

DATA SHEET

HQS-SmartHome (Code 60054)

HEAD acoustics Quality Standard,
 Smart Home Devices



Measurement configuration multiple talkers

Overview

HEAD acoustics introduces the quality standard HQS-SmartHome. The standard is especially tailored for testing the communication quality of voice-operated smart home devices.

Key features of HQS-SmartHome:

- Speech and transmission quality with background noise scenarios
- Speech quality with reverberant simulations
- Directivity measurements
- Performance tests of echo canceling
- Performance tests during double talk

There are measurements available for single and multi talker scenarios. HEAD acoustics provides the complete package of hardware and software to execute measurements.

Description

HQS-SmartHome helps improving the communication quality of voice-operated smart home devices. It contains tailored measurements for this purpose.

Among others, there are directivity measurements with HEAD acoustics' turntable HRT I and communication performance tests. HQS-SmartHome includes measurements with background noise or reverberation reproductions, applying 3PASS lab with 3PASS reverb. The reverberation scenarios reproduce different typical rooms of a home. Additionally, there are also characteristic background noises of everyday life for these rooms available.

List of included room reproductions:

- Living room
- Kitchen
- Bathroom
- Office room

The analysis software ACQUA plays back and processes audio signals, analyzes them and generates result reports. It presents the results convenient and clear.

Applications

Testing communication performance of:

- Smart home devices
- Speakerphones
- Conferencing devices

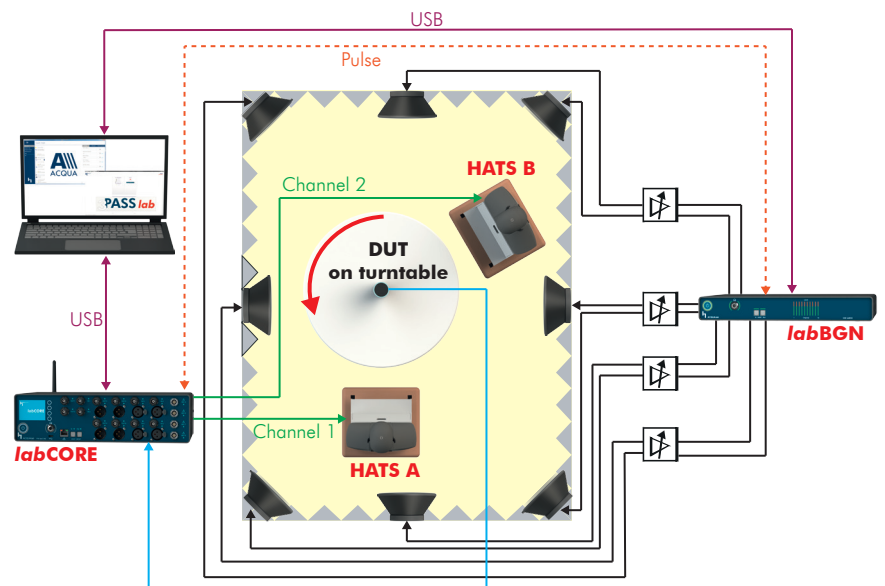
Measurement projects

Single talker

Single talker measurements involve one HATS. The measurements apply artificial signals as well as real-speech signals in sending and receiving direction. Speech quality is also tested with background noises and with simulations of reverberant environments. The scope is extended with measurements concerning echo canceling, double talk and directivity.

Multi talker

Multi talker measurements involve two HATS. There are preparatory measurements and settings to simplify the measurement procedure. The main measurements meet the ITU-T recommendation P.340 Annex B including real-speech signal testing. Furthermore, there are speech quality measurements including background noise scenarios and disturbing noise from concurrent talker.



Configuration example with two HATS

General requirements

Software

- **ACQUA (Code 6810)**, Advanced Communication Quality Analysis, Version 4.1.100 or later
- **3PASS lab (Code 6990)**, background noise simulation system
- **ACOPT 09 (Code 6819)**, option Speech Level Voltmeter
- **ACOPT 20 (Code 6843)**, option Quality Pie
- **ACOPT 21 (Code 6844)**, option 3QUEST
- **ACOPT 35 (Code 6866)**, option 3QUEST-SWB/FB

Hardware

- **labCORE (Code 7700)**, modular multi-channel hardware platform
- **coreBUS (Code 7710)**, I/O bus mainboard
- **coreOUT-Amp2 (Code 7720)**, power amplifier output module (two channels) analog output module
- **coreIN-Mic4 (Code 7730)**, microphone input module (four channels)
- **HMS II.3 (Code 1230)**, HEAD measurement system with ear simulator, pinna type 3.3 or 3.4
- **HRT I (Code 6498)**, HEAD acoustics remote-operated turntable

Project requirements

Single talker

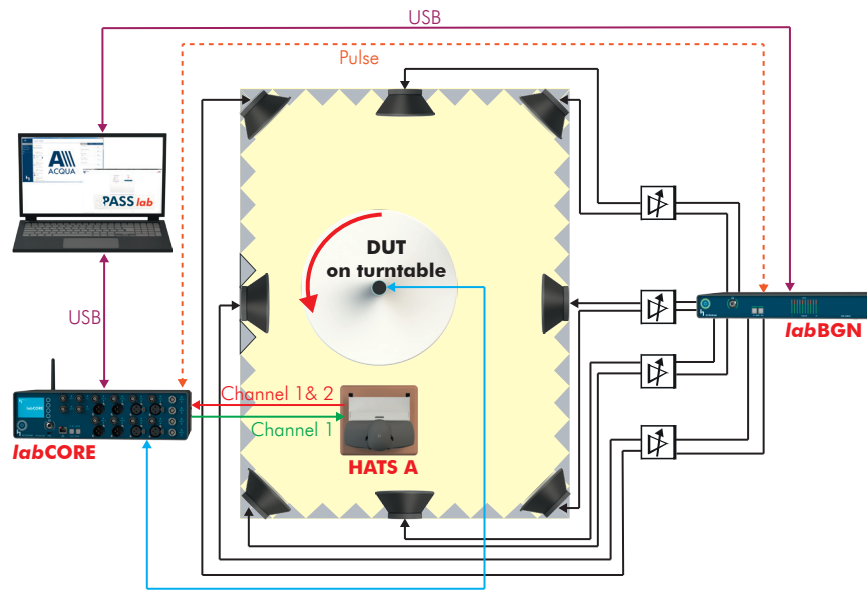
- **3PASS reverb (Code 6996)**, option, simulation of reverberation scenarios
- **ACOPT 25 (Code 6852)**, option Psychoacoustics
- **ACOPT 26 (Code 6853)**, option Room Acoustics
- **ACOPT 29 (Code 6856)**, option EQUEST
- **ACOPT 30 (Code 6857)**, option POLQA
- **ACOPT 32 (Code 6859)**, option Speech-based Double Talk
- **coreBEQ (Code 7740)**, binaural equalization
- **HIS L (Code 1231)**, HEAD impedance simulator, left ear

Multi talker

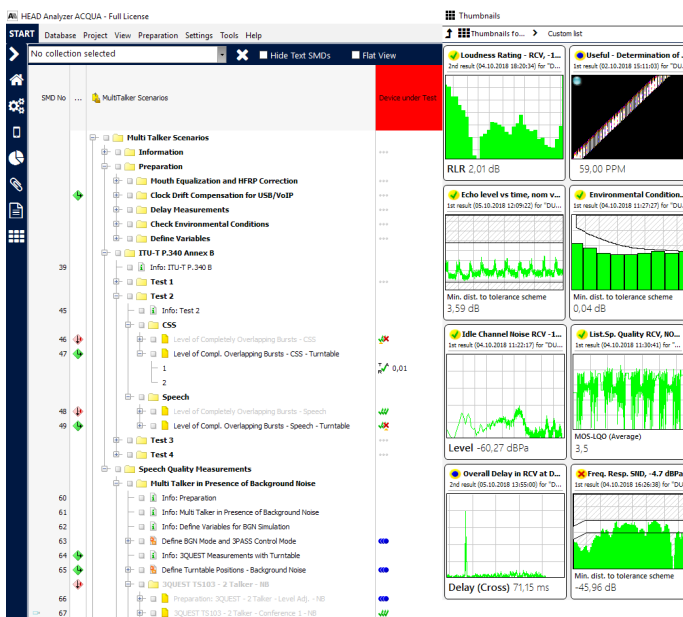
- **HMS II.5 (Code 1388)**, HEAD measurement system without ear simulator

Options

- **3PASS flex (Code 6995)**, background noise simulation system
- **coreIP (Code 7770)**, labCORE I/O module, Voice over IP reference gateway
 - **coreIP-IMP (Code 7771)**, labCORE VoIP impairment option
- **coreBT (Code 7780)**, labCORE I/O module, Bluetooth® reference access point
- **coreBT-EXT (Code 7781)**, labCORE Bluetooth extended codec option



Configuration example with one HATS



Measurement results from HQS-SmartHome (exemplary)

Delivery items

- **HQS-SmartHome (Code 60054)**, delivered as ACQUA database
- **V2C file**
- **Manual** as PDF

Measurements

The list gives an overview of the measurements included in HQS-SmartHome.

Measurements in receiving direction (single talker)

- Delay
- Loudness rating
- Loudness (ISO 532-1)
- Variation of loudness rating
- Active speech level (ASL)
- Frequency response
- Listening speech quality (POLQA)
- Distortion
- Pulsed noise distortion, Signal-to-distortion noise ratio
- Idle channel noise
- Out-of-band signals
- Directivity measurements (ASL)
- Network impairment measurements

Measurements in sending direction (single talker)

- Delay
- Loudness rating
- Active speech level (ASL)
- Frequency response
- Listening speech quality (POLQA)
- Distortion
- Pulsed noise distortion, Signal-to-distortion noise ratio
- Idle channel noise
- Out-of-band signals
- Activation sensitivity
- Muted microphone tests
- Directivity measurements (ASL)
- Transmission performance with background noise
- Reverberant speech performance

Echo measurements (single talker)

- Terminal coupling loss
- Echo level vs. time
- Spectral echo attenuation
- Echo performance with time variant echo path
- Perceptual echo assessment
- Stability loss

Double talk measurements (single talker)

- Attenuation range (SND, RCV)
- Detection of echo components

Measurements in sending direction (multi talker)

- Adaption time in talker alternation (composite source signals)
- Adaption time in talker alternation (real speech signals)
- Level of completely overlapping bursts (CSS)
- Level of completely overlapping bursts (real speech signals)
- Dynamic turn taking, switching characteristics (CSS)
- Dynamic turn taking, switching characteristics (real speech signals)
- Concurrent talk with AM-FM signals (Composite source activation signal)
- Concurrent talk with AM-FM signals (real speech activation signal)
- Speech quality measurements with background noise
- Robustness against disturbing noise from concurrent talker

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