		
Control	Apps ReSound Smart™ 3D ReSound Control™ app ReSound Relief for Tinnitus Management	Wireless accessories Remote Control 2	ReSound Assist

Wireless
 Uses 2.4 GHz technology for crystal clear sound, stereo streaming, no neckworn device, streaming at least 7 meters

Tinnitus
 Comprehensive tinnitus management solution with built-in Tinnitus Sound Generator.

Rechargeable
 Built-in lithium-ion rechargeable solution with sleek and discreet portable charging case.

Z-power
 Rechargeable silver-zinc battery.

Portfolio overview

	RIE performance*	BTE performance*	Custom performance*	Almost invisible	Super power	Pediatrics		
Premium	LiNX Quattro 9, 7 LiNX 3D 9 RIE 61 RHA, RIE 61Z 312, RIE 62 13	LiNX 3D 9 BTE 67 312, BTE 77 13, BTE 88 13	LiNX 3D 9 CIC 10A, MIH-S 10A	LiNX 3D 9 MIH 13/312, ITC 10A/13/312, ITE 13/312	LiNX 3D 9 IIC 10A	ENZO 3D 9 BTE / SP BTE 88 13, BTE / SP BTE 98 675	Up Smart 9 BTE 77 13, BTE 88 13, BTE 98 675	Up 9 BTE 67 312
Advanced	LiNX 3D 7, 5 RIE 61Z 312, RIE 62 13	LiNX 3D 7, 5 BTE 67 312, BTE 77 13, BTE 88 13	LiNX 3D 7, 5 CIC 10A, MIH-S 10A	LiNX 3D 7, 5 MIH 13/312, ITC 10A/13/312, ITE 13/312	LiNX 3D 7, 5 IIC 10A	ENZO 3D 7, 5 BTE / SP BTE 88 13, BTE / SP BTE 98 675	Up Smart 7, 5 BTE 77 13, BTE 88 13, BTE 98 675	Up 7, 5 BTE 67 312
Essential	Enya 4, 3, 2 RIE 62 312	Enya 4, 3, 2 BTE 67 312, BTE 77 13, BTE 88 13	Enya 4, 3, 2 CIC 10A	Enya 4, 3, 2 ITC 312, ITE 13/312		Magna 4, 2 BTE 90 675		

2.4GHz connectivity

Sound Streaming	Made for Apple	Wireless accessories	
		Micro Mic Multi Mic Phone Clip+ TV Streamer 2	
Control	Apps		Wireless accessories
	ReSound Smart™ 3D ReSound Control™ app ReSound Relief for Tinnitus Management		Remote Control 2
			ReSound Assist

Wireless
Uses 2.4 GHz technology for crystal clear sound, stereo streaming, no neckworn device, streaming at least 7 meters

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Z-power
Rechargeable silver-zinc battery.

* Note that the feature set is not identical for all models in a product family.



Hearing Aids

Every time you fit a client, it's an opportunity to build your reputation. So when you recommend a ReSound hearing aid, we understand the trust you've placed in us.

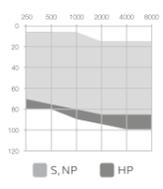
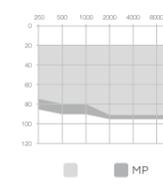
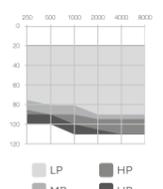
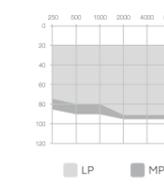
We offer a wide variety of designs crafted for usability, all-day comfort and durability. From conception to production, an incredible amount of detailed thought goes into every aspect of development.

We want your clients to feel proud of owning a ReSound hearing aid. And we want you to feel confident about choosing one.

SUREFIT AND SUREFIT 2



Receiver-in-the-ear

FORM FACTOR	62	62	61	61
Fitting range				
ReSound LiNX Quattro		•		•
ReSound LiNX 3D		•	•	
ReSound Enya	•			
Battery size	312	13	312	Lithium-ion rechargeable
Full-on gain on ear simulator (IEC 118-0)	69	82	82	82
Maximum output on ear simulator	128	137	137	136
Programmable push button			•	•
Multi functioning push button	•	•		
Telecoil	•	• ²		
DAI (direct audio input)	•	•		
Program with	CS44 + Prg.-Adaptor	CS44 + Prg.-Adaptor	CS53 CS63	
Compatibility with wireless accessories	• ¹	•	•	•
Direct audio streaming (Made for iPhone)		•	•	•
ReSound Control App (Phone Clip+ is required)	•	•	•	•
ReSound Smart 3D App ¹		•	•	•
Tinnitus Sound Generator	•	•	•	•

¹ Sound Enhancer features available only for ReSound LiNX 3D 9 and ReSound LiNX Quattro.

² Telecoil only available in ReSound LiNX 3D 62.

SUREFIT

SUREFIT



Behind-the-ear

FORM FACTOR	67	77	88	88	77	67
Fitting range						
ReSound LiNX 3D				•	•	•
ReSound Enya	• ¹	•	•			
Battery size	312	13	13	13	13	312
Full-on gain on ear simulator	64	66	74	74	66	65
Maximum output on ear simulator	132	134	139	140	134	130
Push button	•	•	•	•	•	•
Volume control		•	•	•	•	•
Telecoil	•	•	•	•	•	•
DAI (direct audio input)	•	•	•	•	•	•
Program with	CS44 + Prg.- Adaptor Airlink 2, Noahlink Wireless	CS44 + CS55 flex strip Airlink 2, Noahlink Wireless				
Compatibility with wireless accessories	•	• ³	• ³	•	•	•
Direct audio streaming (Made for iPhone)				•	•	•
ReSound Control App (Phone Clip+ is required)	•	• ²	• ²	•	•	•
ReSound Smart 3D App				•	•	•
Tinnitus Sound Generator				•	•	•

¹ 67 not available in Enya 2

² ReSound Control App not available with Enya 2

³ Enya 2 only compatible with ReSound Remote Control 2



Custom products

FORM FACTOR	MIH-S	MIH	ITE	ITC	CIC	IIC
Fitting range						
ReSound LiNX 3D	•	•	•	•	•	•
ReSound Enya			•	•	•	
POWER LEVELS						
LP	•	•		•	•	•
NP/MP	•	•	•	•	•	
HP	•	•	•	•	•	
UP	•	•	•	•	•	
Battery size	10	312		312	10	10
Full-on gain on ear simulator	79	79	79	79	79	49
Maximum output on ear simulator	137	137	137	137	137	124
Dual microphone			optional	optional		
Push button	optional	optional	optional	optional	optional	
Volume control	optional	optional	optional	optional	optional	
Telecoil		optional	optional	optional		
Program with	CS53	CS53	CS53	CS53	CS53	IIC Prg cable
Program with		Airlink 2, Noahlink Wireless	Airlink 2, Noahlink Wireless	Airlink 2, Noahlink Wireless		
Ear-to-Ear communication		•	• ¹			
Compatibility with wireless accessories		•	• ²	• ²		
Direct audio streaming (Made for iPhone)		•	• ³	• ³		
ReSound Control app (Phone Clip+ is required)		•	•	•		
ReSound Smart 3D app		•	• ⁴	• ⁴		
Tinnitus Sound Generator		•		•	•	•

¹No E2E for Enya 3 and 2

²No wireless compatibility for Enya 2

³No direct audio streaming (MFI) for Enya ITE, any level

⁴No Smart app in Enya ITCs (any level)

SUPER POWER



FORM FACTOR	90	98
Fitting range		
ReSound ENZO 3D		•
ReSound Magna 4	•	
ReSound Up Smart 9		
ReSound Up 9		
Battery size	675	675
Full-on gain on ear simulator (dB)	86	86
Maximum output on ear simulator (dB SPL)	144	145
Push button	•	•
Volume control		•
Analogue programmable volume control	•	
Telecoil	•	•
DAI (direct audio input)	•	•
Program with	Prg.-Adaptor II	CS44 + Prg.-Adaptor Airlink, Airlink 2, Noahlink Wireless
Compatibility with wireless accessories		•
Direct audio streaming (Made for iPhone)		•
ReSound Control App (Phone Clip+ is required)		•
ReSound Smart App		
ReSound Smart 3D App		•
Tinnitus Sound Generator		•

PEDIATRICS



	67	77	88	98
Fitting range				
		•	•	•
	•	•	•	•
Battery size	312	13	13	675
Full-on gain on ear simulator (dB)	64	66	80	86
Maximum output on ear simulator (dB SPL)	132	134	139	145
Push button	•	•	•	•
Volume control		•	•	•
Analogue programmable volume control				
Telecoil	•	•	•	•
DAI (direct audio input)	•	•	•	•
Program with	CS44 + Prg.-Adaptor Airlink, Airlink 2, Noahlink Wireless	CS44 + Prg.-Adaptor Airlink 2, Noahlink Wireless	CS44 + Prg.-Adaptor Airlink 2, Noahlink Wireless	CS44 + Prg.-Adaptor Airlink 2, Noahlink Wireless
Compatibility with wireless accessories	•	•	•	•
Direct audio streaming (Made for iPhone)		•	•	•
ReSound Control App (Phone Clip+ is required)	•	•	•	•
ReSound Smart App		•	•	•
ReSound Smart 3D App				
Tinnitus Sound Generator				

Colors can vary depending on model

		Light Blonde	Medium Blond	Dark Brown	Pearl White	Sterling Grey	Anthracite	Gloss Black	Silver	Black	Beige	Monza Red	Ocean Blue	Gloss Anthracite	Gloss Medium Blonde
ReSound LiNX Quattro	61														
	62														
ReSound LiNX 3D	61														
	62														
	77														
	88														

		Medium Blonde	Dark brown	Sterling Grey	Black	Beige
ReSound Enya						

Colors can vary depending on model

Light Blonde Medium Blonde Dark Brown Pearl White Sterling Grey Anthracite Gloss Black Silver Black Beige Monza Red Ocean Blue Pink Baby Blue

RS ENZO 3D	
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RS Magna 4	
RS Magna 2	

RS Up Smart 77	
RS Up Smart 88	
Up Smart 98	
Up 67	
Up 77	
Up 88	



ReSound LiNX 3D	Faceplate										
	Shell										



ReSound LiNX 3D	Faceplate									
	Shell									



RS Enya	Faceplate	
	Shell	

Charging case

The ReSound LiNX Quattro hearing aid charger is an expertly-designed portable charging case designed for the RIE 61 DRWC.

It provides the user with a complete rechargeable solution, and is sleek and compact for easy transport and discreet use. It charges two hearing aids fully within 3 hours.

It is intuitive, with 5 LED lights that display the battery level of the hearing aids and 3 LED lights on the back that display the power remaining on the charger. The charging case has capacity for 3 full hearing aid charges after a full charge.



Charger



Charging cable



TECHNICAL DATA	
Dimensions	99.4 x 35 x 67.5 mm / 3,9 x 1.4 x 2.7"
Weight	145 g / 5.1 oz
Power Supply	Rechargeable Lithium Ion battery
Power Connector	Micro USB
Power Source	3.7 V, 2200 mAh
Charging time for internal lithium ion battery in Charger	Max 3 hours, depending on initial state of the battery
Battery life (fully charged, not connected to mains power)	Min. 3 full charges of 2 hearing instruments, Without hearing instruments: 12 months
Charging time for Hearing aids	Maximum 3 hours, depending on initial state of the battery
Wireless frequency communication between hearing aid and charger	2.4 GHz
Wireless charging frequency	267 kHz and 333 kHz.
ESD tolerance	According IEC 61000-4-2 Electrostatic discharge immunity test standard
Operating & Charging temperature range	0 to 40 °C / 32 to 104 °F
Storage temperature for charger and Hearing aids	-20 to 45 °C / -4 to 113 °F

External Receivers Surefit 2:

RS LiNX Quattro, RS LiNX 3D, RS Enya 4 & 3



Dome Selections

Domes	 S	 M	 L
	 S	 M	 L
	 Tulip		
Lock	 Sport Lock		

Hooks and Thin Tubes Surefit:

RS LiNX 3D, RS Enya, RS Up Smart



Dome Selections

Domes	 S	 M	 L
	 S	 M	 L
	 Tulip		

Getting it right

We want you to be confident about choosing a ReSound hearing aid. So in addition to best-in-class audiology benefits, our devices should be robust and reliable.

Miniaturization

It's an enormous undertaking to design these tiny computers. We craft sophisticated electronics into a hearing aid roughly the size of an almond. The plastics, circuitry, processing chips, and electronics all need to deliver outstanding performance – and because of the miniature design, there's no room for error.

The human factor

Hearing aids are exposed daily to perspiration, oil, and chemicals from products like perfume and hairspray. And nobody's perfect; we drop them or forget to take them off in the shower. Almost anything can happen to a hearing aid, and we want it to keep on working.

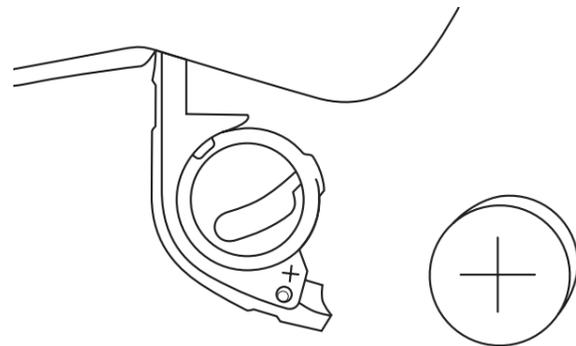
It takes years to develop a hearing aid, and testing is an important part of development to ensure we get it right – and to ensure we keep getting better.

Sourcing components

Our supplying partners certify that each component's specification is met. But when we receive components, we test them again. We need, among other things, uniform materials, the ability to withstand temperature and exposure to chemicals, perfectly finished edges, and no cracks or notches. Here are some of the component tests we perform.

UV Test

Some plastics are particularly sensitive to UV light. They change color or become fragile when exposed to natural light. So we test all plastic materials before they are allowed into our product development.



Wear-and-tear test

We test components that are most prone to wear out in order to evaluate their robustness. For example, the program switches, volume controls and battery doors are pressed, opened and closed thousands of times under controlled conditions.

Protection

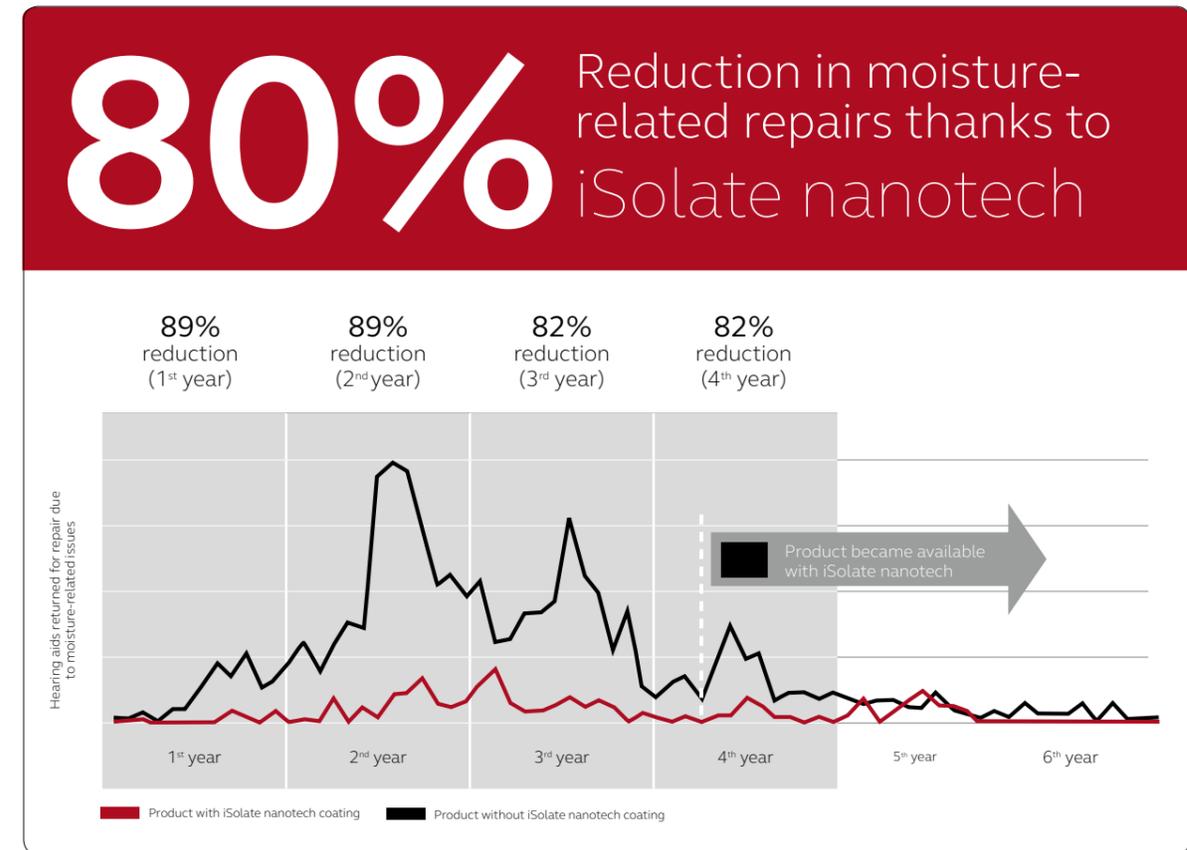
Skin is a human organ that protects us from harm by creating a barrier to the outside world. As it renews, dead cells slough off; skin creates lubricants to protect itself; it grows hairs and it sweats. It's a brilliant mechanism, but it is a hostile environment for hearing aids. So just as we need skin to protect our bodies from harm, hearing aids need a barrier between the electronics and human contact.

We address this with a multi-faceted approach, starting with the construction of the plastics around the device. We also use filters and foam as barriers. Every barrier we construct needs to be carefully tested so it doesn't negatively affect the acoustical performance of the hearing aid.

iSolate nanotech

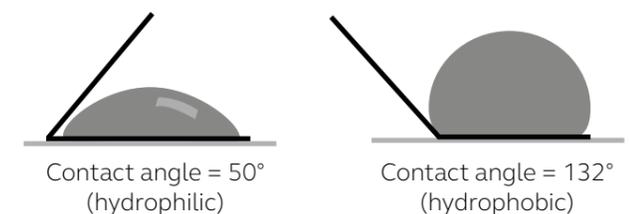
One of the best known barriers in the hearing aid industry is nanocoating. Long used in the clothing industry, nanotech pores are so small that water droplets can't get in, but water vapor – and acoustical transmission – can get out. ReSound uses iSolate™ nanotech. We apply this polymer coating with a

specially developed vacuum process so the coating penetrates into even the smallest openings. The final coating is a thousand times thinner than the diameter of a human hair. We coat outside casings, but even more importantly, we coat every single component inside as well. Every product in the ReSound portfolio – regardless of price class – is iSolate nanotech coated.



Total test size: ca. 10.000 units

A contact angle of 90° or more will create a hydrophobic surface, creating liquid repellency.



Water and dust resistance – IP57/IP58

The IEC60529 IP test system is intended to rate the degree of protection provided by enclosures for electrical equipment under normal conditions of use. The hearing aid industry has adopted this test standard with slight modifications to suggest the robustness of hearing aids to the effects of exposure to dust and water. The industry generally excludes hearing aid batteries from the hearing aids' 'electronic system.' (Zinc-Air batteries rarely survive immersion in water.)

The IPXX test is not a legal requirement nor a certification. It is a one-time test per model of a newly

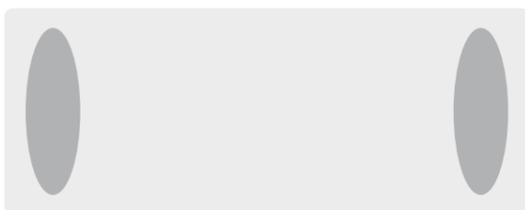
manufactured device. It does not predict how well the hearing aid will perform over time, and is therefore only one of many tests we conduct.

All ReSound BTE and RIE hearing aids except for ReSound LiNX Quattro 61, are classified IP57 to indicate they are water resistant and dust tight. ReSound LiNX Quattro 61 is classified IP58.

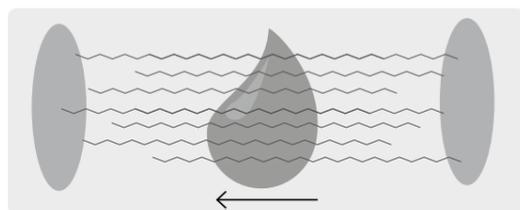
Environmental test

Hearing aids perform in harsh, corrosive environments, so they need to be rugged. During development, we stress test them to identify potential weaknesses in the electrical circuitry design. We typically run a several-week sequence

exposing the hearing aids to things like salt water mist, humidity and temperature. Then we examine them for corrosion, migration, delimitation and other results negatively affecting performance.



Two solder points on a circuit board



Under a drop of salt water (like sweat), unprotected metals can migrate from one solder point to another. This would result in short circuiting and battery drain.

With iSolate nanotech coating. A stress test to see how corrosion can develop over time



Without iSolate nanotech coating



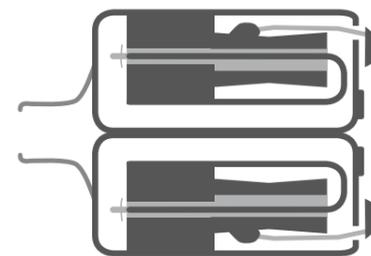
Assembly

No matter how careful we are with components, entirely new issues can surface during assembly. One component can affect another adversely. The pressure, torque, tolerances, electromagnetic compatibility and many other things can produce unexpected results.

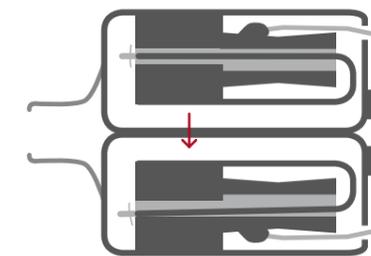
Drop and impact test

Some components in hearing aids, such as the receiver, are sensitive to physical shock. So shock absorbing suspensions are critical. We'd like ReSound hearing aids to surpass people's expectations for robustness. So we drop them on hard surfaces. We hit them under controlled conditions from many angles, testing the electro acoustic performance before and

after. We use high-speed video to examine the effects of impact. We model the impact of the hearing aid on a hard surface after a free fall and optimize the design of suspensions, controlling the g-force to make sure the receiver isn't damaged. And we put hearing aids in a tumbler so they randomly hit the surface at angles impossible to duplicate in a controlled environment.



Good receiver with no bending of the armatures



Bendt armature due to high impact

Wax filter test

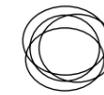
Earwax and human oils are natural substances, but they are problematic for electronic devices. So at ReSound, designing wax filters is serious business.

A good wax filter means that only the filter needs to be changed periodically, rather than an entire component. So we test them thoroughly.

Artificial earwax test

ReSound R&D has developed a unique compound replicating the properties of earwax. We use this

to better understand how earwax and human oils penetrate and affect hearing aids.



Audiology

Like you, we place people with hearing loss at the heart of everything we do. Together we can create a world where more people with hearing loss successfully adapt to a life with hearing aids – one that makes them feel more involved, connected and in control. ReSound empowers people to hear more, do more and be more than they ever thought possible.

Inspired by nature, we look for ways to emulate the way the normal ear works. Because hearing is a process that occurs in the brain, we strive to provide sound that leverages this process. As a result, your clients get a full, rich hearing experience like no other.

The unique way that ReSound uses directional technology to ensure benefits in real life situations is a good example of this strategy. Binaural Directionality III ensures that the brain has the right information to take advantage of an improved signal-to-noise ratio without cutting off access to surrounding sounds. This means that users can focus on the sounds they want to hear, but still monitor their environment. The latest innovations provide an even more vivid sense of space and speech.

PREMIUM & ADVANCED

		9	7	9	7	5	
		More on Page	RS LiNX Quattro 9	RS LiNX Quattro 7	RS LiNX3D 9	RS LiNX3D 7	RS LiNX3D 5
FUNCTIONAL FEATURES	Programs		4	4	4	4	4
	Ear-to-Ear communication		•	•	•	•	•
	Made for iPhone		•	•	•	•	•
	Wireless	65	•	•	•	•	•
	PhoneNow	53	•	•	•	•	•
	Comfort Phone	53	•	•	•	•	•
	Protection	28	iSolate nanotech	iSolate nanotech	iSolate nanotech	iSolate nanotech	iSolate nanotech
AUDIOLOGICAL FEATURES	WARP bands	40	17	17	17	17	9
	Environmental Classifier	41	•	•	•	•	•
	Environment recognition	42	Binaural Environmental Optimizer II				
			Environmental Optimizer II	Environmental Optimizer II	Environmental Optimizer II	Environmental Optimizer II	
	Noise reduction	45	Personalized noise reduction	Personalized noise reduction	Personalized noise reduction	Personalized noise reduction	
			Noise Tracker II	Noise Tracker II	Noise Tracker II	Noise Tracker II	Noise Tracker II
			4 ••••	4 ••••	4 ••••	4 ••••	2 ••••
	Wind noise reduction	47	Wind Guard	Wind Guard	Wind Guard	Wind Guard	Wind Guard
	Expansion	46	•	•	•	•	•
	Impulse Noise Reduction	44	•	•			
	Directionality	54	Binaural Directionality III	Binaural Directionality	Binaural Directionality III	Binaural Directionality	
			Spatial Sense		Spatial Sense		
			Natural Directionality II	Natural Directionality II	Natural Directionality II	Natural Directionality II	Natural Directionality II
			Autoscope	Autoscope	Autoscope	Autoscope	
Multiscope			Multiscope	Multiscope	Multiscope	Adaptive directionality	
Fixed			Fixed	Fixed	Fixed	Fixed	
Synchronized Soft Switching			Synchronized Soft Switching	Synchronized Soft Switching	Synchronized Soft Switching	Soft Switching	
Adjustable Directional mix	Adjustable Directional mix	Adjustable Directional mix	Adjustable Directional mix				
Multiple amplification strategies	52						
Adjustable time constants		•	•	•	•		
Feedback management	Type	50	DFS Ultra II	DFS Ultra II	DFS Ultra II	DFS Ultra II	DFS Ultra II
	Level		3 •••	3 •••	3 •••	3 •••	3 •••
	Music Mode		•	•	•	•	•
	Auto DFS		•	•	•	•	•
Acceptance Manager		•	•	•	•	•	
Tinnitus Sound Generator	82	•	•	•	•	•	
Sound Shaper	48	•	•	•	•	•	
FITTING FEATURES	ReSound Assist	78	•	•	•	•	•
	Gain handles	40	17	17	17	17	12
	Data Logging		Onboard Analyzer II	Onboard Analyzer II	Onboard Analyzer II	Onboard Analyzer II	Onboard Analyzer II
	In Situ Audiometry		•	•	•	•	•

		ESSENTIAL			
		4	3	2	
FUNCTIONAL FEATURES	More on Page	Enya 4	Enya 3	Enya 2	
	Programs	4 + 3 wireless programs	4 + 3 wireless programs	4	
	Ear-to-Ear communication	•			
	Made for iPhone				
	Wireless	65	•	•	
	PhoneNow	53	•	•	
	Comfort Phone	53			
	Protection	28	iSolate nanotech	iSolate nanotech	iSolate nanotech
	WARP bands	40	10	8	6
	Environmental Classifier	41			
Environment recognition	42				
Noise reduction	45	Noise Tracker II	Noise Tracker II	Noise Tracker II	
		1••••	1••••	1••••	
Wind noise reduction	47	Wind Guard	Wind Guard		
Expansion	46	•	•	•	
DIRECTIONALITY	54				
		Adaptive directionality	Adaptive directionality	Adaptive directionality	
		Fixed	Fixed	Fixed	
		Soft Switching	Soft Switching		
Multiple amplification strategies	52				
Adjustable time constants					
Feedback management	Type	50	DFS Ultra	DFS Ultra	DFS Ultra
	Level		1••••	1••••	1••••
	Music Mode				
	Auto DFS		•	•	•
Acceptance Manager					
Tinnitus Sound Generator	82	•	•	•	
Sound Shaper	48				
FITTING FEATURES	ReSound Assist	78			
	Gain handles	40	10	8	6
	Data Logging		Onboard Analyzer II	Onboard Analyzer II	Onboard Analyzer II
	In Situ Audiometry		•	•	•

SUPER POWER		
9	7	5
ENZO 3D 9	ENZO 3D 7	ENZO 3D 5
4	4	4
•	•	•
•	•	•
iSolate nanotech	iSolate nanotech	iSolate nanotech
17	14	12
•	•	•
Binaural Environmental Optimizer II	Environmental Optimizer	Binaural Environmental Optimizer II
Personalized noise reduction		
Noise Tracker II	Noise Tracker II	Noise Tracker II
4••••	3••••	2••••
Wind Guard	Wind Guard	Wind Guard
•	•	•
Binaural Directionality III with Spatial Sense		
	Binaural directionality	
Natural directionality II	Natural directionality II	Natural directionality II
Autoscope		
	Multiscope	Adaptive directionality
Fixed	Fixed	Fixed
Synchronized Soft Switching	Synchronized Soft Switching	Soft Switching
Adjustable Directional mix		
•	•	•
	•	•
DFS Ultra II	DFS Ultra II	DFS Ultra II
3•••	3•••	3•••
•	•	•
•	•	•
•	•	•
•	•	•
17	14	12
Onboard Analyzer II	Onboard Analyzer II	Onboard Analyzer II
•	•	•



		SUPER POWER		
FUNCTIONAL FEATURES		More on page	4 Magna 4	2 Magna 2
	Programs		5	4
	Ear-to-Ear communication			
	Made for iPhone			
	Wireless	65		
	PhoneNow	53	•	•
	Comfort Phone	53		
	Protection	28	iSolate nanotech	iSolate nanotech
AUDIOLOGICAL FEATURES	WARP bands	40	9	6
	Environmental Classifier	41		
	Environment recognition	42		
	Noise reduction	45	Noise Tracker II	Noise Tracker II
			2 ••••	1 ••••
	Wind noise reduction	47		
	Expansion	46	•	•
	Directionality	54	Adaptive directionality	
			Fixed	Fixed
			Soft Switching	
	Multiple amplification strategies	52	•	•
Feedback management	Type	50	DFS Ultra	Dual Stabilizer II DFS
	Level		3 •••	3 •••
	Music Mode			
	Auto DFS			
Synchronized acceptance manager				
Sound Shaper	48	•		
FITTING FEATURES	ReSound Assist	78		
	Gain Handles	40	6	4
	Data Logging		Onboard Analyzer II	Onboard Analyzer II
	In Situ Audiometry		•	•

PAEDIATRICS		
9	7	5
Up Smart 9	Up Smart 7	Up Smart 5
9	9	4 flexible programs + 3 wireless programs
•	•	•
•	•	•
•	•	•
•	•	•
•	•	•
iSolate nanotech	iSolate nanotech	iSolate nanotech
17	17	9
•	•	•
Binaural Environmental Optimizer II		
Environmental Optimizer II	Environmental Optimizer	
Personalized noise reduction		
Noise Tracker II	Noise Tracker II	Noise Tracker II
4 ••••	3 ••••	3 ••••
Wind Guard	Wind Guard	Wind Guard
•	•	•
Binaural directionality		
Natural directionality II	Natural directionality II	
Autoscope		
Multiscope	Multiscopee	Adaptive directionality
Fixed	Fixed	Fixed
Synchronized Soft Switching	Synchronized Soft Switching	Soft Switching
Adjustable Directional mix		
•	•	•
DFS Ultra II	DFS Ultra II	DFS Ultra II
3 •••	3 •••	3 •••
•	•	•
•	•	•
•	•	•
•	•	•
9	9	9
Onboard Analyzer II	Onboard Analyzer II	Onboard Analyzer II
•	•	•

PAEDIATRICS	
9	7
Up 9	Up 7
4	3
•	•
•	•
•	•
•	•
•	•
iSolate nanotech	iSolate nanotech
17	17
•	•
NoiseTracker II	NoiseTracker II
4 ••••	3 ••••
Wind Guard	Wind Guard
•	•
Binaural directionality	
Natural directionality II	Natural directionality II
Autoscope	
Multiscopee	Multiscopee
Fixed	Fixed
Synchronized Soft Switching	Synchronized Soft Switching
Adjustable Directional mix	
DFS Ultra II	DFS Ultra II
3 •••	3 •••
•	•
•	•
9	7
Onboard Analyzer II	Onboard Analyzer II
•	•



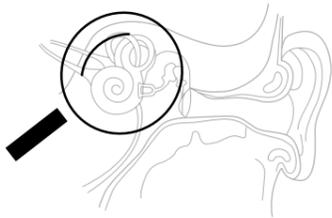
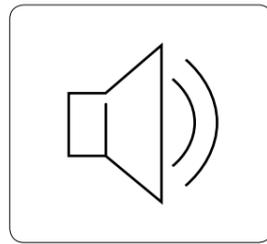
Warp Processing™

Role

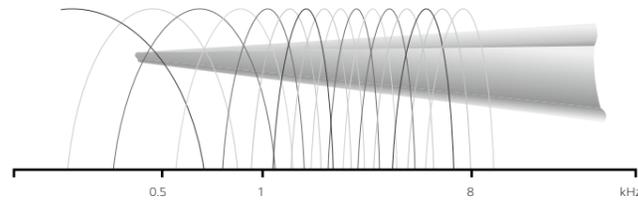
Replicates the way the natural ear divides sound into distinct pitches

End user benefit

Near-zero distortion and remarkable purity of sound.



ReSound devices analyze sound with similar resolution to the human cochlea does.



If one could unroll the cochlea (above left), the area which responds to high frequencies would be on the right and low frequencies on the left. The best way to model the cochlea in digital hearing aid processing is with our Warp™ processor. The frequencies of incoming sounds are mapped to a nonlinear scale similarly to the healthy cochlea.

Gain Handles

Gain handles allow the fitter to shape the frequency response and change the compression ratios at discrete frequencies. Hearing aids offer between 5 -17 gain handles, depending on the model.

RESOUND MODEL	MAXIMUM FREQUENCY HANDLES
LiNX Quattro 9 / LiNX Quattro 7 / LiNX 3D 9 / LiNX 3D 7 / Up Smart 9, Up Smart 7 / Up 9, Up 7	17
Enya 4	10
Magna 4 / Up Smart 5	9
Magna 2	6
Enya 4, Enya 3	4
Enya 2	3

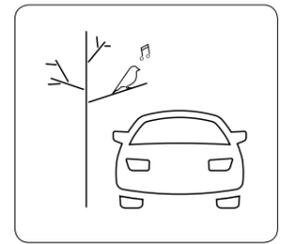
Environmental Classifier

Role

Analyzes the incoming sounds and classifies them into listening environments

End user benefit

Sets the foundation for a comfortable hearing experience



Hearing instruments have complex sound processing that adapts to the listening environment. One way they do this is by recognizing characteristics of incoming sound and categorizing them in a meaningful and accurate way.

Environmental Classifier employs sophisticated speech and noise detection algorithms based on frequency content and spectral balance, as well as the temporal

properties of the incoming sound. Furthermore, the classification is calculated on the basis of probabilistic models, resulting in classification of listening environments which has shown a high degree of consistency with listener perception. Automatic control of feature settings based on the acoustic environment is transparent and natural-sounding. The user benefits without noticing changes in the sound processing.

THE SEVEN ENVIRONMENTS IN ENVIRONMENTAL CLASSIFIER						
Quiet	Soft Speech	Loud Speech	Speech in moderate noise	Speech in loud noise	Moderate noise	Loud noise
< 54 dB	< 60 dB	> 60 dB	< 75 dB	> 75 dB	< 75 dB	> 75 dB

i Time used to determine an environment: 4 seconds or less

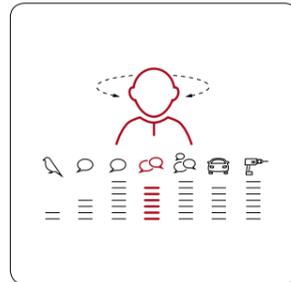
Environmental Optimizer

Role

Provide automatic adjustment of hearing instrument settings

End user benefit

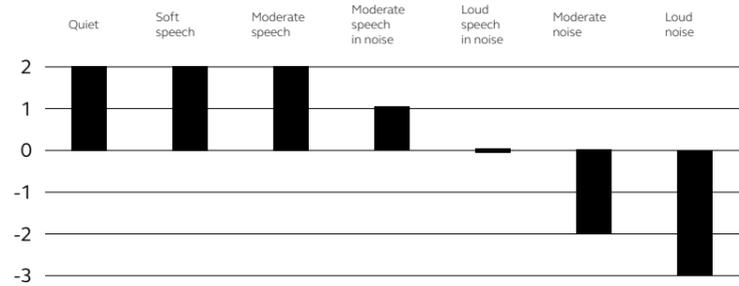
Users enjoy optimal audibility and listening comfort even when moving through rapidly changing sound environments, and without needing to make frequent manual adjustments.



It is well-known that hearing aid users often have varying preferences for hearing aid volume depending on the listening environment. Therefore, when the Environmental Classifier identifies an environment, the Environmental

Optimizer automatically adjusts the volume, which saves the user the trouble of frequent manual adjustments of volume control or program change.

Automatic volume adjustment when Environmental Optimizer is enabled



Default values for severe hearing losses vary slightly



Time to determine need to change environment: 4 seconds.

Duration of transition: 1 dB per second

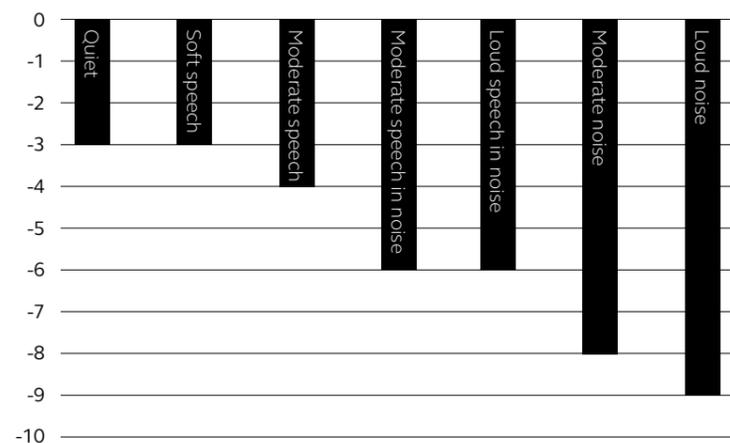


Frequency of data exchange between the instruments: every 222 milliseconds

Environmental Optimizer II

In addition to volume per environment, Environmental Optimizer II has individually tailored adaptive noise reduction (NoiseTracker™ II) assigned to each environment. It is an extraordinary solution for hearing aid users because both the need to adapt to multiple listening environments and comfort in noise are balanced.

Default NoiseTracker II reduction when Environmental Optimizer II is enabled



Binaural Environmental Optimizer II

Allows the two instruments to wirelessly exchange data about the environment in order to ensure that they work in cooperation when identifying environments.

ENVIRONMENTAL OPTIMIZER OVERVIEW	
VERSION	DESCRIPTION
Environmental Optimizer	Gain per environment
Environmental Optimizer II	Gain and noise reduction per environment
Binaural Environmental Optimizer II	Gain and noise per environment with synchronization between right/left

RESOUND MODEL	CHOICE
LiNX Quattro 9 / LiNX Quattro 7 / LiNX 3D 9 / LiNX 3D 7 / ENZO 3D 9 / Up Smart 9 / Up 9	Binaural Environmental Optimizer II Environmental Optimizer II
ENZO 3D 7 / Up Smart 7 / Up 7	Environmental Optimizer
Enya 4, Enya 3, Enya 2 / Magna 4, Magna 2 / Up Smart 5	Not available

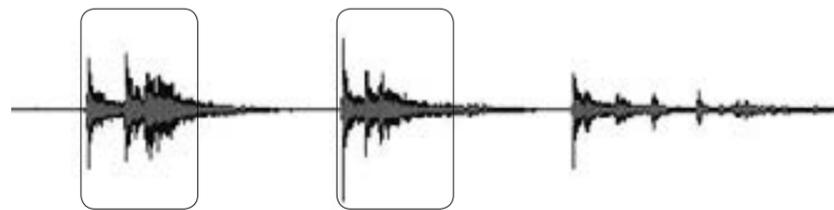
Impulse Noise Reduction

Role

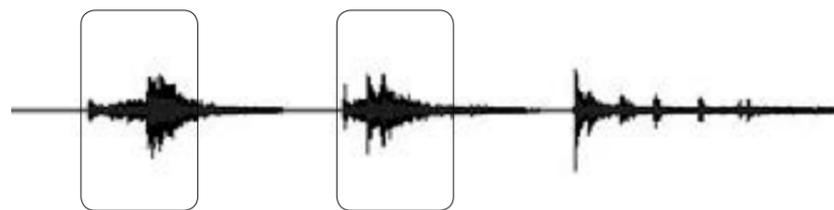
Reduces amplification for sudden, brief noises.

End user benefit

Improves listening comfort and sound quality for impulse sounds like clanking silverware or jangling keys



Without Impulse noise reduction



With impulse noise reduction

Impulse noise reduction works in parallel with the Warp compression system to ensure that transient sounds are not overamplified. Soft transient speech sounds are preserved. In this example, the sound of plates being stacked was recorded through a ReSound

LiNX Quattro hearing aid with (bottom panel) and without (top panel) impulse noise reduction active. The boxes show how peaks where overshoot occurs are reduced with impulse noise reduction.

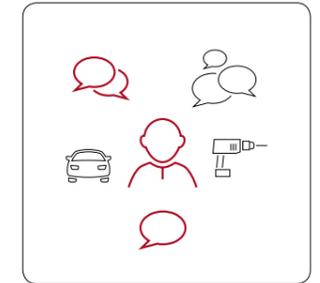
NoiseTracker II

Role

Reduces disturbing background sound without affecting speech audibility

End user benefit

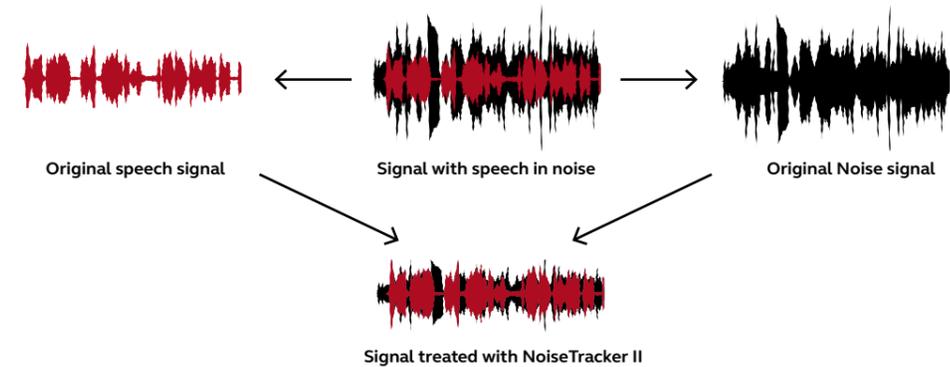
Improves listening comfort without compromising speech understanding



NoiseTracker™ II reduces noise by spectral subtraction. It analyzes the incoming sound and recognizes when speech is present within the individual bands. A spectral analysis is continuously carried out whenever speech is not present. This allows the noise spectrum to effectively be “subtracted” from the total signal without affecting speech.

For devices with a situation-dependent noise reduction, the setting can be different for each of the 7 environments recognized by the Environment Classifier. To ensure a seamless, natural listening experience, an infinite number of actual settings are applied based on a weighted analysis of the Environmental Classifier data.

The amount of noise subtracted is dependent on the setting, and is weighted according to a speech importance function.



RESOUND MODEL	CHOICE
LiNX Quattro 9 / LiNX Quattro 7 / LiNX 3D 9 / LiNX 3D 7 / LiNX 3D 5 / ENZO 3D / Up Smart 9	Mild Moderate Considerable Strong Per Environment
ENZO ² 7 / ENZO 3D 7 / Up Smart 7 / Up 7	Mild Moderate Considerable
ENZO 3D 5 / Up Smart 5 / Magna 4	Mild Moderate
Enya 4, Enya 3, Enya 2 / Magna 2	On/off
On = Mild	

NOISE TRACKER II SPECIFICATIONS	
SETTING	REDUCTION
Mild	-3 dB
Moderate	-6 dB
Considerable	-8 dB
Strong	-10 dB

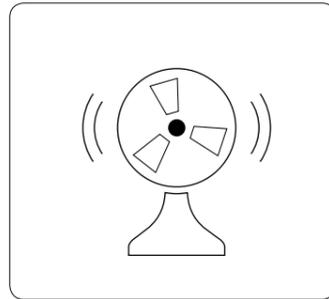
Expansion

Role

Reduces amplification for very soft sounds which are not of interest to the wearer, such as very low level environmental sounds or noise generated internally by the hearing instrument.

End user benefit

Users, especially those with mild hearing loss, will be undisturbed by the noise of the hearing aid. The hearing instrument itself sounds quiet.



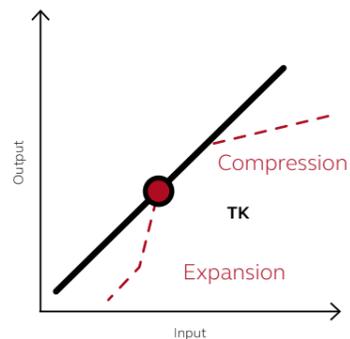
Our modern world is filled with many soft sounds that people with unimpaired hearing naturally filter out, for example the humming of a refrigerator or of a computer fan. Expansion reduces amplification of very soft sounds so that soft background noises and noise from the

microphones are not distracting, providing the best backdrop for pleasurable listening and moving through rapidly changing sound environments without needing to make frequent manual adjustments.

EXPANSION SPECIFICATIONS		
Setting	Maximum reduction	Threshold kneepoint (TK)
Low	3 (dB)	26 dB < TK < 38 dB TK ≈ 32 dB
Medium	6 (dB)	29 dB < TK < 41 dB TK ≈ 35 dB
High	9 (dB)	29 dB < TK < 41 dB TK ≈ 38 dB

RESOUND MODEL	CHOICE
LiNX Quattro 9 / LiNX Quattro 7 / LiNX 3D 9 / LiNX 3D 7 / LiNX 3D 5 / ENZO 3D 9 / Up Smart 9	Mild Medium Strong
ENZO 3D 7 / Up Smart 7 / Up 7	Mild Medium
Enya 4, Enya 3, Enya 2 / ENZO 3D 5 / Magna 4, Magna 2 / Up Smart 5	Active*
*Active = Mild	

The exact value of the kneepoint varies by model, as it is dependent on the components used in the device. It varies also from one frequency band to another



i Expansion ratio: 2:1
Attack time: 50 ms
Release time: 250 ms

Wind Guard

Role

To accurately detect wind noise, and adaptively reduce it.

End user benefit

A natural sounding experience, with soft wind awareness in the background and minimal impact on audibility of other sounds in the environment.



Wind Guard is an advanced wind noise suppression system which

- 1 Constantly monitors and stores the gain levels of each of the Warp bands.
- 2 Uses dual microphones to recognize the presence of wind; turbulence caused by wind is uniquely identifiable because it is uncorrelated at the two microphones.
- 3 Adaptively reduces gain to the same level as before wind was detected.

This sophisticated algorithm varies with the environment and the level of the wind noise, making the reduction personalized to the situation without sacrificing audibility for other sounds.

THE THREE STATES OF WIND GUARD		
OFF - no wind noise detected; environmental sound levels monitored	OFF - soft wind noise detected; environmental sound levels stored	ON - moderate to loud wind noise detected; gain reduced to stored environmental levels

WIND GUARD SPECIFICATIONS	
Setting	Definition
Mild	Fc* + 6 dB
Moderate	Fc + 3 dB
Strong	Fc + 0 dB

*Fc = Full compensation to the average level of the sound environment (wind noise level)

RESOUND MODEL	CHOICE
LiNX Quattro 9 / LiNX 3D 9 / LiNX 3D 5 / ENZO 3D 9 / ENZO 9 / Up Smart 9 / Up 9	Mild Moderate Strong
LiNX Quattro 7 / LiNX 3D 7 / ENZO 3D 7 / Up Smart 7 / Up 7	Mild Moderate
Up Smart 5 / Enya 4, Enya 3 / Magna 4	On/Off
*On = Mild	Note: Wind Guard is only available for hearing instruments with 2 microphones.

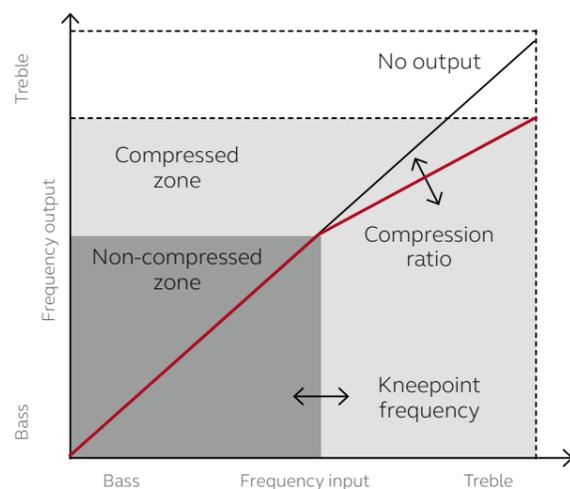
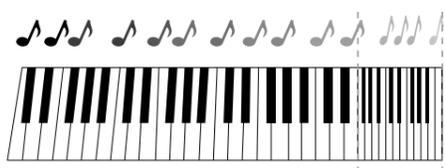
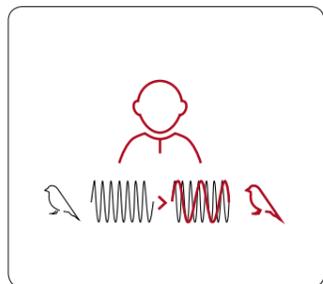
Sound Shaper

Role

Allows audibility improvement for high-frequency sounds by compressing them in a frequency zone where they can be heard.

End user benefit

Improves audibility of speech cues that would otherwise be lost while maintaining best possible sound quality



SOUND SHAPER SPECIFICATIONS

Setting	Kneepoint frequency	Compression ratio
Mild	4000 Hz	1,33
Moderate	3500 Hz	2
Strong	2500 Hz	2

RESOUND MODEL

CHOICE

LiNX Quattro 9, LiNX Quattro 7 / LiNX 3D 9 / LiNX 3D 7 / LiNX 3D 5 / ENZO 3D 9, ENZO 3D 7, ENZO 3D 5 / Magna 4 / Up Smart 9, Up Smart 7, Up Smart 5	Off Mild Moderate Strong
---	-----------------------------------

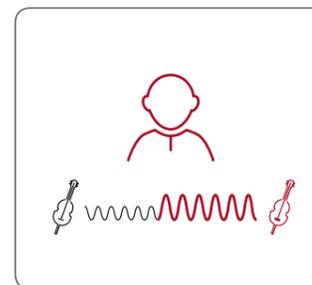
Low Frequency Boost

Role

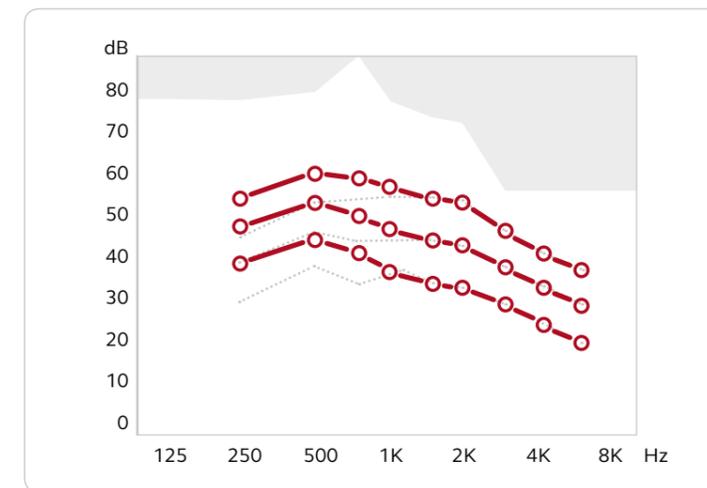
Optimizes loudness for experienced end-users with severe and profound hearing losses.

End user benefit

The hearing instrument provides the preferred sound quality.



End-users with severe and profound hearing losses often prefer more low frequency gain than typically prescribed. This helps meet sound quality preferences without increasing risk of feedback. Low Frequency Boost gives the fitter a quick and easy way to adjust the low frequency gains with three settings



LOW FREQUENCY BOOST SPECIFICATIONS

	250 Hz	500 Hz	750 Hz	1000 Hz
Mild	3 dB	6 dB	3 dB	1 dB
Moderate	6 dB	9 dB	5 dB	2 dB
Strong	9 dB	12 dB	8 dB	3 dB

RESOUND MODEL

CHOICE

LiNX Quattro 9 / LiNX 3D 9 / ENZO 3D 9	Mild Moderate Strong
LiNX Quattro 7 / LiNX 3D 7 / ENZO 3D 7	Mild Moderate
LiNX 3D 5 / ENZO 3D 5	On**

* For UP receiver and PBTE models ** On = Mild

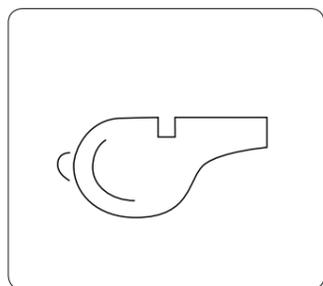
DFS™ digital feedback suppression

Role

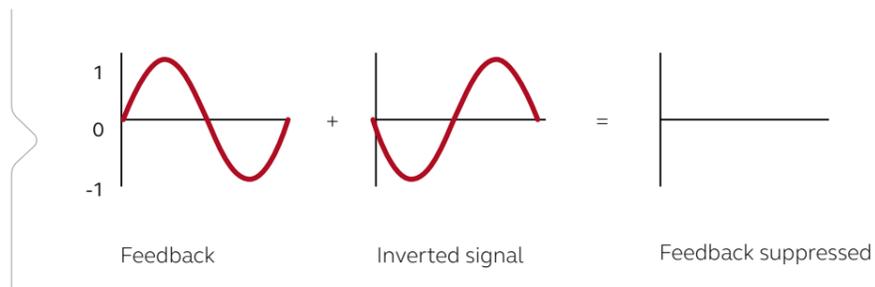
Reduces feedback while preserving amplification without compromising sound quality

End user benefit

User is not bothered by feedback or by sudden reduction of volume, which some other hearing aids do to prevent feedback.



When feedback is detected, a phase-inverted signal is applied, which cancels out the whistling. ReSound's DFS applies two individual control systems that work together to provide maximum comfort with feedback-free hearing



Static control

The system analyzes the calibration signal during fitting and neutralizes feedback with a static control signal. This accounts for the unchanging contributors to feedback such as venting, ear geometry, and hearing aid components.



Dynamic control

The dynamic control system includes two parts. One is a dynamic filter that changes to eliminate feedback via phase cancellation when wearing the hearing aids. In extreme situations where the feedback cancellation may be overwhelmed, dynamic gain restoration layers on top to ensure comfortable listening.

Dual Stabilizer II DFS with Whistle Control

Feedback suppression system follows the same principle as the DFS Ultra, but with simpler algorithms.

Whistle Control

As part of the dynamic control system, Whistle Control is used only in extreme cases, when DFS alone cannot cancel feedback completely. In such cases, it lowers the gain to the prescribed level of frequencies affected by feedback until feedback is eliminated.

Auto DFS

This DFS option learns the feedback path of the individual to efficiently cancel feedback. Whistle Control is not built in to Auto DFS.

Music Mode

Music is typically difficult for feedback cancellation systems to process, as it is difficult to distinguish true feedback from other tonal input sounds. Music Mode uses the same processing as DFS Ultra II, but slows down feedback cancellation to ensure that tonal sounds are not adversely affected. Rich sound quality for music is preserved.

DFS OVERVIEW				
SETTING	AUTO DFS	ADVANCED DETECTION ALGORITHM	WHISTLE CONTROL	MUSIC MODE
DFS Ultra™ II	•	•	•	•
DFS Ultra™		•	•	
Dual Stabilizer™ II			•	

RESOUND MODEL	TYPE OF DFS	SETTING
LiNX Quattro 9, LiNX Quattro 7 / LiNX 3D 9, LiNX 3D 7, LiNX 3D 5 ENZO ² 9, ENZO ² 7, ENZO ² 5 / ENZO 3D 9, ENZO 3D 7, ENZO 3D 5 / Up Smart 9, Up Smart 7, Up Smart 5	DFS Ultra™ II	Mild Moderate Strong Music mode
Enya 4, Enya 3 / Magna 4	DFS Ultra™ II	Mild Moderate Strong
Enya 2	DFS Ultra™ II	On
Magna 2	Dual Stabilizer™ II DFS	On

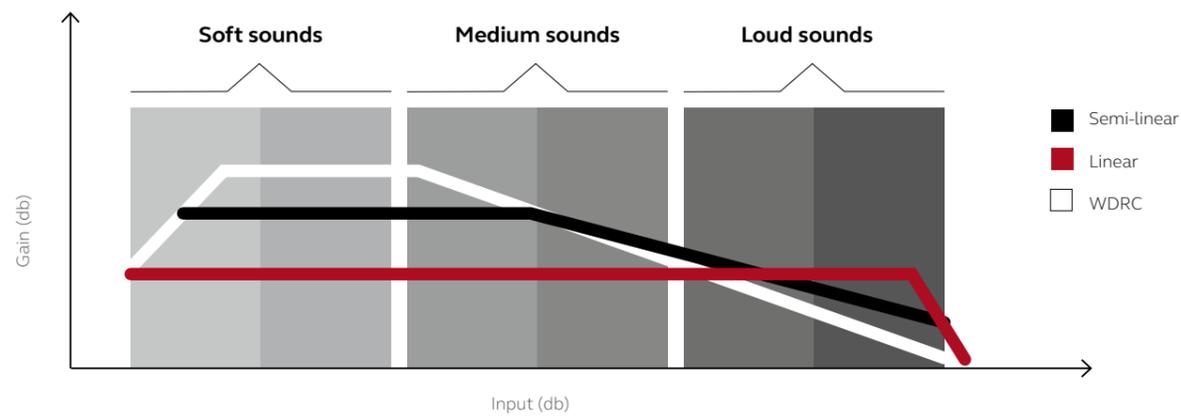
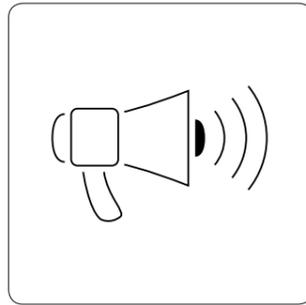
Amplification modes

Role

Provides fitting flexibility for experienced end-users with severe and profound hearing losses, many of whom have developed a preference for the sound to which they are already accustomed.

End user benefit

The hearing instrument provides the preferred sound quality.



3 Amplification modes

1. WDRC

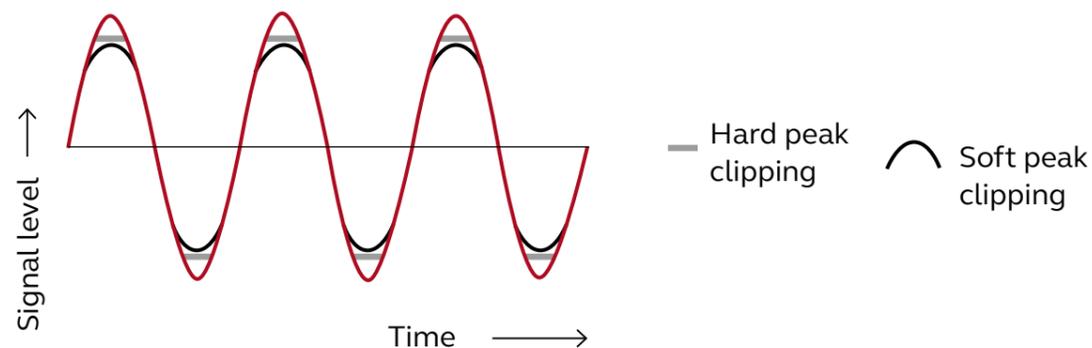
Provides compression prescribed by the selected fitting target.

2. Semi-linear

Reduces compression ratios prescribed by the selected fitting target by reducing the gain for soft inputs and increasing gain for loud inputs. Both WDRC and semi-linear modes use compression limiting to control maximum output, for the least distortion (most commonly preferred by hearing aid wearers).

3. Linear

Provides a compression ratio of 1:1, setting the gains for soft and loud inputs to the same targets as for moderate level. In this mode, Soft Peak Clipping and Hard Peak Clipping are options for limiting the output of the hearing aid. Despite that both options create more distortion in the output of the hearing aid (Hard Peak Clipping creates the most), it is sometimes preferred by those with severe and profound hearing losses.



PhoneNow™

Role

Switches automatically to a telephone program upon detection of a handset.

End user benefit

User can conveniently use the phone without needing to consider hearing aid programs



The PhoneNow™ program is activated by magnetic fields, generated either by the handset of a stationary phone or by a small magnet located on the handset or mobile phone. When the handset is held to the ear, the hearing instrument detects the magnetic field and

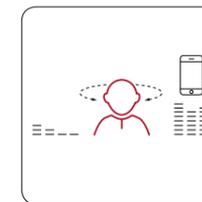
switches to PhoneNow™. This program can be acoustic (where the microphone of the hearing instrument is used) or inductive (the telecoil of the instrument is used).

DETECTION DISTANCE

Around 2 cm

Activation time:
Less than one second

Deactivation time:
3 to 4 seconds



Comfort Phone™ Function

When one device is activated with the PhoneNow™ program, the Comfort Phone™ feature uses Ear-to-Ear communication to automatically reduce the gain of the other device by 6 dB. This allows the wearer to concentrate more easily on the phone conversation.

RESOUND MODEL	CHOICE
LiNX Quattro 9, LiNX Quattro 7 / LiNX 3D 9, LiNX 3D 7, LiNX 3D 5 / Enya 4 / ENZO 3D 9, ENZO 3D 7, ENZO 3D 5 / Up Smart 9, Up Smart 7, Up Smart 5 / Up 9, Up 7	PHONE NOW COMFORT PHONE
Enya 3, Enya 2 / Magna 4, Magna 2	PHONE NOW

*Comfort Phone not available on some custom models

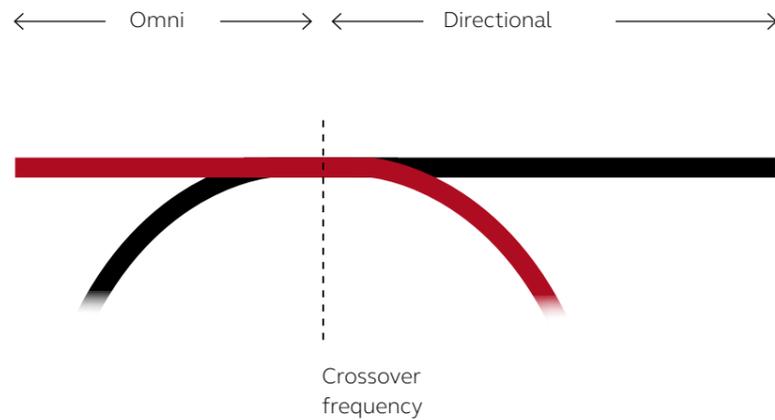
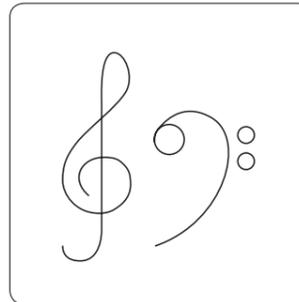
Directional Mix

Role

Prepares low and high pitches to be treated differently. Directionality can be applied to high pitches, while low pitches always remain in omni.

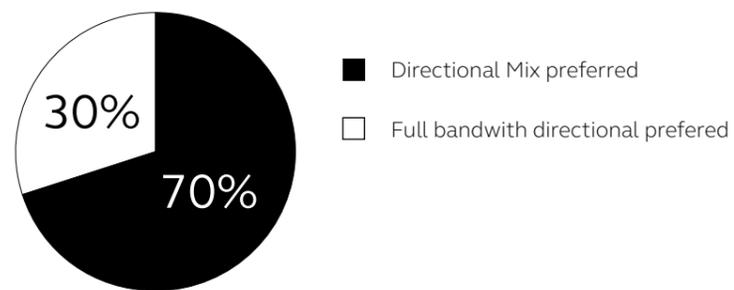
End user benefit

Rich sound quality and enhanced ability to understand speech while retaining awareness of surroundings.



The lower signals, whose frequencies are below the crossover frequency are amplified as omni. The crossover frequency depends on the space between the hearing instrument's two microphones.

Sound quality preference for Directional Mix



CHOICE					
		Very high	High	Low	Very low
LiNX Quattro, LiNX 3D	Series 61	500 Hz	800 Hz	1150 Hz	1500 Hz
LiNX Quattro (62 only), LiNX 3D	Series 62	600 Hz	900 Hz	1200 Hz	1500 Hz
	Series 67	450 Hz	750 Hz	1100 Hz	1450 Hz
	Series 77	450 Hz	800 Hz	1150 Hz	1500 Hz
	Series 88	500 Hz	800 Hz	1150 Hz	1500 Hz
Up Smart, Enya	Series 77	600 Hz	850 Hz	1100 Hz	1350 Hz
	Series 88	600 Hz	850 Hz	1100 Hz	1350 Hz
Enya	Series 62	600 Hz	850 Hz	1100 Hz	1350 Hz
ENZO 3D, Up, Up Smart	Series 98	500 Hz	775 Hz	1050 Hz	1325 Hz
Magna	Series 90	500 Hz	775 Hz	1050 Hz	1325 Hz
All custom	5mm spacing	800 Hz	1050 Hz	1300 Hz	1550 Hz
ITE custom	10mm spacing	600 Hz	850 Hz	1100 Hz	1350 Hz

RESOUND MODEL	CHOICE
LiNX Quattro 9 / LiNX 3D 9 / ENZO 3D 9 / Up Smart 9, Up 9	Very low Low High Very high
LiNX Quattro 7 / LiNX 3D 7 / Enya 4, Enya 3, Enya 2 / ENZO 3D 7 / ENZO 3D 5 / Magna 4, Magna 2 / Up Smart 7, Up Smart 5 / Up 7	Prescribed by fitting software depending on the audiogram

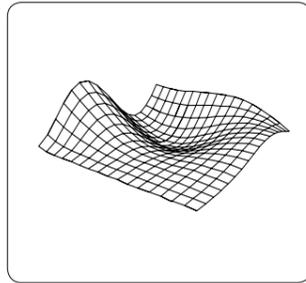
Spatial Sense

Role

Replaces spatial cues that are disrupted due to hearing aid placement behind the ear and the effects of wide dynamic range compression

End user benefit

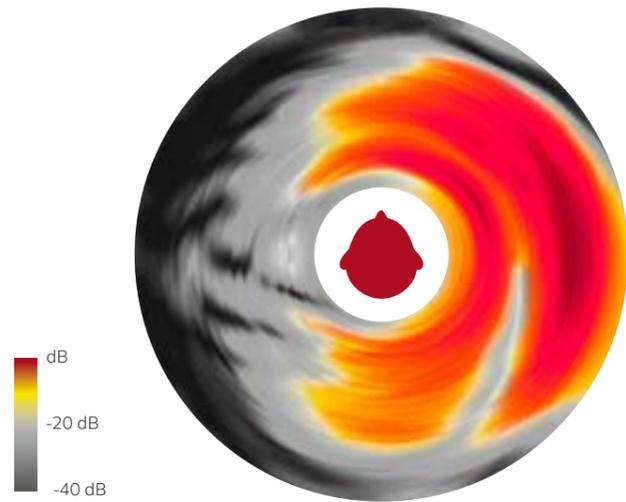
Vivid spatial awareness with exceptional sound quality



Spatial Sense is a combination of two algorithms. The first is a pinna restoration algorithm. It reproduces the monaural spectral cues of the open ear that are disrupted by positioning the hearing aid microphone outside of the pinna. The second algorithm preserves the Interaural

Level Difference (ILD), which is the natural difference in the levels of sound reaching each ear that are caused by the head shadow. This is an important binaural localization cue that can be disrupted by Wide Dynamic Range Compression.

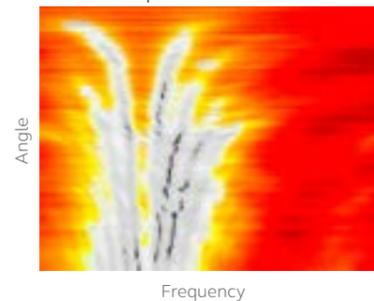
Unaided Ear



This figure shows the angle-dependent attenuation for the unaided right ear. Dark red indicates little-to-no attenuation. The characteristic attenuation pattern for the unaided ear is emulated by Spatial Sense.

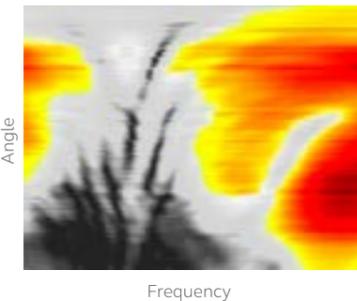
Errors in front-back localization and overall localization errors for sounds coming from multiple angles are reduced with Spatial Sense.

BTE
without Spatial Sense



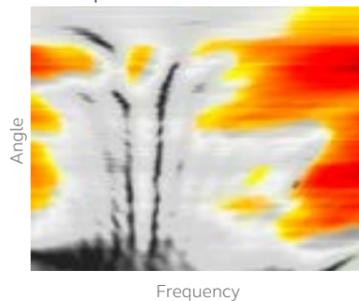
Many spatial cues are lost

Unaided Ear



Attenuation pattern of the right, unaided ear

BTE
with Spatial Sense

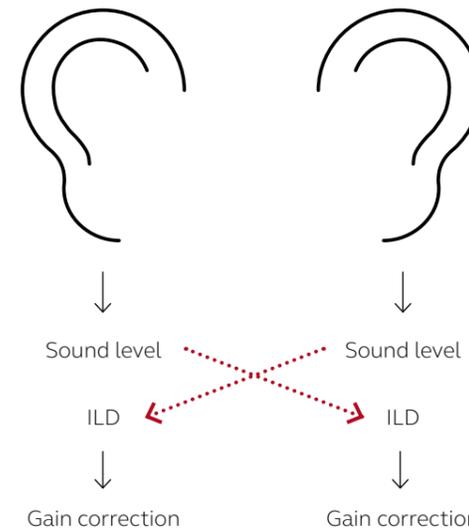


Attenuation pattern closely resembles that of the unaided ear

Interaural level difference (ILD) restoration

Sounds not directly in front or in back are more intense at the ear closest to the sound. WDRC can disturb this important localization cue. For example:

<p>Without amplification</p> <p>The signal reaches the left ear at 70 dB, and then the right ear at 60 dB. The interaural level difference (ILD) is thus 10 dB, because of the shadowing effect of the head. It is easy to perceive that the sound comes from the left side.</p>	
<p>With WDRC amplification</p> <p>WDRC may add 5 dB gain on the left and 10 dB on the right because softer sounds are amplified more by WDRC. The ILD is thus reduced to 5 dB – it is more difficult to perceive where the sound comes from.</p>	
<p>With WDRC amplification AND Spatial Sense</p> <p>Spatial Sense calculates the correct ILD and preserves it by aligning the gains of the two hearing aids based on Ear-to-Ear data exchange.</p>	



The ear-to-ear data exchange between hearing aids is analogous to the crossing of signals between ears in the auditory system. This helps to emulate ILD preservation in a way most similar to the normal auditory processes

RESOUND MODEL	CHOICE
LiNX Quattro 9 / LiNX 3D 9 / ENZO 3D 9	Spatial Sense available
Note: No Spatial Sense in custom models	

Only for dual microphone hearing instruments

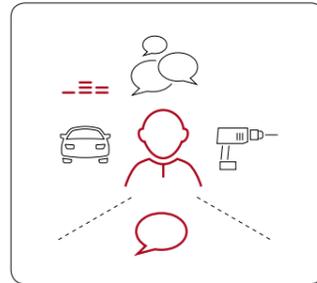
Directional Sound Processing

Role

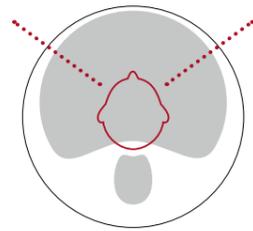
Improves SNR by reducing the amplification of sounds coming from behind the user

End user benefit

Improves speech intelligibility in noisy situations

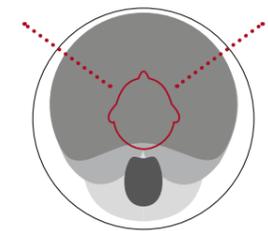


Directionality uses the sound collected by two microphones to enhance the amplification of sounds coming from the front more than sounds coming from behind.



Fixed Directionality

Fixed directionality is the simplest directional option and provides a non-varying hypercardioid pattern. In this setting, signals coming from behind and the sides are reduced in order to enable the user to better concentrate on signal from the front. The directional characteristics are constant and static. If selected, this type of directionality is always 'on.'

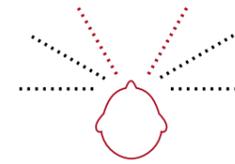


Adaptive Directionality

Adaptive Directionality is similar to Fixed Directionality, but Adaptive Directionality dynamically changes the directional pattern to reduce the loudest sounds from the rear. This is preferable to Fixed Directionality for users often in environments with multiple, moving, or simultaneous noise sources.

Integrated Wind Noise Management™

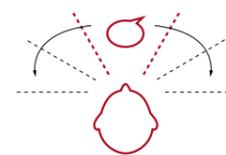
Adaptive directionality also features classic wind noise reduction for devices without Wind Guard™.



Multiscope Directionality

Multiscope Directionality is an advanced form of Adaptive Directionality that allows the width of the directional beam to be set in the fitting software, in effect making the area of focus larger or smaller.

MULTISCOPE DIRECTIONALITY SPECIFICATIONS		
SETTING	MONAURAL FITTING APPROX. ANGLE OF FOCUS	BINAURAL FITTING APPROX. ANGLE OF FOCUS
NARROW	50°	80°
MEDIUM	70°	120°
WIDE	90°	180°



Autoscope Directionality

Autoscope is an automated form of Multiscope where the beamwidth adjusts depending on the strength of the speech signal in front of the user.

i Time necessary to adjust from "narrow" to "wide": 4 seconds.

Only for dual microphone hearing instruments

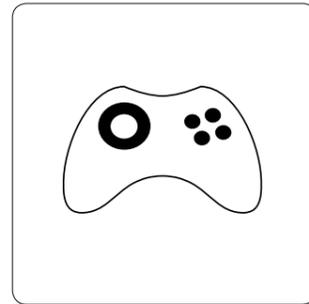
Controlling Directional Sound Processing

Role

To provide the brain with acoustic information so users can select and focus on whatever sound they are interested in, without requiring them to be vigilant about changing programs

End user benefit

Natural and unobtrusive way to ensure hearing aids are in the directional mode when needed.



Studies show that most hearing aid wearers with selectable programs remain in the same program most of the time. Thus they may not benefit from directionality. At the same time, conventional directionality may reduce the user's awareness of their surroundings. The

following are specialized features that automatically activate directional sound processing based on the sound environment. They ensure appropriate use of directionality and help balance directional benefit with environmental awareness.

Soft Switching

Smoothly switches the hearing aid between omni and directional mode depending on the sound environment. This is available for Adaptive Directionality, Multiscope and Autoscope options and unlike the binaural strategies, is also applicable to monaural fittings.

SOFT SWITCHING MICROPHONE MODES					
Front	Speech	Speech	Speech	Noise	Noise
Rear	Quiet	Babble	Noise	Noise	Speech
MICROPHONE RESPONSE					
	Omni	Directional	Directional	Omni	Omni

Synchronized Soft Switching

Uses Ear-to-Ear communication to ensure both instruments in a binaural fitting are in the same microphone mode.



Activation time:

Time to identify directional need; 3 seconds.

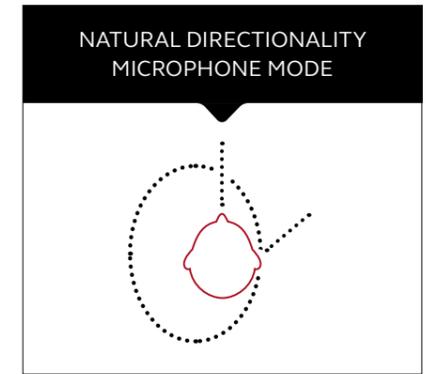
Duration of activation to directional; 10 seconds.

De activation time:

Time to identify directional need has ceased; 3 seconds. Duration of deactivation to omni; 20 seconds.

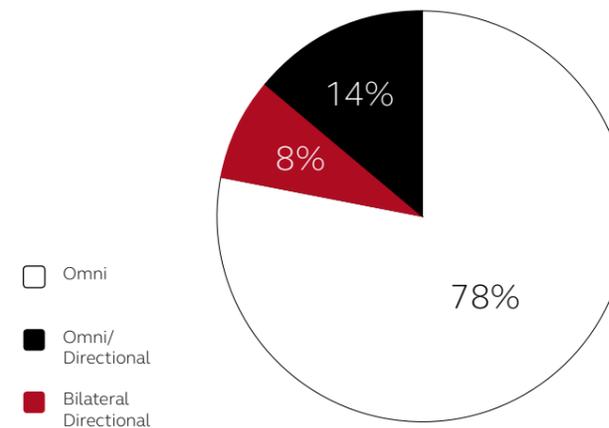
Natural Directionality II

Employs an asymmetrical fitting strategy with one ear always in directional (the "focus" ear) and one ear always in omni (the "monitor" ear). The focus ear is prescribed according to the better-hearing ear. The brain can create a unified binaural image based on which ear has the better representation of the signal of interest. This allows users to stay aware of background noises, doesn't require user vigilance to change programs, and increases ease of listening.



Binaural Directionality

Relies on Ear-to-Ear data exchange to select the optimal microphone mode on each ear so the strongest voice signal is clear without losing the ability to perceive the surroundings and other speakers.



Clinical studies show that wearers using Binaural Directionality were in a directional mode 22% of the time, which is in agreement with research on user preferences for directionality in daily life.

BINAURAL DIRECTIONALITY MICROPHONE MODES				
MICROPHONE RESPONSE				
	Dir/Dir	Dir/Omni	Omni/Dir	Omni/Omni

Binaural Directionality II with Spatial Sense

Expands the Binaural Directionality strategy by using Spatial Sense when the hearing aids are in the omni/omni microphone mode.

Only for dual microphone hearing instruments

Binaural Directionality III

Improves the ability to stay aware of sounds to the sides and back; more than 30% of the time, the signal of interest is not directly in front of the hearing aid wearer.

DIRECTIONAL FEATURES OVERVIEW											
RESOUND MODEL	Fixed directionality	Adaptive Directionality	Adaptive Directionality with Wind noise management	Multiscopee	Autoscope	Soft Switching	Synchronized Soft Switching	Natural Directionality II	Binaural Directionality	Binaural Directionality II	Binaural Directionality III
LiNX Quattro 9 / LiNX 3D 9 / ENZO 3D 9	•			•	•	•	• ¹				• ²
ENZO 3D 9 / Up Smart 9	•			•	•	•	• ¹			• ²	
Up 9	•			•	•		• ¹	•	•		
LiNX Quattro 7 / LiNX 3D / ENZO 3D 7	•			•			• ¹	•	• ²		
Up Smart 7 / Up 7	•			•			•	•			
LiNX 3D 5 / ENZO 3D 5 / Enya 4, Enya 3 / ENZO 5 / Up Smart 5	•	•				•					
Magna 4	•		•			•					
Magna 2	•										
Enya 2	•	•									

¹ Non-wireless models offer Soft Switching

² Non-wireless models offer Natural Directionality II

No directionality in IIC, CIC and MIH



Wireless connectivity

In today's hyper-connected world, more and more of the sounds people want to hear no longer come from a person near us.

ReSound's proprietary 2.4GHz-based technology delivers the only integrated wireless ecosystem in the industry. For people with hearing loss, it opens a whole new world of information and entertainment. And it is closing the gap between how people with and without hearing loss can enjoy and access sound.

Our proprietary 2.4 GHz wireless technology allows ReSound devices to connect directly to iPhone for streaming sound. With ReSound wireless accessories, you get:

- direct sound streaming
- a robust connection
- no intermediary device
- crystal clear sound

ReSound integrated apps give your clients the ability to control and personalize their hearing aids with the device they already carry with them – their phone.

ReSound wireless technology also enables enhanced features that use Ear-to-Ear data exchange (see sections on fitting software and audiology features).

Easy for you – and your customers

Easy to pair

- Same pairing for all accessories, so you only need to learn it once
- Individualized, private pairing
- Install and forget

Easy to use

- Intuitive user interface
- Smart button layouts
- One-click functionality



ReSound Micro Mic

- Hear speech clearly even when noise, distance or reverberation are issues
- Good to use when speaker is beside or behind the hearing aid wearer
- Drop control – mutes transmitted signal momentarily when dropped from heights above 75 cm
- Can be paired and shared with any number of ReSound wireless hearing aids
- Up to 25 meter range (clear line of sight)
- Talk time: Typical 10 hours
- Extremely small and discreet

TIP: The Micro Mic is also great to use on-the-fly. Just lay it down close to any loudspeaker to better hear the audio when away from home.



ReSound Multi Mic

- Hear speech clearly – even in noise, distance or reverberation are issues
- Good to use when speaker is beside or behind the hearing aid wearer
- Drop control – mutes transmitted signal momentarily when dropped from heights above 75 cm
- Can be paired and shared with any number of ReSound wireless hearing aids
- Up to 25 meter range (clear line of sight)
- Talk time:
 - Microphone mode: Typical 11 hours
 - Line-in mode: Typical 11 hours
 - Telecoil mode: Typical 7 hours
 - FM mode: Typical 10 hours
- Automatically switches to optimized table mode to enable pickup of multiple speakers when placed horizontally
- Direct streaming from almost any sound source, including FM (FM receiver required), telecoil and line-in

TIP: By plugging an FM Euro pin receiver into the Multi Mic, All ReSound wireless and ReSound Smart Hearing aids can pick up FM signals; no need to attach an FM receiver to the hearing aid itself.



ReSound TV Streamer 2

- Streams stereo sound
- Reconnects automatically if user moves out of range and returns within 5 minutes
- Can predefine balance between streamed sound volume and hearing aid volume in Aventa.
- Hearing aid wearers can adjust balance between right/left or streamed/hearing aid volume with either the Remote Control 2, the ReSound Control app or the ReSound Smart app.
- Connect up to three streamers to one set of hearing aids, or one streamer to an unlimited number of ReSound wireless Hearing aids
- 7-meter range (clear line of sight)



ReSound Phone Clip+

- Streams phone conversations and has microphone to pick up and transmit user's voice
- Streams music in stereo
- Mute button to block out surrounding sounds
- Doubles as a basic remote control for hearing instruments (volume and program)
- Provides state-of-the-art headset functionality if desired
- Has two simultaneous connections to Bluetooth phones or music streamers
- 3-meter range (clear line of sight)

TIP: The Phone Clip+ is an excellent choice for handsfree telephone conversations – even for people who use the direct connection to their iPhone.



ReSound Unite Remote Control 2

- Control program and volume
- Adjust balance between right/left and streamed/hearing aid volume
- LCD display for easy visual reference
- Lock key to avoid accidental button activation while in purse or pocket
- Home key to take wearer back to default settings
- 3-meter range (clear line of sight)

TIP: In ReSound Smart Fit, you can assign names to hearing aid programs. These names will be displayed on the Remote Control 2's LCD screen.

WITH RESOUND SMART HEARING AIDS, YOUR CLIENT CAN EASILY SWITCH BETWEEN

- Streaming from an iPhone, iPad or iPod touch
- Answering either of 2 telephones paired to the Phone Clip+
- Streaming from any of three streaming accessories (TV Streamer 2, Micro Mic, Multi Mic)
- Using a Remote Control 2

Apps



The ReSound Smart 3D app enables tele-audiology with ReSound Assist, and offers advice about getting used to hearing aids. The new design puts the most used functions on the front screen.



With the award-winning ReSound Smart™ app, your clients can personalise their hearing experience from their iPhone or Android smartphone. It's available for Apple Watch too.



With the ReSound Control app and the Phone Clip+, adjusting volume or changing programs is as easy as a tap and a swipe.



Wireless Connectivity

THE RIGHT APP FOR EACH HEARING AID			
HEARING AID	RESOUND SMART 3D APP	RESOUND SMART APP	RESOUND CONTROL + PHONE CLIP
ReSound LiNX Quattro 9/7	Yes + recommended		Yes
RS LiNX3D 9/7/5	Yes + recommended		Yes
RS Enya 4/3/2			Yes + recommended
RS ENZO 3D 9/7/5	Yes + recommended		Yes
RS Magna 4/2			
RS UP Smart™ 9/7/5		Yes + recommended	Yes
RS UP 9/7			Yes + recommended

WHY SPECIFIC HEARING AIDS WORK WITH SPECIFIC APPS	
	Before Bluetooth Smart was available, the Bluetooth signal was received by the Phone Clip+, and then transmitted to wireless hearing aids via ReSound's 2,4 GHz proprietary program. This is how ReSound Control app works
	Bluetooth Smart is the Bluetooth low-energy protocol. Bluetooth Smart is integrated directly into ReSound Smart Hearing aids, so the app on the smartphone can send information directly to the app. This is how ReSound Smart/Smart 3D app work.
	Enabling remote fine-tuning via Cloud technology required building an entirely new platform in order for the app and the ReSound Smart Fit software to exchange information. This is why ReSound LiNX 3D, ReSound Enzo 3D and Resound LiNX Quattro use the ReSound Smart 3D app.

INTEGRATED APP FEATURES		APPS				
		ReSound Control app*	ReSound Smart app	RS Smart app for Apple Watch	ReSound Smart 3D app	RS Smart 3D app for Apple Watch
FUNCTIONS	VOLUME AND PROGRAM					
	Hearing aid program selection	•	•	•	•	•
	Streamer selection	•	•	•	•	•
	Hearing aid volume adjustments	•	•	•	•	•
	Mute hearing aids	•	•	•	•	•
	ReSound streamer volume adjustments	•	•	•	•	•
	SOUND ADJUSTMENT					
	Bass/treble adjustment	•	•			
	Sound Enhancer - bass/mid/treble adjustment				•	•
	Quick buttons - short cuts to sound optimization				•	•
	Sound Enhancer - wind, noise, speech adjustment**		•	•	•	•
	Sound Enhancer adjustments (speech focus, comfort in noise and wind)				•	•
	Tinnitus Management adjustment**		•	•	•	•
	Create favourite programs with or without geo-tags		•		•	•
	OTHER FUNCTIONS					
Program/streamer name customization by user	•	•	•	•	•	
See battery and connection status		•	•	•	•	
Get inspiration and personalized information about hearing aid		•	•	•	•	
Find your hearing aid		•	•	•	•	

* ReSound Phone Clip+ is needed to use ReSound Control app
 ** Available in ReSound LiNX Quattro 9, ReSound LiNX 3D 9 and ReSound Enzo 3D 9

Sound Enhancer

- All adjustments available in the app are the same discrete steps as in ReSound fitting software.
- Adjustments made in the app are not saved in the hearing aid, but they can be saved in the app as a Favorite.
- Feature adjustments remain per program until reboot (open/close battery door)
- Tapping the 'Undo' button in the app will return the user to the default settings of that program.
- In the fitting software, feature values for left/right hearing aid must be identical. For Speech Focus this includes both beamwidth and Directional Mix values.

SOUND ENHANCER DEFAULT PER PROGRAM			
Program availability	Noise	Speech	Wind
All-around	•	•	•
Restaurant	•	•	•
Party	•	•	•
Music	•	•	•
Traffic	•	•	•
Outdoor	•	•	•
Acoustic phone	•	•	•
TC (in normal program)	•		
TC Phone (in normal program)	•		
DAI in normal program	•		

• Available with default settings
 * Available in manual programs per feature if: Noise: Noise Tracker II not set to Per Environment
 Speech: Directionality set to adaptive (Autoscoopee or Soft Switching) - Wind: Wind Guard enabled



Fitting Software

Designed by hearing care professionals, ReSound Smart Fit is your professional fitting tool. It features an intuitive workflow with easy access to fine-tuning controls, and it is your gateway to a new era of tele-audiology. It even offers seamless access to leading manufacturers' real-ear modules directly from the fitting software for quick, accurate real-ear measurements.

Both you and your clients will enjoy true wireless fitting sessions with either Airlink 2 or Noahlink Wireless. You'll be free from untangling cables, and your client won't need to wear any sort of intermediate device.

It all adds up to a comfortable and unobtrusive fitting session - and a great client experience.

Intuitive wireless workflow with ReSound Smart Fit

Thanks to input from research trials and usability studies, hearing care professionals were at the heart of the new ReSound Smart Fit design. An improved fitting and navigation flow supports the way you want to work and provides faster access to the features you use the most. Fast processing during fitting means less time spent navigating through the fitting software.

Everything you need is available on-screen, including client details, hearing aid options and feature guidance. This leads to a more effective and efficient fitting experience, all while leaving a great first impression with your clients.

ReSound Smart Fit also integrates with Otometrics, Interacoustics and MedRx equipment, so you can do real-ear measurements quickly and efficiently, without opening separate software.

Get more with one system

One software installation is all you need to fit all ReSound hearing aids. Both ReSound Aventa and ReSound Smart Fit are included in the installation, so you have the right software for any ReSound hearing aid. When you connect a hearing aid, the Smart Launcher automatically detects whether it is a ReSound LiNX 3D or a legacy device and opens the appropriate fitting software module. From there, you get access to all history and fitting information. With easy access to previous data from your clients, it is easy to transfer between legacy hearing aids and newer product technology.

Noahlink wireless

Connecting seamlessly with ReSound Smart Fit, Noahlink wireless is the industry standard fitting interface and works with any wireless ReSound hearing aid. If you have an Airlink 2, a free software upgrade can give you the full functionality of Noahlink wireless.

The new AutoREM features and Inter Module Communication Protocol 2 (IMC2) compatibility in ReSound Smart Fit 1.2 or later requires Noah Version 4.8 (or higher). IMC2 allows direct communication between REM modules and Noah. There are currently three compatible real ear systems.

MANUFACTURER	MODULE NAME	VERSION
OTometrics	OTOSuite	4.82.00 (or higher)
Interacoustics	Callisto Suite	1.9.0 (or higher)
MedRx	Avant REM	3.2 (or higher)

Manufacturer and module compatibility is subject to change. Please contact customer support for the latest information.

Compatible with the following hearing aids

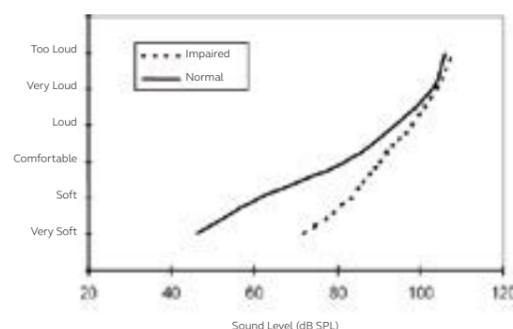
- ReSound LiNX Quattro
- ReSound LiNX 3D
- ReSound ENZO 3D

All other models compatible with ReSound Aventa fitting software.



The perfect balance for optimal gain and compression

Wearers of hearing aids need acoustic information which is as free from distortion as possible. With its combination of advanced technology and carefully selected compression parameters, ReSound's Wide Dynamic Range Compression (WDRC) keeps distortion to a minimum. However, to achieve the best results, prescribing the right hearing aid gain is essential. During fitting, the Audiogram+ algorithm helps you achieve the optimal hearing aid gain for all your clients with mild to profound hearing loss.



The goal of our hearing aids is to give your clients access to acoustic information so they can hear, understand, and speak to the people around them. We believe the human brain is the best processor of speech in noise, so we try to make sure that sound reaches the auditory system with minimal distortion and loss of acoustic cues. From the selection of components to sound processing and fitting, this is our guiding principle in all aspects of hearing aid design.

Based on the work of Villchur (1973), ReSound pioneered WDRC, the world's first system that accounted for abnormal loudness growth by applying progressively less gain as input levels increased. To provide a reliable starting point for the WDRC, we developed a fitting algorithm based on psychoacoustic measurements of the increase in loudness. This meant that, after years of clinical experience and thousands of fittings, we were able to refine our threshold-based fitting algorithm. And Audiogram+ was born.

Loudness normalization

The Audiogram+ target prescription is grounded in loudness normalization – although it is not the gains you prescribe that realize this objective. To achieve loudness normalization, we need to apply gain that is dependent

on frequency and input level so that the hearing aid wearer perceives the loudness of narrowband signals in a similar way to someone with normal hearing. Loudness normalization assumes that loudness summation will be similar for someone with hearing loss and someone with normal hearing, so real-world sounds will be loud enough for the wearer. However, hearing aid wearers tend to prefer less gain than someone following a loudness normalization rationale would prescribe (Smeds, 2006; Keidser & Grant, 2003).

Because of this, Audiogram+ prescribes less gain than a strict loudness normalization rationale would indicate. Compared to the generic NAL-NL 2 fitting rule, which aims to maximize speech understanding, Audiogram+ tends to prescribe several dB less insertion gain depending on frequency and hearing loss configuration.

Influence of audiometric data

Audiogram+ calculates insertion gain targets for narrowband inputs of 50, 65 and 80dB SPL at 11 audiometric octave and inter-octave frequencies from 125 Hz to 8 kHz. Apart from the hearing threshold levels at individual frequencies, Audiogram+ takes four audiometric factors into consideration:

1. Severity of hearing loss
2. Configuration of hearing loss
3. Individual Uncomfortable Loudness (UCL)
4. Whether the hearing loss has a conductive component

Hearing loss severity

For severe-to-profound hearing loss, there is less high-frequency emphasis and more low-frequency gain in the prescribed response than for mild-to-moderately severe loss. These empirically derived accommodations for severe-to-profound hearing loss are consistent with the observations of other investigators. For example, Byrne et al (1990) estimated an optimal frequency response and measured insertion gain at the preferred volume with this response for a number of people with severe-to-profound hearing loss. They found that the optimum low-frequency gain was higher than that prescribed by the NAL formula, and that preferred gain was about 10dB higher. Audiogram+ compensates for hearing loss severity with a low-frequency gain increase of 4 to 5dB and a high frequency reduction of 4 to 5dB compared to a prescription not corrected for severity. Although the exact conditions imposed on the Audiogram+ formula are more complicated, these changes are generally applied when the PTA exceeds 65dB HL.

Hearing loss configuration

The ability of hearing aid wearers to make use of high frequency speech information has been observed to decrease as hearing threshold levels rise above 60dB HL (Hogan & Turner, 1998). An explanation for this could be the presence of “dead regions”. The probability of a high-frequency dead region increases sharply when the high-frequency hearing threshold exceeds 80dB HL. Audiogram+ avoids prescribing excessive high-frequency gain in cases of steeply sloping high-frequency hearing loss.

Uncomfortable loudness levels (UCL)

Some hearing aid wearers may have a lower or higher tolerance for loud sounds than that predicted by their hearing threshold levels. If you enter UCL data into Aventa software, it will adjust the gain to accommodate the individual's dynamic range into the prescription. The effect on the targets corresponds to about a third of the difference between the predicted and actual UCLs. If the measured UCL is lower than predicted, targets are reduced, and if higher, targets are increased. Although the ReSound system includes compression limiting at the output stage, there is no prescription for MPO in Audiogram+. Instead, MPO is prescribed according to the method described by Dillon (2001).

Hearing aid use

According to Olsen et al, 1999, and Keidser & Grant, 2003, experienced hearing aid wearers perceive loudness and gain preferences differently to inexperienced wearers, at least for those with moderate-to-severe hearing loss. Audiogram+ can account for this preference if you select “First-time user” on the Aventa fitting software “Patient” page. This correction decreases high-frequency gain by about 6dB relative to the targets for experienced wearers, and increases the high-frequency compression ratio slightly. For wearers who are sensitive to high-frequency gain, the “Comfort” wearer profile results in a gain reduction from about 10% of the hearing threshold level at 2kHz to about 25% of the hearing threshold level at higher frequencies.

ReSound Assist- a new approach to hearing care

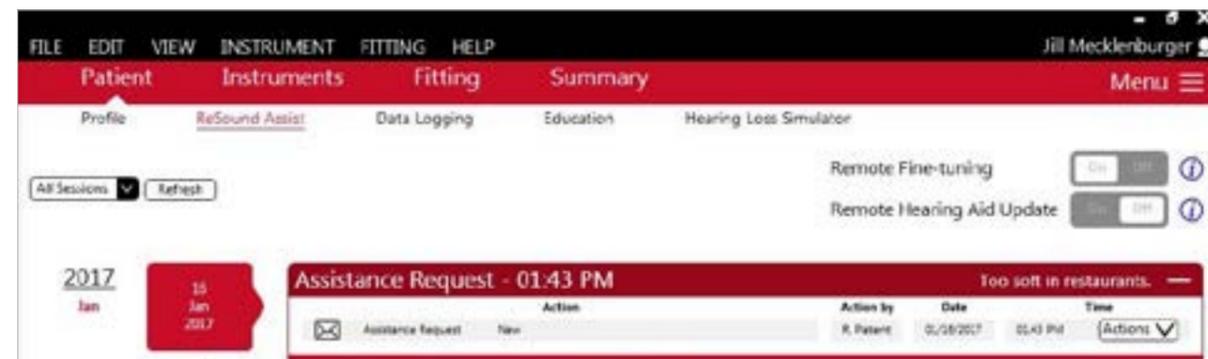
As a hearing care practitioner, searching for ways to provide the best care for your clients is always a priority. ReSound Assist was developed with this purpose in mind. It's a revolutionary way to connect with clients in-between regularly scheduled in-office appointments.

Send fine-tuning adjustments anywhere

When you receive direct information, you can create more accurate fine-tuning and adjustments. Sent directly back to your clients' ReSound Smart 3D™ app, you can offer more support, guidance and a better user experience.

Receive requests in real-time

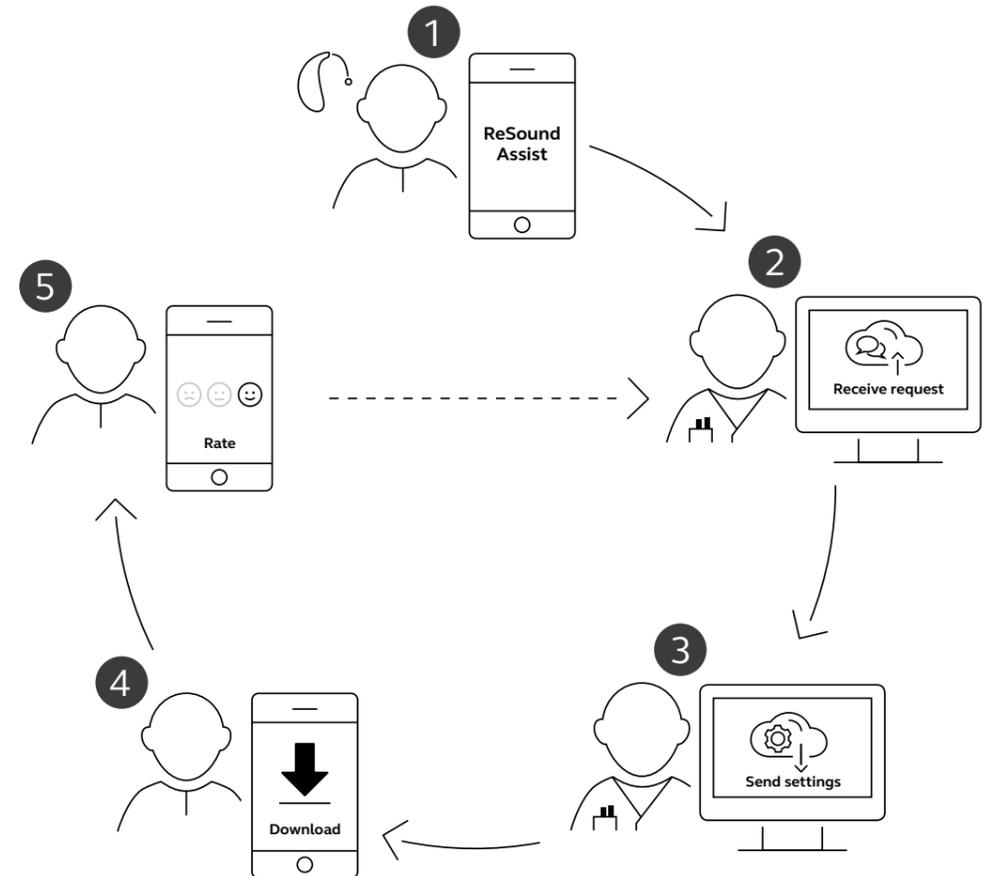
Instead of trying to remember details of a challenging hearing situation at their next clinic visit, with ReSound Assist, your clients can request assistance in real-time. Sent from exactly where your clients need help, you receive more accurate descriptions of their hearing experience.



How ReSound Assist works

In the ReSound Smart 3D App, your client makes a request that guides them through a simple questionnaire and an optional message describing the situation.

- 1 Client sends a request, description of the situation and an optional message in the ReSound Smart 3D App.
- 2 You receive request, along with an automatic record of hearing aid settings.
- 3 You fine-tune in Smart Fit software and send adjustments and/or messages straight to client's ReSound Smart 3D App.
- 4 Client places hearing aids close to smartphone, taps installs – and enjoys the improvements.
- 5 Client gives feedback about new settings with the Rate My Sound feature of the ReSound Smart 3D app.





Tinnitus

About 10% of the adult population has tinnitus, or ringing in the ears. Almost 80% of tinnitus sufferers also have hearing loss.

Tinnitus is a very individual condition requiring a tailored approach, but a combination of counselling and sound therapy is often successful. ReSound offers therapeutic sound for tinnitus relief built into our hearing aids, and a complete array of counselling materials to help you address the needs of this clientele.

Tinnitus Management

While sound therapy is widely accepted as an effective way of managing tinnitus, there is no one-size-fits-all approach. Most clients experience the best effect from broadband stimuli such as white noise; but studies show that some prefer other sounds, such as modulating and/or filtered noise. Furthermore, preferences often vary depending on time of day, mood or environment.

Some clients respond best when they can adjust parameters so they feel in control of their therapy. Others prefer to 'set it and forget it' so their therapy and tinnitus stay very much in the background.

This means that audiologists need a flexible sound therapy toolbox if they are to help each client find the best way to manage their tinnitus.

ReSound hearing aids can be fit as combination devices, with both sound amplification and tinnitus sound therapy. Either can be deactivated during fitting so the devices can behave exclusively as a tinnitus sound generator or as a hearing aid that treats tinnitus using amplification only.

Tinnitus Sound Therapy

White Noise Generator

Most literature agrees that broadband stimulus is the most effective form of sound therapy because it activates the greatest number of neurons in the brain. The ReSound Tinnitus Sound Generator (TSG) default white noise is therefore set to a broadband filter. It has the flexibility of low and high cut controls to provide more individualized comfort.

The TSG frequency bandwidth is meant to be individually set during fitting to provide listening comfort and optimal relief from tinnitus. Clients using the ReSound Smart app can also adjust the sound with low- and high-cut controls to adjust the sound whenever they wish.

Within Smart Fit, the hearing aid's volume button should be programmed to either adjust the volume of amplification or the volume of the tinnitus sound generator.

SETTING	RANGE
Low-cut filter	125Kz - 2kHz
High-cut filter	2kHz - 7kHz

Amplitude modulation (AM)

This is a fluctuation in the level of the noise signal while all other spectral components remain uniform. AM attenuation is randomized so there is no audible periodicity, or a repeating pattern of sounds.

AM and AM speed are comfort features. They should be adjusted as needed on a case-by-case basis.

Once AM is activated, you have three options to control how often fluctuations occur in the noise:

 SLOW (2 SEC.)

 MEDIUM (4 SEC.)

 FAST (8 SEC.)

ReSound fitting software Aventa comes with three AM attenuation options:

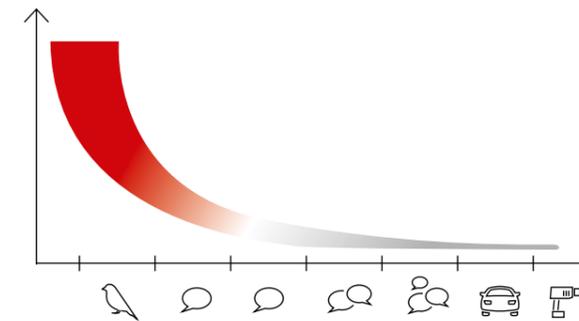
ATTENUATION OPTIONS	E.G PROGRAMMED VOLUME OF TSG: 65DBSPL	SMART APP TSG
Mild (-6dB)	65 dBSPL - 59 dBSPL6	Same
Moderate (-10dB)	65 dBSPL - 51 dBSPL6	Same
Strong (-14dB)	65 dBSPL - 51 dBSPL	Same

Synchronization

For hearing devices with Ear-to-Ear capabilities, Synchronized Amplitude Modulation improves comfort by synchronizing the Amplitude Modulation to both hearing aids as the wearer moves through different listening environments. Synchronized Environmental Steering™ automatically adjusts the volume of the sound generator in each hearing aid independently.

Environmental Steering

This adjusts the volume of the sound generator according to the seven listening environments defined in the Environmental Classifier. Tinnitus tends to be more intrusive when it's quiet so, as a rule of thumb, the volume of the sound generator will go up in quiet environments and fall in speech-heavy or noisy environments.



Environmental Steering serves a number of purposes.

- It can help avoid the potential risk of completely masking the tinnitus for users who do not fully understand the aim of sound therapy (or tinnitus treatment) or who are not familiar with a manual volume control. Masking the tinnitus does not allow for habituation, as one cannot habituate to what is not audible, and this can be detrimental in the tinnitus treatment.
- It ensures that the TSG signal does not interfere with important information, such as speech.
- Taking away the need for a manual volume control can put less emphasis on the device, and for some, may help reduce the attention that is paid to the tinnitus. For those who react better to having control, a manual volume control can be activated. For those who respond best to even more control, the ReSound Smart app and ReSound Smart 3D app provide control options to also adjust pitch and modulation.

Nature Sounds

Our studies found that the most popular natural sounds for sound therapy are water and air. Nature Sounds are six sounds inspired by water, such as breaking waves and beach surf. The sounds are synthesized using a patent-protected technique to sound like natural water sounds. They can be played directly from the hearing aids without the need for an external device.

Nature Sounds can be activated per program during fitting with ReSound Smart Fit fitting software. Your client can make further adjustments with the ReSound Smart® app.





ReSound Smart 3D™ app



Wearers of ReSound LiNX Quattro, ReSound LiNX 3D and ReSound ENZO 3D can use the Tinnitus Manager within the ReSound Smart 3D app to personalize their Tinnitus Sound Generator if you have activated it in ReSound Fit Software. If the TSG was activated during fitting, the ReSound Smart 3D app will display the tinnitus symbol in the top right-hand corner of the program button.

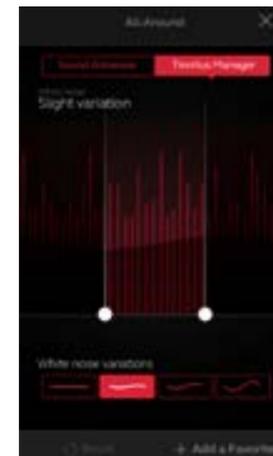


Your client can then use the app to make further adjustments to the TSG and save their new settings in 'favorites'. These are also saved in Detail view so you can refer to them in counseling sessions.



If you select standard TSG for a program, your client can adjust the pitch and modulation in the ReSound Smart 3D app. They can save their new settings as a favorite program.

LEVELS OF PITCH ADJUSTMENT:	
Low	Off, 500 Hz, 750 Hz, 1000 Hz, 1500 Hz, 2000 Hz
High	2000 Hz, 3000 Hz, 4000 Hz



If you activated Nature Sounds for a particular program during fitting, your client will be able to switch between white noise and any of the six sounds inspired by water. Selecting white noise enables adjustment of pitch but not modulation.

In the table below you can see a summary of ReSound's tinnitus sound therapy options. Our latest premium models give you the opportunity to offer your tinnitus clients varied, flexible sound therapy.

FEATURE OVERVIEW	TSG WHITE NOISE GENERATOR	TSG SYNCH	TSG NATURE SOUNDS	TSG ENVIRONMENTAL STEERING	SMART 3D APP TSG	RELIEF APP	FITTING SOFTWARE
RS LiNX Quattro 9/7/5	•	•	•	•	•	•	Smart Fit 1.3 or later
RS LiNX 3D 9/7/5	•	•	•	•	•	•	Smart Fit 1.0 or later
RS Enya 4	•	•				•	Aventa 3.9 or later
RS Enya 3/2	•					•	Aventa 3.9 or later
RS ENZO 3D	•	•	•	•	•	•	Smart Fit 1.1 or later

The ReSound Smart 3D app is a free download at the App Store and Google Play.

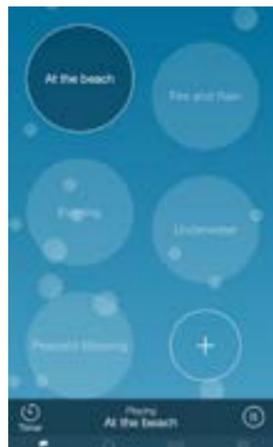
See resoundpro.com/compatibility for more information about compatibility.

Learn to manage your tinnitus with the ReSound Relief app



ReSound Relief™ uses a combination of sounds and relaxing exercises that aim to distract your brain from focusing on tinnitus. Over time the brain learns to focus less on the tinnitus.

The app lets you manage your personal library of soundscapes to be used for sound therapy, one of the most common therapies to minimize the effects of tinnitus. Either listen to the default soundscapes or create your own from a collection of more than 50 High Definition environmental sounds and small pieces of music. To help you cope with your tinnitus, Relief also provides different activities to relax and get better sleep such as guided meditations, breathing exercises and imagery. It also includes a Learn section to teach you more information about what is tinnitus, what are the causes of tinnitus, common therapies as well as tips to help you better deal with the effects of your tinnitus.



ReSound Relief app home screen

The large bubbles represent soundscapes, just tap on them and enjoy the sound therapy. The + button allows you to create your own soundscapes.



Create your own soundscapes

Create your own soundscapes by combining up to 5 different sounds. Choose from High Definition environmental, musical and therapeutic sounds, then tweak the volume of each sound to create the soundscape that better helps your tinnitus.

Personalized weekly plans

With My Plan, under My Relief section, you can create a personalized plan to teach you how to manage your tinnitus. Just answer some questions about your tinnitus and the issues that bother you the most, and ReSound Relief will create a weekly plan to help you train managing your tinnitus.

Moreover, the app will track your usage and progress towards your weekly goals, so you can discuss them with your hearing care professional in order to obtain better guidance on how to manage your tinnitus.

ReSound Relief is compatible with any smartphone (iOS and Android) and doesn't require hearing aids. The ReSound Relief app is available as a free download on both the App Store and Google Play. For more information visit the ReSound Relief website: www.gnresound.com/reliefapp

At ReSound we understand how important it is for you to have a partner you can trust. One that not only has the latest technology, but also a shared commitment to go that extra mile to help people with hearing loss successfully adapt to life with hearing aids. So its good to know we've been keeping our promise to help make life sound better for over 150 years, enabling you to help your clients hear more, do more and be more than they ever thought possible.

ReSound is part of the GN Group – pioneering great sound from world-leading ReSound hearing aids to Jabra office headsets and sports headphones. The GN Group was founded in 1869, employing over 5,000 people, and listed on NASDAQ OMX Copenhagen.

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