The international modern standard for clinical acoustic and video speech and voice assessment, analysis and biofeedback
lingWAVES - A Modular System for Voice and Speech

lingWAVES is one of the most frequently used systems for professional voice and speech analysis, biofeedback and documentation worldwide. A combination of standard and new technology for analysis and processing together with easy operation are the key features of this unique system.

The system consists of different acoustic and video modules managed by one client based application with complementary and tested hardware for high level standardization and comparability. A client manager organizes patient/client based analysis and documentation with the benefit of comparing and tracking clinical assessment over time.

The modular character of lingWAVES allows a choice of different module combinations (suites), so the system can be used by a wide range of professionals, including speech/language therapy/pathology, otolaryngology/ENT/phoniatriks and services for professional singers and speakers. lingWAVES modules can also be upgraded at any time.

Visit our web page for up-to-date information:

► www.lingWAVES.com

► Reference for more than 400 articles/books > see latest publications: WEVOSYS > knowledge
► 100% conform to ASHA > “Recommended Protocols for Instrumental Assessment of Voice”
# lingWAVES Acoustic Sets & Suites

## Upgrade Option

<table>
<thead>
<tr>
<th>Hardware</th>
<th>TheraVox</th>
<th>Voice Protocol</th>
<th>SLP Suite Pro VPR</th>
<th>Voice Clinic Suite Pro</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiFi USB microphone</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>lingWAVES Connector USB + SPL meter-microphone - real SPL</td>
<td>✓ + table tripod</td>
<td>✓ + table tripod</td>
<td>✓ + large tripod</td>
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## Basis

<table>
<thead>
<tr>
<th>Option</th>
<th>TheraVox</th>
<th>Voice Protocol</th>
<th>SLP Suite Pro VPR</th>
<th>Voice Clinic Suite Pro</th>
</tr>
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<tbody>
<tr>
<td>Voice Recording</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Comparison of Recordings</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Client Manager</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Report/Print Out Function</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Screen Shot Function</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Client and Database backup</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Voice Disorder Index/VHI-12</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
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## Visual Biofeedback

<table>
<thead>
<tr>
<th>Option</th>
<th>TheraVox</th>
<th>Spectrogram Real Time</th>
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</thead>
<tbody>
<tr>
<td>TheraVox</td>
<td>✓</td>
<td>✓</td>
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## Extended Voice Analysis

<table>
<thead>
<tr>
<th>Option</th>
<th>TheraVox</th>
<th>Voice Protocol</th>
<th>SLP Suite Pro VPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectrogram Pro, Jitter, Shimmer</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>LPC, AMDF, Cepstrum, Autocorrelation, LTAS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Voice Protocol (with s/z, MPT, voice quality, pitch, DSI, speaking profile, real-time pitch/loudness)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Vospector voice quality measurement</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Göttingen Hoarseness Diagram (GHD)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Multi Real Time</td>
<td>✓</td>
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<td>✓</td>
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</tbody>
</table>

## Motor Speech (Diadochokinetetic)

<table>
<thead>
<tr>
<th>Option</th>
<th>TheraVox</th>
<th>Voice Protocol</th>
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</thead>
<tbody>
<tr>
<td>Motor Speech Disorder Assessment</td>
<td>✓</td>
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## Voice Range Profile

<table>
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<tr>
<th>Option</th>
<th>TheraVox</th>
<th>Voice Protocol</th>
<th>SLP Suite Pro VPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDC - Extended Singing Voice Range Profile with Voice Quality Profile (Irregularity, Noise, Overall Severity, Vocal Ring/Singer’s Formant)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>VDC - Extended Speaking Voice Range Profile with Profile Slope Calculation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Vospector - DSI (Dysphonia Severity Index)</td>
<td>✓</td>
<td>✓</td>
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</table>

## Vocal Load Test

<table>
<thead>
<tr>
<th>Option</th>
<th>TheraVox</th>
<th>Voice Protocol</th>
<th>SLP Suite Pro VPR</th>
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</thead>
<tbody>
<tr>
<td>Vocal Load Test</td>
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## System Requirements (2018-07)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
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<tbody>
<tr>
<td>TheraVox</td>
<td>Desktop/notebook with Windows 10, 16 GB RAM, i5/i7 processor, 500 GB hard drive, one free USB port - tested and recommended desktop/notebook can be offered - ask your distributor</td>
</tr>
<tr>
<td>SLP Suite Pro VPR</td>
<td></td>
</tr>
<tr>
<td>Voice Clinic Suite Pro</td>
<td></td>
</tr>
<tr>
<td>Upgrade Option</td>
<td></td>
</tr>
</tbody>
</table>
**lingWAVES Acoustic Modules - Overview**

**Client Manager**
A basic feature within lingWAVES for all modules is an easy to use client management, especially useful for clinical applications. Setup a new client or choose an existing one within the manager and perform your sessions. All data will be stored automatically in a database.

Based on this client management system you will be able to compare assessment and diagnostic results over time as pre/post or time line. Use the built-in backup function for data protection.

**Phonetogram VDC**
Latest and most advanced technology for extended voice range profile measurement can be found in lingWAVES Phonetogram VDC. Speaking and singing profile in combination with DSI and time line tracking are outstanding features. This worldwide unique commercial system tracks also voice quality during singing profile assessment in real-time. Software and included recording hardware comply with international norms (UEP, NCVS)

**Voice Protocol**
Revolutionary and Unique - a quick and easy 10 minute standard voice assessment protocol - gives reliable and objective measures for voice assessment tasks used worldwide.

A must - have for every clinic - whether you are a voice specialist or only see an occasional voice or Parkinsons client. Saves time in gathering and analyzing data instantaneously and provides a clear instant printed report including progress tracking, norms and outcomes

**Vospector**
The Vospector measures the voice quality of a patient and objectively represents it analogous to the RBH scale. lingWAVES Vospector measurements made on sustained vowels include minimum, maximum, average and standard deviation for fundamental frequency, jitter, shimmer and GNE (glottal to noise excitation ratio - the new reliable clinical measurement of vocal fold airstream noise).

Separate measurements “add up” to yield further voice parameters like irregularity, noise and overall severity of dysphonia that can be regarded as objective counterparts to R (roughness), B (breathiness) and H (hoarseness) components of
the RBH/ORB (Cape-V) rating system for the perceptual evaluation of dysphonia - see more ...

**Motor Speech Disorder Assessment**

Motor Speech Disorder Assessment (MSDA) is a latest technology tool to analyse speech parameters of motor speech disorders automatically. The new technology enables analysis of speech in a diadochokinetic (DDK) tasks within seconds. The result is an understandable report of numerical parameters and time line tracking at a glance - see more ..

**Voice Disorder Index (VHI-12)**

The Voice Disorder Index (VDI/VHI-12) has been established as a reliable tool for measuring voice related quality of life. The purpose of the VDI is to provide some preliminary information regarding the severity of voice problem as it relates to the most common activities in daily life. The VDI/VHI-12 correlates well with the original VHI \((r=0.98)\), but is more easy to use for patients and clinicians because of the reduced amount of questions - see more ..

**Spectrogram Real Time**

Sound spectrographs are a standard tool in voice diagnostics and also used as biofeedback. With lingWAVES Spectrogram Real Time, you can create a real time spectrograph while you are recording a patient’s voice. The display shows a spectrogram - in real time - see more ..

**Multi Real Time Display**

Multi Real Time is an extended Real Time Spectrogram which also displays fundamental frequency/pitch and energy during signal recording. Multi Real Time shows acoustic parameters such as time signal, spectrogram, pitch and energy during voice and speech production without time delay in real time. This tool is often used to compare vocalization and pronunciation between speech pa-
lingWAVES offers several modules for standard and extended voice signal analysis like long term (energy, spectrogram, spectrogram pro, pitch, shimmer, jitter) and short term analysis (FFT, LPC, LTAS, AMDF, autocorrelation, cepstrum). It is easy to add voice analysis to each recorded voice signal. The whole analysis will automatically be saved in a project file. This means that you can reopen the voice record with the same analysis you have done before.

**Vocal Load Test**

The new lingWAVES vocal load test controls vocal load and endurance of the speaking voice. This test gives important and reliable information about voice constitution, now tracking voice quality information as well as volume and pitch in real-time - see more ...

**TheraVox Visual Biofeedback**

TheraVox is a delightful highly recommended computer speech therapy tool made with beautiful graphics for both children and adults. It is a series of motivating games/activities in which voice and speech elements like voicing, voice onset, loudness, articulation, co-articulation and prosody are transformed into real time graphics. The patient gets visual feedback for qualitative and quantitative attributes of his voice and speech, which is of crucial importance for enhancing self-monitoring skills within the context of speech therapy - see more ...

**Clinical Pre/Post Comparison**

Almost all acoustic modules within lingWAVES are made for clinical practice. This includes beside a reliable voice assessment also functionality...
for pre/post documentation. Voice Protocol, Pho
togram VDC, Vospector, MSDA are such modules
offering pre/post and/or time line displays.

It’s a breeze to compare and document two re-
cordings with the multi-window view of lingWAVES.
You can arrange 2 or more recordings in different
windows with additional acoustic analysis.

**lingWAVES Hard- und Software**
If we say lingWAVES is a "system", it means
that you not only get a piece of software and you
have to take care about recording hardware - ling-
WAVES systems are delivered with tested, stan-
dardized and advanced audio capture plug-and-play
USB hardware optimized for clinical recordings
(UEP, ASHA and NCVS conform*). The complete
set makes sure that you can do reliable and com-
parable assessment, diagnostics and documenta-
tions - even if you use different computers or you
do your assessment at different places.

lingWAVES is a CE marked and a cer-
tified EU medical product class.

**Service and Support**
Our professional service and support is a big
advantage for all lingWAVES customers. Find the
latest lingWAVES updates, FAQ and remote sup-
port on our web page. Contact our worldwide dis-
tributors or us for a short term help for problems
and questions.

www.wevosys.com - www.lingWAVES.com

* UEP - Union of European Phoniatrics,
ASHA - American Speech-Language-Hearing Associa-
tion: Protocol for Instrumental Assessment of Vocal Func-
tion, NCVS - National Center for Voice and Speech
lingWAVES smartENDOSTROBO

A Complete System
With the new module smartENDOSTROBO lingWAVES is one of the most complete systems for clinical acoustic and video speech and voice assessment. The system is based on the latest device generation and most modern technology and supports all endoscopic - stroboscopic applications in the field of ENT/Otolaryngology.

World innovation Made in Germany: First USB controlled and powered strobo-light unit (thumb thick unit!). A system compact and portable thanks new smart hardware technology - complete unit fits to a notebook case!

Key Features
- Excellent image quality
- New smart LED light technology, perfect illumination, no heat
- Usable for rigid and flexible endoscopes / FEES, universal adapter
- Modern and up-to-date lingWAVES application, digital documentation system, uniform and clear design, client management, 1-2-3-4 workflow
- Snapshot, cycle frame-by-frame and videokymography report
- Noiseless, flicker-free stroboscopic and audio recordings
- Updates & support for strobo hardware and lingWAVES application
- Standard USB 2.0 connector, LED powered by computer, mobile use (e.g. in-patient)
- DigiCam camera for digitalization fully integrated in lingWAVES
- www.smartENDOSTROBO.com

System requirements: Desktop/notebook with Windows 10, 16 GB RAM, i5/i7 processor, 500 GB hard drive, one free USB port - lingWAVES smartENDOSTROBO can be delivered with tested desktop/notebook, ask your distributor
**lingWAVES Nasality**

**Nasality - Nasalance**
lingWAVES Nasality is a new high technology module within the lingWAVES voice and speech system for professional users. It is non-invasive and measures and gives feedback about the presence of nasality in speech production. It measures the degree of velopharyngeal opening during voiced speech - also known as nasalance.

**New Mask System**
Compared to other traditional systems which have some form of plate separation between the mouth and nose, lingWAVES Nasality uses a new dual wall cushion nose mask with a lightweight durable flexi-tube for a higher acoustic separation between nose and mouth signal. It also uses an improved measurement algorithm for nasalance with real time calculation.

**Nasalance Measure & Display**
The insufficiency of velopharyngeal closure during vowels and sonorants that causes nasal resonance can be estimated and displayed for evaluation/measurement or biofeedback in speech training of the nasalance of the voice, with nasalance defined as a ratio of acoustic energy at the nares or nostrils to that at the mouth.

**Biofeedback**
After starting the module, users can display clients’ nasalance level in real time represented by colored bar graph and sagittal head view for biofeedback exercises. This gives an clear and intuitive display for monitoring velopharyngeal activity during speech.

**Measurement & Trend**
By switching to a measurement/trend display, users are able to record clients’ speech (e.g. syllable/word repetitions, passages, SNAP test for kids or any other internationally used standardized speech norm data). The application automatically calculates an instant easily interpretable and objective nasalance score for the whole recording or manually labeled parts of it.

See more: [www.lingWAVES.com](http://www.lingWAVES.com)

System requirements: Desktop/notebook with Windows 10, 16 GB RAM, i5/i7 processor, 500 GB hard drive, one free USB port
**lingWAVES EGG**

**A Complete System**

Electroglottography allows for laryngographic assessment of phonatory function during connected speech, soft and loud singing. It gives qualitative and quantitative information about the contact, separation and open phase of vocal fold vibration and is therefore of great use in the interpretation of pathological conditions and follow-ups after surgical treatment or conservative voice therapy. It has proved particularly useful in assessment and documentation of organic voice disorders.

**lingWAVES EGG - real time**

The lingWAVES EGG module fits seamless in the modular lingWAVES speech software package. It can be added as an upgrade to existing lingWAVES sets/suites or purchased as a stand alone system. lingWAVES users will definitely benefit working with a uniform and friendly software user interface for clinical voice analyses.

Analysis can be done in record or real time mode. The real time mode offer e.g. a real time display of a single period (one opening and closing phase).

**EGG Hardware**

The lingWAVES EGG comes with the best available and EU medical product certified EGG hardware on the market. In cooperation with Laryngograph Ltd. we offer a high quality standard for hard- and software.

System requirements: Desktop/notebook with Windows 10, 16 GB RAM, i5/i7 processor, 500 GB hard drive, one free USB port