Phonak Government Services
Training Guide
Phonak Marvel™ 2.0 • November 2019
More to Marvel

Since its introduction, Phonak Marvel has been living up to its reputation of being **not just a great hearing aid, but a multifunctional marvel** delivering a **love at first sound** experience — each and every day. With Marvel, hearing aid wearers enjoy all the benefits of cutting-edge Phonak technologies:

- Clear, rich sound
- Connects to smartphones, TV and more
- Rechargeable
- Smart apps

All of these key characteristics are what set Marvel in a league of its own, and now it is about to get even more marvelous. Introducing **Marvel 2.0**:

- **More** hearing performance
- **More** connectivity and apps
- **More** choice

All of these improvements are now available for previous and new generations of Marvel hearing aids, creating an industry-first standard to benefit an entire platform.

Notes

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More hearing performance

From the moment you first fit your patients with their Marvel hearing aids, they can expect:

- Exceptional sound quality from the first fit
- Better speech understanding in noise
- Reduced listening effort in noise
- Top-rated streamed sound quality

The proven performance of Marvel — Phoank Audéo™ Marvel clients report:

- Exceptional sound quality from the first fit: 88%
- Better speech understanding in noise: 82%

My hearing aids provide me with exceptional sound quality from the first fit.

I understand conversations better even in noisy environments.

Now we are ready to take the proven Marvel performance to the next level.

Notes
More hearing performance with Roger™ technology

- StereoZoom
- UltraZoom
- Real Ear Sound

Notes
More hearing performance

Roger™ technology provides outstanding hearing performance in noise and over distance.6

As a break-through in hearing technology, Marvel hearing aids now feature RogerDirect™. This allows Roger to stream directly to Marvel hearing aids without attaching an external receiver.

RogerDirect — Easy access to even more hearing performance6

- No external receiver needs to be attached
- Direct streaming to Marvel hearing aids

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to</td>
<td>42%</td>
</tr>
<tr>
<td>smaller</td>
<td></td>
</tr>
<tr>
<td>On average</td>
<td>27%</td>
</tr>
<tr>
<td>less battery consumption</td>
<td></td>
</tr>
<tr>
<td>All Audéo™ M and Bolero™ M models are Roger compatible</td>
<td></td>
</tr>
</tbody>
</table>

*With RogerDirect compared to previous generation

Notes
More connectivity and apps

More Bluetooth® connectivity

Unlike any other hearing technology, Marvel can connect directly to either iOS®, Android™ or other Bluetooth-enabled devices.

With Marvel 2.0, Phonak offers more connectivity and improved usability, allowing your patient to easily pair their hearing aids to two Bluetooth devices instead of just one.

Notes
More connectivity and apps

More personalized hearing experience

From scientific research we know that some patients want to have the ability to fine-tune their hearing aids. This involvement increases patients' perceived sound quality⁷ and hearing aid satisfaction⁸.

The new advanced Remote Control function within the myPhonak app allows your patients to adjust their hearing aids to their individual needs in real-time. They can easily select standard pre-settings and create personalized programs, giving them more control for their hearing preference.

Notes
Marvel 2.0 features new products designed to meet the expectations of hearing aid wearers and enables you to offer even more marvelous solutions to your patients. The extended Marvel portfolio is made up of a new Receiver-In-Canal (RIC) and a Behind-The-Ear (BTE), as well as two new accessories.

**Phonak Audéo™ M-RT**

All cutting-edge Marvel technology in one ultimate hearing aid.

**Phonak Bolero™ M-M**

Marvel performance is now available in a BTE, offering maximum reliability and robustness.

**Phonak RemoteControl**

**Phonak PartnerMic™**

**Notes**

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More choice

Phonak Audéo just got more marvelous

Audéo M-312  Audéo M-R  Audéo M-312T  Audéo M-13T  Audéo M-RT

Phonak Audéo M-RT: The all-in-one solution

Rechargeable
T-Coil
Direct connectivity to Android and iOS
RogerDirect
Binaural VoiceStream Technology™
Hands-free calls

cShell Titanium available

Notes
More choice

Phonak Bolero Marvel — Marvel performance now in a BTE

Marvel BTE
With IP68 rating for reliability and robustness

NEW SlimTube
• Up to 3 dB SPL more output
• Designed to offer an ergonomic fit

New accessories

Phonak RemoteControl
Easy to use remote control:
• Adjust volume
• Change programs
• Adjust Environmental Balance during streaming

Phonak PartnerMic
Easy to use directional microphone:
• AirStream™ technology
• Always directional
• One-to-one conversations

Notes
Phonak Marvel 2.0

- Zero compromise with the unbeatable combination of Roger and Marvel
- Unrivalled connectivity via the broadest range of compatible devices
- Seamless personalization via more remote control functions in one app
- Marvel technology for every age and lifestyle
- The all-in-one Audéo M-RT

Notes
## Phonak Audéo M

### Product description

<table>
<thead>
<tr>
<th>Battery size</th>
<th>Audéo M-312</th>
<th>Audéo M-312T</th>
<th>Audéo M-13T</th>
<th>Audéo M-R</th>
<th>Audéo M-RT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>312</td>
<td>312</td>
<td>13</td>
<td>built-in rechargeable</td>
<td>built-in rechargeable</td>
</tr>
</tbody>
</table>

| Multi-function button | ✓            | ✓            | ✓            | ✓          | ✓          |
| Telecoil | ✓            | ✓            | ✓            | ✓          | ✓          |
| Bluetooth® | ✓            | ✓            | ✓            | ✓          | ✓          |
| Nano coating | ✓            | ✓            | ✓            | ✓          | ✓          |
| IP rating | IP68 ³       | IP68 ³       | IP68 ³       | IP68 ³     | IP68 ³     |
| Dimensions | L x W x D | 26.8 x 11.2 x 7.1 mm (1.05 x 0.44 x 0.28") | 29.1 x 11.9 x 7.2 mm (1.14 x 0.46 x 0.29") | 29.0 x 11.9 x 8.1 mm (1.13 x 0.47 x 0.32") | 28.0 x 11.9 x 8.0 mm (1.11 x 0.47 x 0.32") | 30.5 x 12.5 x 8.0 mm (1.20 x 0.49 x 0.32") |
| Weight | 1.1 g (0.04 oz) | 1.3 g (0.04 oz) | 1.4 g (0.05 oz) | 2.1 g (0.07 oz) | 2.3 g (0.08 oz) |
| Charging times | 0% to 100% 3 h | 0% to 100% 3 h | 0% to 80% 1.5 h | 0% to 80% 1.5 h | 0% to 80% 1.5 h |

| S Receiver | 2 cc coupler | 2 cc coupler | 2 cc coupler | 2 cc coupler | 2 cc coupler |
| Max. Power Output (dB SPL) | 111          | 111          | 111          | 111          | 111          |
| Max. gain (dB) | 46           | 46           | 46           | 46           | 46           |
| Frequency range (Hz) | <100 – >8000 | <100 – >8000 | <100 – >8000 | <100 – >8000 | <100 – >8000 |
| Working current (mA) | 2.2          | 2.2          | 2.2          | 2.2          | 2.2          |

| M Receiver | 2 cc coupler | 2 cc coupler | 2 cc coupler | 2 cc coupler | 2 cc coupler |
| Max. Power Output (dB SPL) | 114          | 114          | 114          | 114          | 114          |
| Max. gain (dB) | 50           | 50           | 50           | 50           | 50           |
| Frequency range (Hz) | <100 – >8000 | <100 – >8000 | <100 – >8000 | <100 – >8000 | <100 – >8000 |
| Working current (mA) | 2.1          | 2.1          | 2.1          | 2.1          | 2.1          |

| P Receiver | 2 cc coupler | 2 cc coupler | 2 cc coupler | 2 cc coupler | 2 cc coupler |
| Max. Power Output (dB SPL) | 122          | 122          | 122          | 122          | 122          |
| Max. gain (dB) | 58           | 58           | 58           | 58           | 58           |
| Frequency range (Hz) | <100 – >6300 | <100 – >6300 | <100 – >6300 | <100 – >6300 | <100 – >6300 |
| Working current (mA) | 2.2          | 2.2          | 2.2          | 2.2          | 2.2          |

| UP Receiver | 2 cc coupler | 2 cc coupler | 2 cc coupler | 2 cc coupler | 2 cc coupler |
| Max. Power Output (dB SPL) | 130          | 130          | 130          | 130          | 130          |
| Max. gain (dB) | 67           | 67           | 67           | 67           | 67           |
| Frequency range (Hz) | <100 – >6000 | <100 – >6000 | <100 – >6000 | <100 – >6000 | <100 – >6000 |
| Working current (mA) | 2.1          | 2.1          | 2.1          | 2.1          | 2.1          |

### Fitting range

| S Receiver | Mild to moderately-severe hearing loss. |
| M Receiver | Mild to severe hearing loss. |
| P Receiver | Mild to severe hearing loss. |
| UP Receiver | Moderate to profound hearing loss. |
## Acoustic coupling

<table>
<thead>
<tr>
<th></th>
<th>S Receiver</th>
<th>M Receiver</th>
<th>P Receiver</th>
<th>UP Receiver</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available in four different lengths (0, 1, 2, 3), L &amp; R</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td><strong>Dome</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cap dome</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open dome</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vented dome</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power dome</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SlimTip</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acrylic</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>RIC SecureFit (Silicone)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Titanium</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>cShell</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acrylic</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Titanium</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Wireless communication portfolio

<table>
<thead>
<tr>
<th>Wireless accessory</th>
<th>Audéo M-312</th>
<th>Audéo M-312T</th>
<th>Audéo M-13T</th>
<th>Audéo M-R</th>
<th>Audéo M-RT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV Connector</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Phonak PartnerMic</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Phonak RemoteControl</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td><strong>Roger</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roger microphones</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td><strong>Apps</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>myPhonak</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Phonak Guide</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>myCall-to-Text</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

## Fitting

<table>
<thead>
<tr>
<th>Fitting</th>
<th>Audéo M-312</th>
<th>Audéo M-312T</th>
<th>Audéo M-13T</th>
<th>Audéo M-R</th>
<th>Audéo M-RT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phonak Target</td>
<td>6.0 or higher</td>
<td>6.0.1 or higher</td>
<td>6.0.1 or higher</td>
<td>6.0 or higher</td>
<td>6.1 or higher</td>
</tr>
<tr>
<td>Noahlink Wireless</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>NOAHLink</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>HI-PRO, HI-PRO2</td>
<td>•</td>
<td>•</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Housing colors

- HO Beige
- P1 Sand Beige
- P3 Sandalwood
- P4 Chestnut
- P5 Champagne
- P6 Silver Gray
- P7 Graphite Gray
- P8 Velvet Black
- T7 Alpine White
Phonak Marvel
RIC coupling guide

Phonak Audéo M

Receivers

Standard (S)
46/111 (2cc)

Medium (M)
50/114 (2cc)

Power (P)
58/122 (2cc)

UltraPower (UP)
67/130 (2cc)

Compatible with cShell only

Preferred Marvel receiver

Mild to moderately-severe hearing loss

Mild to severe hearing loss

Mild to severe hearing loss

Moderate to profound hearing loss

Coupling options

Cap Dome
Open Dome
Vented Dome
Power Dome

SlimTip (Acrylic)
RIC SecureFit (Silicone)
SlimTip Titanium
cShell
cShell Titanium
# Phonak Bolero M

## Product description

<table>
<thead>
<tr>
<th>Bolero M-M</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery size</td>
<td>312</td>
</tr>
<tr>
<td>Multi-function button</td>
<td>•</td>
</tr>
<tr>
<td>Telecoil</td>
<td>•</td>
</tr>
<tr>
<td>Bluetooth®</td>
<td>•</td>
</tr>
<tr>
<td>Nano coating</td>
<td>•</td>
</tr>
<tr>
<td>IP rating</td>
<td>IP68°</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Battery size</th>
<th>312</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-function button</td>
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</tr>
<tr>
<td>Telecoil</td>
<td>•</td>
</tr>
<tr>
<td>Bluetooth®</td>
<td>•</td>
</tr>
<tr>
<td>Nano coating</td>
<td>•</td>
</tr>
<tr>
<td>IP rating</td>
<td>IP68°</td>
</tr>
</tbody>
</table>

### SlimTube HE

<table>
<thead>
<tr>
<th>Max. Power Output (dB SPL)</th>
<th>2 cc coupler</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. gain (dB)</td>
<td>2 cc coupler</td>
<td></td>
</tr>
<tr>
<td>Frequency range (Hz)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working current (mA)</td>
<td>1.5</td>
<td>1.6</td>
</tr>
</tbody>
</table>

### HE11 680

<table>
<thead>
<tr>
<th>Max. Power Output (dB SPL)</th>
<th>2 cc coupler</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. gain (dB)</td>
<td>2 cc coupler</td>
<td></td>
</tr>
<tr>
<td>Frequency range (Hz)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working current (mA)</td>
<td>1.5</td>
<td>1.6</td>
</tr>
</tbody>
</table>

### Fitting range

- Mild to moderately-severe hearing loss, all audiometric configurations

### Housing colors

- **HO Beige**
- **P1 Sand Beige**
- **P3 Sandalwood**
- **P4 Chestnut**
- **P5 Champagne**
- **P6 Silver Gray**
- **P7 Graphite Gray**
- **P8 Velvet Black**
- **T7 Alpine White**
# Phonak Bolero M

## Acoustic coupling

<table>
<thead>
<tr>
<th>Sound outlet</th>
<th>Hook</th>
<th>Damped (HE11 680) transparent</th>
</tr>
</thead>
<tbody>
<tr>
<td>SlimTube HE</td>
<td></td>
<td>Available in left and right and five different lengths (00, 0, 1, 2, 3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ear piece for SlimTube</th>
<th>Dome</th>
<th>Cap dome</th>
<th>one size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Open dome</td>
<td>available in three sizes (S, M, L)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vented dome</td>
<td>available in three sizes (S, M, L)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Power dome</td>
<td>available in three sizes (S, M, L)</td>
<td></td>
</tr>
<tr>
<td>SlimTip</td>
<td>Acrylic</td>
<td>hollow</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silicone</td>
<td>solid</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ear piece for hook</th>
<th>Earmold</th>
</tr>
</thead>
</table>

## Wireless communication portfolio

<table>
<thead>
<tr>
<th>Wireless accessory</th>
<th>TV Connector</th>
<th></th>
<th>Bolero M-M</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Phonak PartnerMic</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phonak RemoteControl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roger</td>
<td>Roger microphones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>App</td>
<td>myPhonak</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phonak Guide</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>myCall-to-Text</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Fitting

<table>
<thead>
<tr>
<th>Bolero M-M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phonak Target</td>
</tr>
<tr>
<td>Noahlink Wireless</td>
</tr>
</tbody>
</table>
Phonak Marvel
BTE coupling guide

Phonak Bolero M

Earhooks

Unfiltered
- HE 11

Filtered
- HE 11 680

SlimTubes
- SlimTube 4.0 (sizes 0, 1, 2, 3)

Coupling options

- Cap Dome
- Open Dome
- Vented Dome
- Power Dome
- BTE SecureFit (Silicone)
- Phonak SlimTip Hard
- Phonak CROS
- Phonak Skeleton
- Phonak Semi-Skeleton
- Phonak Canal
- Phonak Canal Lock
- Phonak Helix Lock
- Phonak Half Shell
- Phonak Carved Full Shell
- Phonak Standard Full Shell
Roger Select™ iN is a versatile microphone ideal for stationary situations where background noise is present. When placed on a table, it discreetly and automatically selects the person who is talking and seamlessly switches from one talker to another. When multiple conversations take place, the listener can manually select whom to listen to. It can also transmit the sound of multimedia devices, e.g. TV.

### Technical Data

<table>
<thead>
<tr>
<th>Type</th>
<th>Roger microphone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (Ø x H)</td>
<td>55 x 12 mm (2.17 x 0.46&quot;)</td>
</tr>
<tr>
<td>Weight</td>
<td>28 g (1 oz)</td>
</tr>
<tr>
<td>Color options</td>
<td>Champagne, Pearl White, Graphite Gray</td>
</tr>
<tr>
<td>Included accessories</td>
<td>Power supply with USB cable, Docking station, Optical audio cable, Clip, Lanyard, Pouch</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>0° to +40° Celsius (+32° to +104° Fahrenheit) Relative humidity of &lt;90% (non-condensing)</td>
</tr>
<tr>
<td>Transport and storage conditions</td>
<td>-20° to +60° Celsius (-4° to +140° Fahrenheit) Relative humidity of &lt;90% for a long period of time</td>
</tr>
</tbody>
</table>

### Device description

- **On/off button incl. battery status light**
- **Microphones and center indicator lights**
- **Center touch key**
- **Six steering touch keys**
- **Microphone mode indicator lights**
- **Install button (for HCP only)**
- **Back indicator light**
- **Connect button**
- **Micro-USB socket**
- **Slots for lanyard and clip**
Roger Pen™ iN

Roger Pen iN is a handy microphone for various listening situations. Thanks to its portable design, it can be conveniently used where additional support is needed over distance and in noise. It can also transmit the sound of multimedia devices, e.g. TV.

Technical Data

<table>
<thead>
<tr>
<th>Type</th>
<th>Roger microphone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (L x Ø)</td>
<td>142 x 15 mm (5.6 x 0.6 ”)</td>
</tr>
<tr>
<td>Weight</td>
<td>28 g (1 oz)</td>
</tr>
<tr>
<td>Color options</td>
<td>Light Sterling, Ruby, Petrol</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>0° to +40° Celsius (+32° to +104° Fahrenheit). Relative humidity of &lt;95% (non-condensing)</td>
</tr>
<tr>
<td>Transport and storage conditions</td>
<td>-20° to +60° Celsius (-4° to +140°Fahrenheit). Relative humidity of &lt;90% for a long period of time</td>
</tr>
</tbody>
</table>
| Battery | Type: Lithium Polymer  
Capacity: 360 mAh  
Voltage: 3.7 V |
| Operating time | 8 hours |
| Power supply | Voltage input: 100-240 V  
Voltage output: 5 VDC / 1A  
Connector: micro-USB  
Cable length: 1.3 m (4.2 feet) |

Device description

1. Indicator light (LED)
2. Microphone
3. Install button (for HCP only)
4. On / off / mute
5. Connect
6. Microphone mode change
7. Charging and audio input (micro-USB)
8. Slot for Roger Pen iN
9. Charging input (micro-USB)
10. Audio input (3.5 mm / 1/8 inch jack)
Roger Pen iN

Features
• Proven Roger speech-in-noise performance
• Fully automatic microphone mode selection
• Manual microphone mode option
• Advanced microphone beamforming
• “Zoom into” soft voices in quiet and over distance
• Audio input for connection to multimedia devices
• Multiple microphone use in a network

Roger installation
Roger Pen iN contains two Roger receivers that can be installed into a pair (two) of Phonak Marvel hearing instruments.

<table>
<thead>
<tr>
<th>Microphone characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Microphone</td>
<td>Array microphone</td>
</tr>
<tr>
<td>Microphone modes</td>
<td>Automatic, Interview, Conference, Handheld</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roger characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission technology</td>
<td>2.4 GHz including adaptive automatic frequency hopping</td>
</tr>
<tr>
<td>Power emission</td>
<td>32 mW</td>
</tr>
</tbody>
</table>
| Operating range            | 10 meters / 33 feet (typical)  
  20 meters / 66 feet (ideal conditions) |

<table>
<thead>
<tr>
<th>Roger system data (Connect)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2.4 GHz</td>
</tr>
<tr>
<td>Connect operating range</td>
<td>10 cm / 3.9 inches</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roger network</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatible Roger receivers</td>
<td>All personal Roger receivers</td>
</tr>
<tr>
<td>Number of Roger receivers</td>
<td>Unlimited</td>
</tr>
</tbody>
</table>
| Compatible Roger microphones| Roger Select, Roger Select iN, Roger Table Mic II,  
  Roger Table Mic II iN, Roger Pen, Roger Pen iN,  
  Roger EasyPen and Roger Clip-On Mic |
| Number of Roger microphones| Up to 10 |

Audio characteristics
<table>
<thead>
<tr>
<th>Audio bandwidth</th>
<th>100 Hz – 7.3 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>El. Safety</td>
<td>IEC / EN 60950-1</td>
</tr>
<tr>
<td>Radiocom 2.4 GHz</td>
<td>EN 300 328</td>
</tr>
<tr>
<td>EMC</td>
<td>EN 301.489-1,-3,-9,-17</td>
</tr>
</tbody>
</table>

Accessories
<table>
<thead>
<tr>
<th>Docking station</th>
<th>Charging input (micro-USB) and audio input (3.5 mm / 1/8 inch jack)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lanyard</td>
<td>Length 56 cm (22 inches)</td>
</tr>
</tbody>
</table>
Phonak PartnerMic

This easy-to-use lapel worn microphone is ideal for one-to-one conversations in noisy environments. It can be attached anywhere close to the speakers voice regardless of directionality or placement. With integrated Phonak AirStream™ technology, clients can benefit from clear speech streamed to their Phonak AirStream compatible hearing aids.

Technical Data

<table>
<thead>
<tr>
<th>Dimensions (L x W x H)</th>
<th>55 x 30 x 18 mm (2.14 x 1.2 x 0.7 ”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>18.2 g (0.04 lbs.)</td>
</tr>
<tr>
<td>Color</td>
<td>Champagne</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>0° to +45° Celsius (+32° to +113° Fahrenheit)</td>
</tr>
<tr>
<td></td>
<td>Relative humidity of &lt;90% (non-condensing)</td>
</tr>
<tr>
<td>Transport and</td>
<td>-20° to +60° Celsius (-4° to +140°Fahrenheit)</td>
</tr>
<tr>
<td>storage conditions</td>
<td>Relative humidity of &lt;95% for a long period of time</td>
</tr>
</tbody>
</table>

Features

- Out of the box pairing
- Always directional regardless of position
- Phonak AirStream technology

Device description

1. Microphone openings
2. Charging input
3. Clip
4. Pairing button
5. Power switch On/Off
6. Indicator light (LED)
### Battery information

<table>
<thead>
<tr>
<th>Type</th>
<th>Lithium Polymer 3.7 VDC. Embedded, not removable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>230 mAh (typ.)</td>
</tr>
<tr>
<td>Operating time</td>
<td>Up to 6 hours streaming</td>
</tr>
<tr>
<td>Charging time</td>
<td>2 hours (typ.)</td>
</tr>
</tbody>
</table>

### Power supply

<table>
<thead>
<tr>
<th>Type</th>
<th>DC, stabilized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary voltage</td>
<td>5 VDC</td>
</tr>
<tr>
<td>Max. current</td>
<td>1 A</td>
</tr>
<tr>
<td>Plug</td>
<td>USB-C</td>
</tr>
<tr>
<td>Important notice</td>
<td>Only use the original Phonak power supply</td>
</tr>
</tbody>
</table>

### Audio information

| Audio quality             | 120 Hz - 7.3 kHz                                 |

### Radio information

<table>
<thead>
<tr>
<th>Streaming technology</th>
<th>AirStream technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>2.4 GHz ISM band</td>
</tr>
<tr>
<td>RF power</td>
<td>20 mW max. (conducted)</td>
</tr>
<tr>
<td>Transmission range</td>
<td>Up to 25 meters / 80 feet</td>
</tr>
<tr>
<td>Max. connected devices</td>
<td>1 pair of hearing aids</td>
</tr>
</tbody>
</table>

### Standards

<table>
<thead>
<tr>
<th>Europe</th>
<th>EN 300 328; EN 301 489; IEC/EN 60601-1-2; IEC/EN 62479; EN/IEC 62368-1; IEC 62133</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>RSS-247; RSS-102</td>
</tr>
<tr>
<td>Japan</td>
<td>ARIB-T66</td>
</tr>
<tr>
<td>USA</td>
<td>CFR 47, part 2.1093; KDB 447498</td>
</tr>
</tbody>
</table>

### Compatibility note

Phonak PartnerMic is only compatible with Phonak direct streaming hearing aids. For further information please visit our website: www.phonakpro.com/PartnerMic
# Technical Data

<table>
<thead>
<tr>
<th>Dimensions (L x W x H)</th>
<th>84 x 32 x 11.5 mm (3.3 x 1.3 x 0.5 “)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>26.4 g (9.3 oz), battery included</td>
</tr>
<tr>
<td>Color</td>
<td>Champagne/black</td>
</tr>
<tr>
<td>Operating conditions</td>
<td>0° to +45° Celsius (32° to 113° Fahrenheit)</td>
</tr>
<tr>
<td>Transport and storage conditions</td>
<td>–20° to +60° Celsius (–4° to +140° Fahrenheit)</td>
</tr>
<tr>
<td>Humidity during storage</td>
<td>0% to 70% (non condensing)</td>
</tr>
<tr>
<td>Humidity during operation</td>
<td>0% to 95% (non condensing)</td>
</tr>
<tr>
<td>Included parts</td>
<td>Lanyard, CR 2032 battery</td>
</tr>
<tr>
<td>Ingress protection</td>
<td>IP52</td>
</tr>
</tbody>
</table>

## Power supply

<table>
<thead>
<tr>
<th>Battery</th>
<th>CR 2032</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating time</td>
<td>12 month at average use</td>
</tr>
</tbody>
</table>

## Radio information

<table>
<thead>
<tr>
<th>Antenna type</th>
<th>Monopole antenna</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation frequency</td>
<td>2.4 GHz – 2.48 GHz</td>
</tr>
<tr>
<td>Modulation</td>
<td>GFSK</td>
</tr>
<tr>
<td>Radiated power</td>
<td>&lt; 2.8mW</td>
</tr>
</tbody>
</table>

## Standards applied

<table>
<thead>
<tr>
<th>Emission standards</th>
<th>CISPR32:2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 60601–1–2:2015</td>
<td></td>
</tr>
<tr>
<td>IEC 60601–1–2:2014</td>
<td></td>
</tr>
<tr>
<td>EN 55011:2009+A1</td>
<td></td>
</tr>
<tr>
<td>CISPR11:2009/AMD1:2010</td>
<td></td>
</tr>
<tr>
<td>CISPR22:1997</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 60601–1–2:2015</td>
<td></td>
</tr>
<tr>
<td>IEC 60601–1–2:2014</td>
<td></td>
</tr>
<tr>
<td>EN 61000–4–2:2009</td>
<td></td>
</tr>
<tr>
<td>IEC 61000–4–2:2008</td>
<td></td>
</tr>
<tr>
<td>EN 61000–4–3:2006+A1+A2</td>
<td></td>
</tr>
<tr>
<td>IEC 61000–4–3:2006+A1+A2</td>
<td></td>
</tr>
<tr>
<td>EN 61000–4–4:2012</td>
<td></td>
</tr>
<tr>
<td>IEC 61000–4–4:2012</td>
<td></td>
</tr>
<tr>
<td>EN 61000–4–5:2014</td>
<td></td>
</tr>
<tr>
<td>IEC 60601–1 (§ 4.10.2):2005</td>
<td></td>
</tr>
</tbody>
</table>

## Legal manufacturer

Sonova AG  
Laubisrütistrasse 28  
CH-8712 Stäfa  
Switzerland
# Part Numbers

## Audéo M Accessories

### Charging Cases for the Audéo M-R
- **Phonak Charger Case Combi**: 075-0040-11
- **Phonak Mini Charger Case**: 075-3009-11
- **Phonak Power Pack**: 071-0003

### Receivers
- **Standard SDS 4.0 0L**: 054-0777
- **Standard SDS 4.0 0R**: 054-0778
- **Standard SDS 4.0 1L**: 054-0779
- **Standard SDS 4.0 1R**: 054-0780
- **Standard SDS 4.0 2L**: 054-0781
- **Standard SDS 4.0 2R**: 054-0782
- **Standard SDS 4.0 3L**: 054-0783
- **Standard SDS 4.0 3R**: 054-0784
- **Medium SDS 4.0 0L**: 054-0801
- **Medium SDS 4.0 0R**: 054-0802
- **Medium SDS 4.0 1L**: 054-0803
- **Medium SDS 4.0 1R**: 054-0804
- **Medium SDS 4.0 2L**: 054-0805
- **Medium SDS 4.0 2R**: 054-0806
- **Medium SDS 4.0 3L**: 054-0807
- **Medium SDS 4.0 3R**: 054-0808
- **Power SDS 4.0 0L**: 054-0812
- **Power SDS 4.0 0R**: 054-0813
- **Power SDS 4.0 1L**: 054-0814
- **Power SDS 4.0 1R**: 054-0815
- **Power SDS 4.0 2L**: 054-0816
- **Power SDS 4.0 2R**: 054-0817
- **Power SDS 4.0 3L**: 054-0818
- **Power SDS 4.0 3R**: 054-0819

### Domes
- **Small Open Dome**: 054-0785
- **Medium Open Dome**: 054-0786
- **Large Open Dome**: 054-0787
- **Small Vented Dome**: 054-0809
- **Medium Vented Dome**: 054-0810
- **Large Vented Dome**: 054-0811
- **Small Power Dome**: 054-0820
- **Medium Power Dome**: 054-0821
- **Large Power Dome**: 054-0822
- **Cap Dome**: 054-0788

### Battery Doors
- **Audéo M-312**: 004-2717-XX1
- **Audéo M-312T**: 004-2756-XX1
- **Audéo M-13T**: 004-8480-XX1

### Hinge Pins
- **Battery door hinge pin - M-312/312T**: 002-0504-1
- **Battery door hinge pin - M-13T**: 002-0039-1
- **Pin Removal Tool**: 002-0404-1

### Color Coding
- **Audéo M-R/RT Color Coding Pin - Blue**: 004-8525-Q61
- **Audéo M-R/RT Color Coding Pin - Red**: 004-8525-R41
- **Audéo M-312 Color Coding Pin - Blue**: 004-2759-071
- **Audéo M-312 Color Coding Pin - Red**: 004-2759-101
- **Audéo M-312T Color Coding Pin - Blue**: 004-2759-071
- **Audéo M-312T Color Coding Pin - Red**: 004-2759-101
- **Audéo M-13T Color Coding Pin - Blue**: 004-2759-071
- **Audéo M-13T Color Coding Pin - Red**: 004-2759-101

### Miscellaneous
- **SDS 4.0 RIC Kit**: 054-0879
- **Rcavr Tool SlimTip 4.0**: 026-1119
- **CeruShield™ Disk**: 098-0445
- **Drying Capsules 4 Pack**: 098-0014
- **Drying Capsules 2 Pack**: 098-0151
### Part Numbers

#### Bolero M Accessories

**Slim Tube HE 4.0**
- SlimTube HE 4.0 00L 054-0884
- SlimTube HE 4.0 00R 054-0885
- SlimTube HE 4.0 0L 054-0794
- SlimTube HE 4.0 0R 054-0795
- SlimTube HE 4.0 1L 054-0796
- SlimTube HE 4.0 1R 054-0798
- SlimTube HE 4.0 2L 054-0799
- SlimTube HE 4.0 2R 054-0823
- SlimTube HE 4.0 3L 054-0824
- SlimTube HE 4.0 3R 054-0825

**Domes**
- Small Open Dome 054-0785
- Medium Open Dome 054-0786
- Large Open Dome 054-0787
- Small Vented Dome 054-0809
- Medium Vented Dome 054-0810
- Large Vented Dome 054-0811
- Small Power Dome 054-0820
- Medium Power Dome 054-0821
- Large Power Dome 054-0822
- Cap Dome 054-0788

**Battery Doors**
- Bolero M-M 042-0177-XX1

**Hinge Pins**
- Bolero M-M Color Coding Pin-Blue 004-2759-071
- Bolero M-M Color Coding Pin-Red 004-2759-101

#### PartnerMic Accessories

**PartnerMic Accessories**
- PartnerMic Pouch 017-0073
- PartnerMic Neckcord 052-0702

**XX=Colors for Audéo M and Bolero M**
- HO-Beige
- P1-Sand Beige
- P3-Sandalwood
- P4-Chestnut
- P5-Champagne
- P6-Silver Gray
- P7-Graphite Gray
- P8-Velvet Black
- T7-Alpine White
Phonak Insight

Phonak AutoSense OS™ 3.0
The new and enhanced automatic operating system

Today’s world is a busy and “acoustically dynamic” place making it challenging to hear, understand and actively engage in, especially for a hearing impaired listener. The Phonak automatic program has been designed to adapt seamlessly based on the acoustic characteristics of the present environment and the benefit is well established. AutoSense OS™ 3.0 is the enhanced automatic operating system in Phonak Marvel™ hearing aids. It delivers clarity and quality of sound enabling the wearer to actively participate in everyday life.

July 2018

Optimal sound quality in every listening environment is always the goal of hearing aid manufacturers and hearing care professionals alike. “Hearing well in a variety of listening situations is rated as highly important to hearing aid wearers and has a direct impact on the satisfaction of hearing aid use throughout daily tasks and listening environments.” (Kochkin, 2010).

Previously, the sound processing of hearing aids was limited to one amplification setting used for all situations. However, since the soundscape around us is dynamic, where the acoustical environment changes frequently, it is unrealistic for a hearing aid with only one amplification setting to deliver maximum benefit in every environment. The evolution of hearing aids has seen the introduction of sound cleaning features such as, noise cancellation, dereverberation, wind noise suppression, feedback cancellation and directionality. These features offer maximum benefit to overall sound quality and speech intelligibility when they are appropriately applied, based on analysis of the sound environment. Rather than having these sound cleaning features permanently activated, their impact is greatest when they are applied selectively. For example, a wearer may not hear oncoming traffic if noise cancellation is permanently suppressing sound from all directions. Thus, defaults are set in the system for different environments.
Of course the possibility exists to have manual programs added to accommodate acoustic characteristics of specific listening environments, i.e. an "everyday" program with an omnidirectional microphone enabled and a "noise" program with a directional microphone enabled, however having several manual programs increases the complexity for the hearing aid wearer. Research data shows the increasing preference of wearers for automatically adaptive sound settings over manual programs for different environments (Rakita and Jones, 2015) and this is further confirmed by data-logging statistics which reveal a decline in manually added programs with the launch of newer technology platforms. (Phonak AG. ID2017 -04, 2017).

![Figure 1. Market research data 2017: Percentage of fittings with manual programs at 2nd session across hearing aid platforms Spice/Spice+, Quest, Venture, Belong (n = 183'331)](image)

**First generation AutoSense OS**

Results of studies focusing specifically on speech intelligibility also show that the majority of participants achieve a 20% improvement in speech understanding whilst listening in AutoSense OS than in a "preferred" manual program across a wide variety of listening environments, suggesting that manual programs may not always be appropriately or accurately selected (Überlacker et al., 2015). Even more interesting is the fact that users rate sound quality as being equal between the automatic and manual programs (Rakita and Jones, 2015). According to Searchfield et al. (2017), a possible explanation for this may be that the practical application of selection relies on the wearer’s manual dexterity, normal cognition, noticeable benefit and motivation levels. Furthermore, their research confirms a bias towards selection of the first program in the setup, whether or not this would be considered “audiologically” optimal.

When Phonak AutoSense OS was originally developed, data from several sound scenes was recorded and used to "train" the system to identify acoustic characteristics and patterns. These characteristics include level differences, estimated signal-to-noise ratios and synchrony of temporal onsets across frequency bands, as well as amplitude and spectrum information. Probabilities of the degree of match between "trained" versus "identified" acoustic parameters in real time are then calculated for the most optimal selection of sound settings in each environment. There are seven sound classes: Calm Situation, Speech in Noise, Speech in Loud Noise, Speech in Car, Comfort in Noise, Comfort in Echo, and Music. Three of the programs, Speech in Loud Noise, Music, and Speech in Car, are "exclusive classes," whilst the other four programs can be activated as a blend, when it is not possible to define complex, real world environments by one acoustic classification. For example, Comfort in Echo and Calm Situation can be blended with respect to how much each of these classifications are detected in the environment.

**Audéo Marvel and AutoSense OS 3.0**

With AutoSense OS 3.0 Phonak has gone a step further and incorporated data from even more sound scenes for the classes Calm Situation, Speech in Noise and Noise into the training for additional robustness of the system. Enabling the desired signal processing is the goal of AutoSense OS 3.0, so to support the wearer’s understanding of speech in noise situations the program Speech in Noise is activated even earlier than before.

**Audiological improvements**

AutoSense OS 3.0 is the foundation for steering the signal processing and applying the most appropriate setting for the wearer based on the acoustics present in the environment. Refinements to the audiological settings within this are always sought to further enhance the user experience and the improvements occur in different areas of the signal processing.

In order to maintain the natural modulations of speech in noise as well as streamed media dual path compression is available and activated based on the listening environment. This means that the temporal and spectral cues in speech are easier for the wearer to identify and use (Gatehouse, Naylor, and Elberling, 2006).
We know that a full and rich sound is preferred by wearers whilst streaming and have therefore further enhanced the sound quality of streamed audio signals by increasing the vent loss gain compensation. This increases the low frequency gain by up to 35dB which is especially beneficial to overcome the vent loss of a RIC hearing aid most likely to be fitted with an open coupling due to the hearing loss or client comfort. This low frequency "boost" is applied to streamed signals (or any other alternative input source, e.g. Telecoil) whilst inputs received directly to the hearing aid microphones remain uncompromised, maintaining the frequency response of a Calm situation.

Adaptive Phonak Digital for Audéo Marvel has been enhanced for spontaneous first fit acceptance. The gain for first time wearers starting at an adaptation level of 80% has been softened for frequencies above 3kHz in order to reduce reported shrillness but without compromising speech intelligibility. The desired effect of this is that the wearer experiences a comfortable sound quality from the outset.

**Classification of media signals**

Listening to music and enjoying it is achieved by an alternate setting than that used to attain optimal speech understanding. In an internal study conducted at the Phonak Audiology Research Center (PARC), participants emphasized their preferences for clarity of speech for dialogue-dominated sound samples and sound quality for music-dominated samples (Jones, 2017). This preference applies not only in the acoustic environment where signals reach the hearing aid microphones directly, but also for streamed media inputs via the Phonak TV Connector or Bluetooth connection to a mobile device.

Phonak Audéo Marvel with AutoSense OS 3.0 now incorporates streamed inputs into the automatic classification process offering the wearer speech clarity as well as an optimal music experience. A recent study conducted at DELTA SenseLab in Denmark confirmed that the new Audéo Marvel in combination with the TV Connector is rated by wearers as close to the ideal profile of sound attributes for streamed media across a range of samples including, speech, speech in noise, music and sport (figure 3). The Audéo Marvel streaming solution was also rated among the top streaming solutions across 7 competitor solutions (Legarth et al., 2018). This confirms that the way in which Phonak Audéo Marvel now classifies streamed media into the sound classes Speech versus Music is yet another way in which AutoSense OS 3.0 provides ideal hearing performance for wearers in their everyday life.

**Binaural VoiceStream Technology™**

Our sophisticated Binaural VoiceStream Technology has been reintroduced into Audéo Marvel with AutoSense OS 3.0. This technology facilitates binaural signal processing such as binaural beamforming and enables programs and features such as Speech in Loud Noise, Speech in 360° and DuoPhone. The ability to stream the full audio bandwidth in real time and bi-directionally across both ears improves speech understanding and reduces listening effort in challenging listening situations (Winneke et al., 2016).

**Summary**

The ability of a hearing aid to automatically adapt to multiple situations increases the adoption rate of the hearing aid, indicating that "hands-free" listening is possible and acceptable (Kochkin, 2010). The enhanced AutoSense OS 3.0 achieves this by selecting the most appropriate settings for the wearer optimizing hearing performance in all listening environments, and now during media streaming too. The hearing aid wearer is freed from expending energy on effortful listening and can focus their enjoyment instead on tasks which are more meaningful to them, secure in the knowledge that their hearing aids will automatically take care of the rest.
References


Authors

Tania Rodrigues qualified as an Audiologist at the University of Cape Town, South Africa. She gained diverse experience in clinical practice working within both the public and private sectors in the United Kingdom, before joining Phonak in 2013. She is now the Audiology Training and Education Manager at Phonak HQ, Switzerland.

Sascha Liebe has been working within the R&D department since 2005. His main tasks are the optimization of the audio quality, features, and automatic steering of the hearing system. He worked as an HCP before joining Phonak and has a Dipl.-Ing. FH from the University of Applied Sciences Luebeck.
Phonak
Field Study News

Media streaming: The sound quality preferred by hearing aid users

This study conducted at DELTA SenseLab in Denmark reveals that the latest solution for television listening from Phonak, the Audéo™ Marvel hearing aids in combination with the TV Connector, is regarded among the best for streamed sound quality. The enhanced AutoSense OS™ 3.0 now includes classification of streamed signals and is rated as the overall preferred solution and very close to the sound quality described by hearing aid wearers as “ideal.”

Tania Rodrigues / July 2018

Introduction

Preferences for media consumption vary across generations with overall time spent increasing in older adults and driven by traditional television and radio sources (Nielsen, 2017). According to the New York Times online, the average American spends just over 5 hours of their day watching media, whether that be live television or streamed content, with people over the age of 50 years watching the most — around 50 hours per week (Koblin, 2016). This phenomenon is not limited to one particular country. By the year 2021, it is projected that 1.68 billion households worldwide will own at least one television. For seniors, watching television has been shown to have positive benefit, offering “an active way to remain socially integrated, to structure daily life, and to satisfy needs for reflection and contemplation” (Oestlund, Jönsson & Waller, 2010). Unfortunately for those with hearing loss, watching television can be a frustrating experience for various reasons.

Firstly, volume preferences for different listeners within a household vary. In a survey conducted in 2015, 45% of respondents reported that one of their main difficulties when watching television was that when they set the volume to a comfortable level, others complained that it was too loud (Strelcyk et al., 2015). To overcome this, hearing aid wearers now have the option to connect their hearing aids with an audio streaming solution, streaming the input directly and wirelessly to their hearing aid. This allows them to control their preferred volume independently of that which is set for other listeners.

Further reasons for frustration according to Strelcyk et al. (2015) include the fact that actors may have foreign accents, loud background music is often present, and a lack of visual cues can make understanding speech difficult.
Automatic and adaptive classification of sound has become standard practice for processing acoustic input signals reaching hearing instrument microphones directly. Phonak set the bar with AutoSelect in the Claro platform in the late nineties and we have continued to enhance the sound experience to meet the needs of the wearer in their everyday listening environments through AutoSense OS over the years. Studies on sound performance reveal that hearing aid wearers consistently rate the speech clarity in noise produced by the program or blending selection of the AutoSense OS classifier as 20% better than that of the manual program selected by the wearer. (Übelacker & Tchorz, 2015) – but what about the need for classification of streamed signals? To date, the processing of streamed media sound has not taken into account the fact that, similar to acoustic signals, media signals also vary in their sound characteristics. Up to now, streamed signals have been processed uniformly using one program, based on acoustical characteristics present in a calm situation. However, statistics show that drama series, reality TV shows, and international sporting events comprised the most watched TV programs in the mid-2010’s (Statista, 2017) – and these broadcasts are composed of a combination of speech only, speech in noise/music, or music only inputs.

In an internal study conducted at PARC (Phonak Audiology Research Center) in the USA, participants emphasized separate preferences for clarity of speech for dialogue-dominated sound samples versus sound quality for music-dominated samples. This applied not only for the acoustic input through the hearing aid microphones but also for media directly streamed to the hearing aid (Jones, 2017).

A previous study revealed that the Phonak TV Connector, in combination with the Audéo B-Direct hearing aids, outperformed its competitors in terms of preference, in particular for television broadcasts containing speech. It also showed sound quality of the system to be very close to the ideal profile, as defined by hearing aid wearers (Legarth et al., 2017). Since this study, AutoSense OS functionality has been expanded. AutoSense OS 3.0 now also includes the classification of media streaming into the sound classes, Speech vs Music, based on the nature of the signal (i.e. dialogue versus music dominant). The purpose of the following study was to benchmark the impact of this innovation against a prior product as well as current competitive solutions.

### Methodology

#### Participants

Fifteen trained hearing impaired participants with mild to moderate hearing loss were recruited for the study; 9 male and 6 female, with a mean age of 75 years (range: 67–84 years). All participants were native Danish speakers and experienced hearing aid wearers, considered expert listeners as a result of training and familiarization with listening tasks received prior to the study (Legarth et al., 2012).

#### Equipment

Participants tested 7 different hearing aid and respective TV streaming solutions. These included the new Phonak Audéo Marvel hearing aids, Phonak Audéo B-Direct hearing aids, and the latest premium hearing aids from 5 competitors. The recommended default first fit using closed SlimTips was selected for all hearing aids and frequency lowering algorithms were turned off, if available. The Phonak fittings deviated in one parameter from the recommended fit in that the RECD was adjusted to match that of KEMAR (Knowles Electronics Manikin for Acoustic Research) in order to reduce variability and equalize settings across manufacturers.

The streaming program was activated on manual button press for all hearing aids (where available), and it was configured to have both streamed and acoustic input in the manufacturers’ recommended balance.

All hearing aids were wirelessly paired to their corresponding TV streaming devices which were connected via cable to a 49” Samsung TV. The TV was connected via HDMI to a lab PC and the original uncompressed audio stream of the broadcast samples were transmitted from Adobe Audition 3.0 running on the lab PC via the TV streamers to the hearing aids.

Six different audio-visual TV broadcast samples were selected as representative of a range of Danish television material to test the streaming solutions, including speech only, music only, and various speech in noise samples (Table 1).

Recordings of the output of all 7 pairs of hearing aids and corresponding TV streamers were made in a standardized room on a KEMAR. Participants listened to the audio recordings via calibrated headphones whilst watching the corresponding time-aligned video recordings on TV.
Procedure
After recordings had been produced, the study was executed in 4 steps:

(1) The 6–8 relevant attributes for the perceptual evaluation of the hearing aid media streamers were identified. The attributes were required to capture the key characteristics that differentiated the hearing aid streamers in the test. Therefore, six of the participants attended a preliminary appointment and were presented with all recordings of the streamers and took part afterwards in a consensus meeting, which led to the attributes, anchors and definitions that would be used for the evaluation of the hearing aid profiles. The attributes which were identified and their descriptions are as follows:

- **Bass** — the deep tones. A sound perceived as thin and tenuous has little Bass. A sound perceived as dark and deep has a lot of Bass.
- **Treble** — the bright tones. A little Treble can sound like “listening under a quilt” where details disappear. A lot of Treble can sound like lisping and sometimes sharp and shrill.
- **Reverberation** — a lot of reverberation sounds as if the sound does not die out. If an echo is heard, this would be a lot of reverberation.
- **Naturalness** — is the sound stream natural and realistic in relation to content shown on the TV?
- **Dynamics** — an expression of how lively the sound is perceived. Flat dynamics means the content sounds flattened and less intrusive. Varying Dynamics can sound alive and seem more realistic.
- **Details** — do details disappear and are blended and muddy? Or are details distinct and clear with high separation? High separation can contribute to better speech intelligibility of the voice.

(2) An overall evaluation of preference was made for all seven hearing aid streamers with the six broadcast samples. All 15 participants completed the preference test twice, in order to check for reliability. Participants rated their preference (double-blind randomization) using SenseLabOnline™ (a proprietary software for facilitating listening tests), on a scale ranging from 0 = dislike extremely to 15 = like extremely. All samples were equalized for loudness to avoid bias.

(3) The second step was a double-blind randomization test and involved all 15 participants. Study participants identified the preferred rating for a given attribute using SenseLabOnline. The software guided the participant through so that they would rate all hearing aids with corresponding streaming solution for each broadcast sample, for each given attribute. Following this, participants then determined the ideal point for each attribute based on their experience with the different sound samples. This created an ideal profile.

(4) Overall preference ratings were then retested and shown to be consistent with the original ratings indicating a high test reliability.

Results
**Phonak Audéo Marvel with the TV Connector is a close match to the ideal profile**
The profile plot in figure 1 shows the ideal profile which the test participants defined across all 6 sound samples as described above. The ideal rating of the different attributes reflects the average rating which subjects would expect to be optimal. The Ideal profile is characterized by:

- Balanced Timbre and Bass
- Medium level Reverberation
- Less than medium Sharpness
- A high level of Dynamics, Details and Naturalness

![Figure 1. The Ideal sound profile across all 6 sound samples, as defined by the test participants.](chart)
Figure 2 shows the profile plot which the participants defined for the Phonak Audéo Marvel hearing aids paired with the TV Connector and which is a very close match to the Ideal profile.

Only one of the 5 competitor solutions produced a profile plot which is similar to that of Phonak and hence similar to the Ideal profile, although participants also rated this solution as Sharper than the preferred Ideal and Phonak Audéo Marvel solution.

Figure 2. The profile of Audéo M hearing aids paired with the TV Connector and overlaid onto the Ideal profile.

Phonak Audéo Marvel with TV Connector is preferred over competitor solutions

Although not statistically different from two competitors, an overall preference for the Phonak Audéo Marvel solution was documented by test, re-test design as shown in figure 3.

Figure 3. Overall preference ratings averaged for all broadcast samples used, showing high re-test reliability.

Conclusion

Market research reveals television watching to be a popular activity enjoyed worldwide. Hearing aid wearers report frustrations relating to differing volume preferences within the household, as well as a lack of speech clarity and visual cues, whilst watching television.

Wearers rate Speech Clarity, for dialogue-rich inputs, and Sound Quality, for music- and/or noise-dominant broadcasts, as their two main preferences when streaming audio media (Jones, 2017).

Phonak Audéo Marvel hearing aids paired with the TV Connector closely matches the ideal profile for streamed media and is rated among the top streaming solutions for hearing aid wearers. This demonstrates that the unique way in which Phonak Audéo Marvel with AutoSense OS 3.0 is now able to classify streamed media is yet another way in which Phonak technology provides ideal hearing performance for wearer’s in their everyday life.

References


Authors and investigators

External principle investigator

Søren Vase Legarth graduated from the Technical University of Denmark in 2004 as M.Sc.E.E. with key interest and attention towards Acoustics. After graduation he was employed at the acoustics department in DELTA and in 2007 when SenseLab was started he had the responsibility of setting up a trained test panel, lab facilities and develop test software. In 2011 he became Head of Department.

Internal principle investigator

Matthias Latzel studied electrical engineering in Bochum and Vienna in 1995. After completing his PhD in 2001, he carried out his PostDoc from 2002 to 2004 in the Department of Audiology at Giessen University. He was the head of the Audiology department at Phonak Germany from 2011. Since 2012 he is the Clinical Research Manager for Phonak AG, Switzerland.

Author

Tania qualified as an Audiologist at the University of Cape Town, South Africa. She gained diverse experience in clinical practice working within both the public and private sectors in the United Kingdom, before joining Phonak in 2013. She is now the Audiology Training and Education Manager at Phonak HQ, Switzerland.
Installing Roger receivers into a pair of hearing devices with RogerDirect™

Make sure the hearing instrument contains the latest FW that is available in Phonak Target 6.1 or higher.

Installation steps:
1. Switch on the Roger iN microphone
2. Press and hold the install button for two seconds until the indicator light starts to blink green:
3. Place the Roger iN microphone on the table
4. Switch on one hearing device (keep other hearing devices switched off)
5. Place the hearing device close to the Roger iN microphone (within 10 cm / 4 inches)

6. Wait approximately 5 seconds until the indicator light on the Roger iN microphone turns solid green

7. Repeat step 2. to 6. with the second hearing device.

Note: The hearing device(s) will automatically be connected to the Roger iN microphone.

In case the indicator light turns red after the installation procedure, the installation was not successful. This could be for the following reasons:
- The distance between the Roger iN microphone and the hearing device was too far
- There are no Roger receivers installed on the Roger iN microphone
- The hearing device already has Roger installed
- The hearing device is not RogerDirect compatible.

Checking number of Roger receivers in a Roger iN microphone

After turning on the Roger microphone, briefly press the install button on the Roger iN microphone:

Roger Select iN
Roger Table Mic II iN
Roger Pen iN

The indicator light feedback will tell you the number of installed Roger receivers:
- Two Roger receivers installed
- One Roger receiver installed
- No Roger receiver installed
Uninstalling Roger receiver from a hearing device

Uninstallation steps:
1. Switch on the Roger iN microphone
2. Press and hold the install button for two seconds until the indicator light starts to blink green
3. Place the Roger iN microphone on the table
4. Switch on one hearing device (keep other hearing devices switched off)
5. Place the hearing device close to the Roger iN microphone (within 10 cm / 4 inches)
6. Wait approximately 5 seconds until the indicator light on the Roger iN microphone turns solid green
7. Repeat step 2 to 6 with the second hearing device if needed.

In case the indicator light turns red after the uninstallation procedure, the uninstallation was not successful. This could be for the following reasons:
- The distance between the Roger iN microphone and the hearing device was too far
- The Roger iN microphone has already two Roger receivers installed
- The hearing device does not have Roger installed
- The hearing device is not RogerDirect compatible.
RogerDirect demo guide

This guide is to assist you in quickly (10 minutes) and easily demonstrating the benefits of the Roger Select iN for your patients using Phonak Marvel hearing instruments.

Equipment needed
- Round or rectangular table, size approximately 1 meter / 3 feet in diameter/length if possible
- Roger Select iN microphone
- Loudspeaker to create noise, connected to a computer (Ex: Party noise file from Phonak Target media software)
  It's also nice to have a Roger MyLink with headphones available for patient’s family or friend(s) to experience demo

Preparation
1. Make sure the equipment is well charged
2. Place the noise speaker approximately 2 meters / 6 feet away from the center of the table and calibrate the noise level to around 70 dBA at the center of the table

Getting started
1. Install Roger™ in both Phonak Marvel hearing instruments and remember to uninstall after the demonstration
2. Invite the patient and family or friend(s) to sit around the table

<table>
<thead>
<tr>
<th>Do</th>
<th>Say</th>
</tr>
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<tbody>
<tr>
<td>1. Switch on the Roger Select and place it in the center of the table</td>
<td>This is Roger Select, a versatile microphone ideal for stationary situations where background noise is present. As you can see, Roger Select picks up each speaker's voice around the table. Roger Select immediately switches the beam in the direction of the current talker. It quickly reacts to changing talkers, keeping you in the conversation. Let's see how the Roger Select performs in noise. I am going to add some noise.</td>
</tr>
<tr>
<td>2. After switching on the noise, wait 10 seconds for the Roger Select to adapt to the noise</td>
<td>Roger Select immediately switches the beam in the direction of the current talker. It quickly reacts to changing talkers, keeping you in the conversation. (If family or friend(s) are present, ask them to say something too.)</td>
</tr>
</tbody>
</table>
# RogerDirect demo guide

<table>
<thead>
<tr>
<th>Do</th>
<th>Say</th>
</tr>
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</table>
| 3. Tap the segment that points in your direction | *(Ask a family member or friend to count to 20.)*  
*In case of a side conversation, you can select who you want to hear. So you can hear me clearly but not the person counting.*  
*(Point in direction of client / other person.)*  
*When you tap the center, the all-around microphone activates and you can hear everyone at the table.*  
*Please try it out yourself.* *(Let patient play with the steering functionality.)* |

| 4. Add clip and place Roger Select on your chest | When you communicate with a single person, then you can clip Roger Select on the chest of your conversation partner. This allows you to move freely as you go shopping or driving in the car. Roger Select detects that it is worn by a speaker and automatically activates the beam that points upward. |

If your patient would like to hear about other options, briefly explain the other Roger microphone. If needed, also demo the key functionalities of the other Roger iN microphone.

## Roger Pen iN

A handy microphone for various listening situations where additional support is needed over distance and in noise.
References


9. IP68 indicates that the hearing aid is water resistant and dust tight. It survived continuous immersion in 1 meter of water for 60 minutes and 8 hours in a dust chamber as per the IEC60529 standard. No traces of dust were evident within the housing.

10. Actual charge time depends on the remaining battery life, but it will not exceed 3 hours.

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At Phonak, we believe that hearing well is essential to living life to the fullest. For more than 70 years, we have remained true to our mission by developing pioneering hearing solutions that change people's lives to thrive socially and emotionally. Life is on.

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