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Data Sheet

ACQUA (Code 6810)

Advanced Communication Quality Analysis Software

Overview

ACQUA is a voice and audio quality test and measurement system developed by HEAD acoustics. The software includes a multi-channel analysis system for diagnosis of acoustic and/or electric transmission paths up to 192 kHz. Predefined but modifiable measurement descriptors embedded in a database structure allow fast and efficient gathering and evaluation of measurement data. All telecom specific analyses comply with the international standards of e.g. ETSI, ITU, TIA, 3GPP, GCF, PTCRB, GSMA, or CTIA.

ACQUA includes a multi-channel signal generator and a multi-channel analyzer. In combination with measurement hardware (e.g. the multi-channel hardware platform *lab*CORE), a wide range of single components, complete terminals and transmission networks can be analyzed via fully synchronized digital in- and outputs.

A variety of ACQUA options (ACOPTs) allows individual tailoring of the software to specific fields of application; from the evaluation of frequency responses to psychoacoustic models and voice quality analysis systems.

Description

ACQUA is an expandable system solution for testing and analyzing acoustics and network access for different scenarios such as VoLTE, UMTS, DECT, Bluetooth®, hands-free (mobile, office, car), headsets, emergency call and in-car communication. It allows the generation, modification and conduction of measurement sequences as well as the analysis, documentation and archiving of measurement data in the time and frequency domain.

ACQUA makes use of user-definable standards or standards based on national and international telecommunication bodies. These standards are implemented in ACQUA databases and consist of various measurement descriptors (SMDs) which are combined to measurement sequences and which determine how the measurement data are captured and analyzed in the time and frequency domain.

The settings of the measurement descriptors are shown in a clearly structured and comprehensible form. Users are able to modify the measurement descriptors or protect them against modification.

The clearly arranged hardware configuration provides a complete overview of the measurement chain from ACQUA over front ends (e.g. *lab*CORE) to artificial head measurement system, third party equipment, and the device under test.

ACQUA includes comfortable and useful report and documentation functions such as A/B comparison of multiple measurement objects, benchmarking or Quality Pie report. It is possible to edit reports with Microsoft Office (alternatively: Open Office, Libre Office).

The databases can be installed on a local SQL server or a network SQL server and allow the automatic archiving of all measurement sequences, results and reports.

The high degree of automization and the ease of use of ACQUA allow the fast conduction of complex test suites with minimal requirements on user interaction.

Key Features

- Analyses in the time domain: level, level vs. time, delay etc.
- Analyses in the frequency domain: frequency response, loudness rating, echo loss, distortion, background noise, out-of-band signals etc.
- Database controlled configuration & control of test procedures and front ends and hardware platforms
- Predefined test cases for automated & guided measurements according to various – partly mandatory – international standards

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Applications

- Voice quality and audio quality testing and optimization (algorithms, devices and systems)
- Conformance tests
- Quality control
- Research & development

Measurement signals

The following measurement signals are used by the measurement descriptors (depending on the corresponding standard):

- Sine
- Sine Stepped Sweep
- Multisine
- Pseudo Noise
- Artificial Voice (P.50)
- Pink, White and Hoth Noise
- Program simulating noise
- Maximum Length Sequence (MLS)
- Speech
- Test signals according to ITU-T Rec. P.501, e.g. Composite Source Signal (CSS)
- Define and edit any test signal
- Import of any test signal

Product versions

ACQUA Full-license (Code 6810)

Full version with maximum range of features (cf. feature list).

ACQUA Workplace (Code 6830)

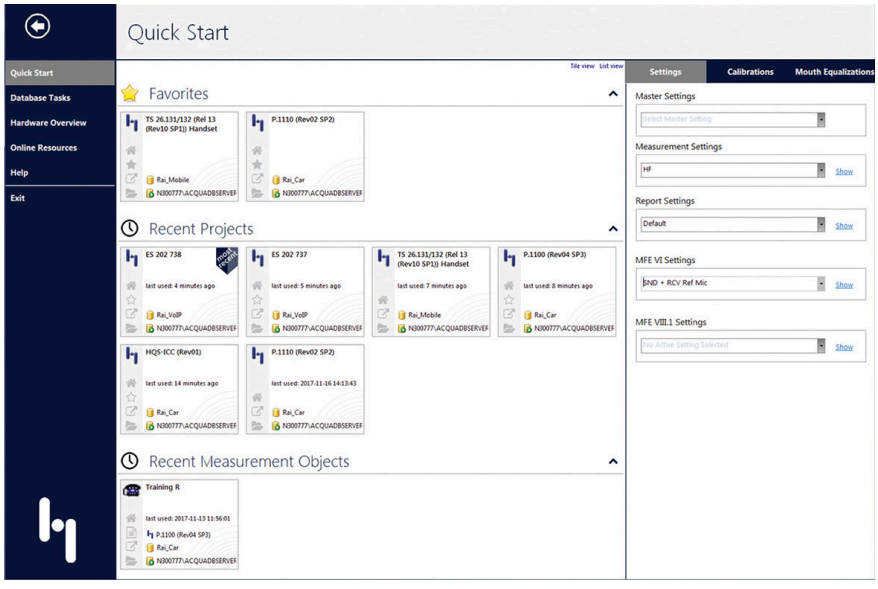
For post-analyses, measurement preparation and documentation, i.e. without the possibility to start measurements. All SMD types can be created/opened/edited, even those which normally require an additional ACOPT.

Optionally, ACQUA Workplace can be upgraded to the full-license version with "UG ACQUA Workplace" (Code 6862).

- Main application areas:
  - Expert system, for building measurement descriptors
  - User system for post-analysis, report generating and measurement data reappraisal (thus "relieving" the measurement room)
  - Verification system for customers and suppliers, especially for customers who do not want to measure themselves, but want to verify tests in detail

Key Features (continued)

- Digital real-time equalization of any artificial mouth
- Individual default settings definable
- Modifiable measurement descriptors
- Automated measurement sequences
- Creation and automatic verification of tolerance schemes
- Recording of any signals via digital interfaces (only with full-license version and compact systems)
- Auditory evaluation of measurement objects, especially important for non-linear time-variant systems
- Acoustic real-time playback for analysis support (e.g. via headphones)
- Data integrity and reproducibility due to archiving of measurement sequences and results in an SQL database
- Calibration of measurement system in e.g. dBV, dBPa
- All telecom specific measurement methods available; implemented calculation methods according to e.g.:
  - ITU-T G.122 / P.64 / P.79 / P.340 / P.502 (Appendix III) / O.131 / O.132
  - IEEE 269
- Optionally, further methods are available, e.g.:
  - 3QUEST (ETSI EG 202 396-3, TS 103 106, TS 103 281 (Model A))
  - EQUEST
  - TOSQA
  - PESQ (ITU-T P.862)
  - POLQA (ITU-T P.863)
  - Relative Approach
  - GCF / PTCRB
  - SNRi & TNLR (ITU-T G.160)
  - 3GPP TS 26.132 (ANR-Tests, Speech-based Double Talk)
  - STITEL, STIPA, RASTI (variants of Speech Transmission Indices)
  - SII (Speech Intelligibility Index)



Interface of the Quick Start menu in ACQUA

ACQUA Compact (Code 6860)

This version includes the ACQUA Compact software and the *lab*CORE main hardware platform. Further *lab*CORE hardware modules and ACQUA databases can be added as needed for the given application.

Network licensing

ACQUA Workplace and most ACQUA options (ACOPT) are available as network license. Pre-existing local licenses can be upgraded to corresponding network licenses.

ACQUA Full-license, ACQUA Compact, all ACQUA databases, and some ACOPTs are only available as local licenses.

System requirements

The PC which ACQUA is installed on has to fulfill the following minimum specifications:

- Core i5
- Min. 4 GB RAM
- NTFS file system required
- Free hard disk capacity required for installation of all components: 1,5 GB
- Free hard disk capacity required for ACQUA databases: depending on the number and size of your databases

- Min. 2 unused USB ports (3 or more recommended)
- Microsoft Windows 8.1 Pro, Microsoft Windows 10 Pro, English or German version, including all current service packs
- Microsoft Office (2007 or later), English or German version, including all current service packs. Note: the OEM version "Microsoft Office Starter" is not suitable for ACQUA due to a lacking COM interface support
  - Alternatively: Open Office or Libre Office

Options

A variety of ACOPTs allows the individual tailoring of the software to specific fields of application (cf. ACQUA Options overview). The currently available options are described in detail in a separate data sheet.

Delivery items

The ACQUA version "Full-license" (Code 6810) includes the following delivery items:

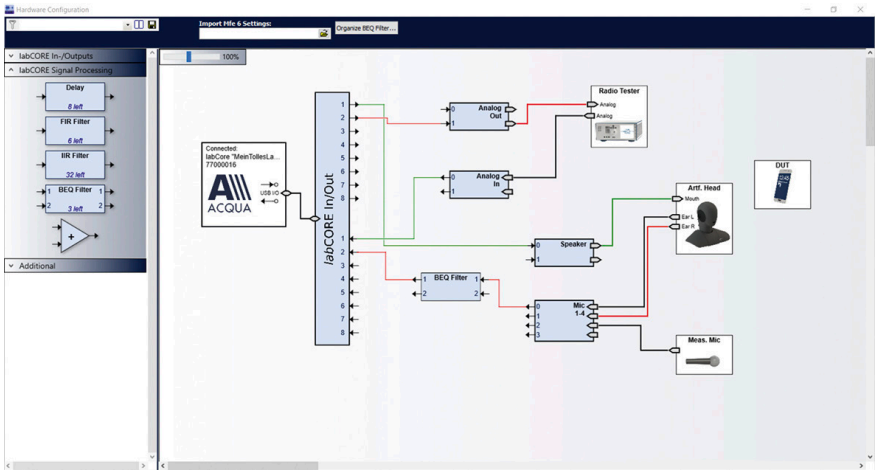
- ACQUA Setup Medium as Download or DVD
- Local Dongle (for USB port)
- One year software maintenance (SMA) and update contract (optionally renewable on a yearly basis)

The ACQUA version "Workplace" (Code 6830) additionally includes the ACQUA option ACOPT 02, option signal analysis. Optionally, a network dongle is available instead of the local dongle (upon request, at an extra charge).

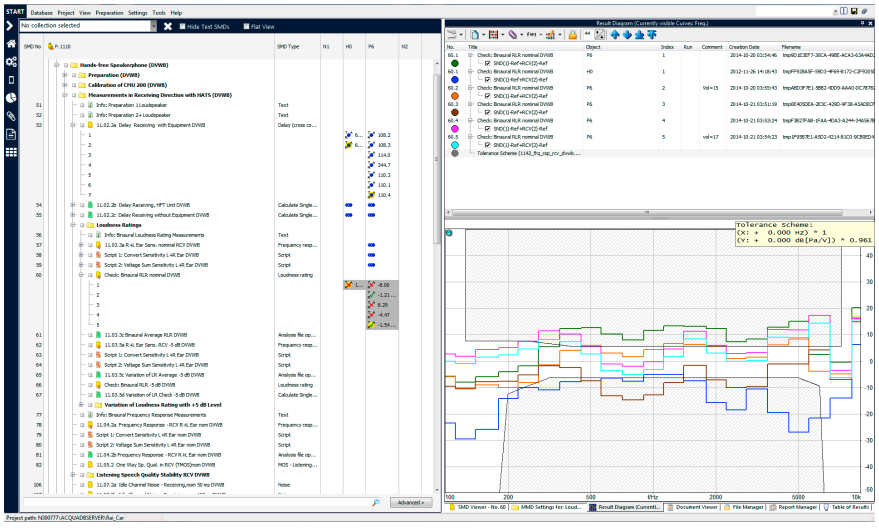
The ACQUA Compact system (Code 6860) is a bundle consisting of compact software and the *lab*CORE main hardware platform (Code 7700).

Accessories

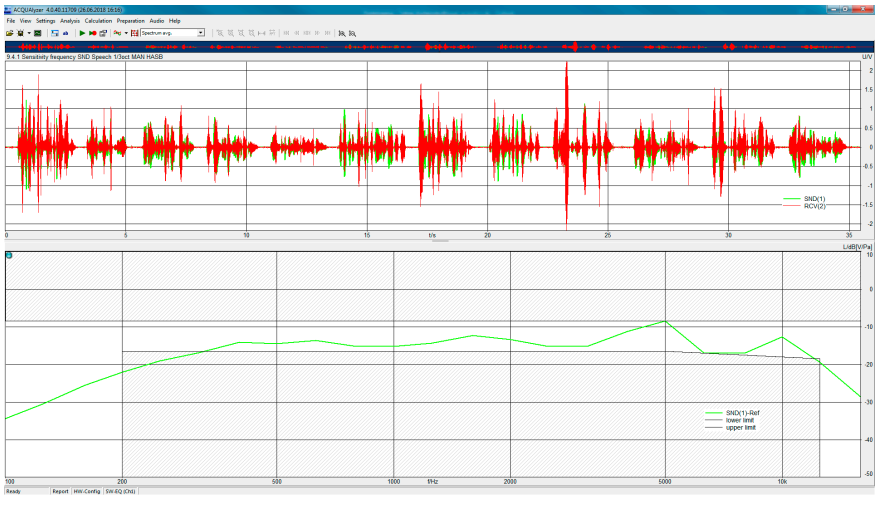
Depending on the measurement task, one or several *lab*CORE hardware extensions or measurement front ends (MFEs) are required for data acquisition and measurement control. Moreover, measurements standards, artificial head with handset positioner and other components may be required.



Window for hardware configuration and front end control in ACQUA



Measurement database in ACQUA



ACQUAlyzer window

Feature List			
ACQUA version	**Full**	**Workplace**	**Compact**
Data and results			
Database archiving:			
• Report	●	-	●
• Analysis data	●	-	●
• Time data	●	-	-[1]
Import/export data with conversion[2]	●	●	●
MP3 import and export	●	●	-
Signal recording	●	-	●
Create report[3]	●	●	●
Edit results with ACQUAlyzer	●	●	-
Open additional projects in separate viewers (r/o)	●	●	-
Project merge and compare	●	●	-
Access ACOPTs from network dongle	●	●	-
Number of measurement objects per project	unlimited	unlimited	2
Single Measurement Descriptors (SMDs)			
Create and edit SMDs	●	●	●
Basic SMD types[4]	●	●	●
Special SMD types			
• 3QUEST (ETSI EG 202 396-3, TS 103 106)	◊21	◊21	◊21
• Active Speech Level (ITU-T P.56)	◊09	◊09	◊09
• CLIP	◊11	-	-
• DTMF	◊12	◊12	-
• EQUEST	◊29	◊29	◊29
MOS - Listening Speech Quality			
• PESQ (ITU-T P.862)	◊16	◊16	◊16
• POLQA (ITU-T P.863)	◊30	◊30	◊30
• TOSQA	◊10	◊10	◊10
Psychoacoustics (ISO 532 A/B, DIN 45631)	◊25	◊25	◊25
Relative Approach	◊17	◊17	◊17
Room Acoustics (ISO 3382, ITU-T P.340)	◊26	◊26	◊26
Speech Intelligibility Index	◊34	◊34	◊34
SNR Improvement (ITU-T G.160)	◊28	◊28	◊28
Speech Transmission Index (IEC 60268-16)	◊27	◊27	◊27
Turntable Support	◊33	◊33	◊33

1) Time data can be archived for the following SMD types: Time response, 3QUEST, EQUEST, MOS (TOSQA , PESQ, POLQA)

2) Conversion to and from the following formats: ASCII, Wave, Microsoft Excel (*.xls), Matlab, PCM

3) Requires Microsoft Word, Open Office or Libre Office

4) Analysis file operations, Automated double talk (ITU-T P.502 Appendix III), Calculate single value, Correlation and transfer function, Delay (Two-frequency method, Cross correlation), Distortion (Noise [ITU-T O.131, IEEE 269-2010], Sinusoidal, Fast sinusoidal), Echo loss, Frequency response, Level, Level vs Time, Loudness rating , Noise, Out of band, Play file, Return loss and longitudal conversion loss, Script, Sidetone masking rating, Text (info), Time distance, Time response, Variation of level, Variation of loudness rating

●	Included
◊	Optional
◊xx	Optional, requires ACOPT xx
□	Available
-	Not available

ACQUA Options (ACOPTs) overview					
	ACQUA version	**Network**	**Full**	**Workplace**	**Compact**
01	Signal Generator and Editor	□	◊	◊	-
02	Signal Analysis	□	◊	●	-
09	SLVM P.56	□	◊	◊	◊
10	TOSQA	-	◊	◊	◊
11	CLIP (ETSI ETS 300 778-1)	□	◊	-	-
12	DTMF	□	◊	◊	-
16	PESQ (ITU-T P.862)	-	◊	◊	◊
17	Relative Approach	□	◊	◊	◊
18	ACQUA COM Remote Control	□	◊	◊	◊
19	Online Analysis	□	◊	◊	-
20	Quality Pie (ITU-T P.505)	□	◊	◊	◊
21	3QUEST (ETSI EG 202 396-3, TS 103 106)	-	◊	◊	◊
22	ETSI ES 203 021	-	◊	-	◊
23	GCF	-	◊	-	◊
24	PTCRB	-	◊	-	◊
25	Psychoacoustics (ISO 532 A/B, DIN 45631)	□	◊	◊	◊
26	Room Acoustics (ISO 3382, ITU-T P.340)	□	◊	◊	◊
27	Speech Transmission Index (RASTI, STIPA, STITEL)	□	◊	◊	◊
28	SNRI & TNLR Calculation (ITU-T G.160)	□	◊	◊	◊
29	EQUEST	-	◊	◊	◊
30	POLQA (ITU-T P.863)	-	◊	◊	◊
31	ACQUA Batch Processing (PESQ, TOSQA, 3QUEST, POLQA etc.)[5]	-	◊	◊	-
32	Speech-based Double Talk Analysis	□	◊	◊	◊
33	LinearX Turntable Support	-	◊	◊	◊
34	Speech Intelligibility Index (ANSI S3.5-1997)	□	◊	◊	◊
35	3QUEST-SWB/FB (ETSI TS 103 281, Model A)	-	◊	◊	◊
37	ABLE – Assessment of Binaural Listening Effort (ETSI TS 103 558)	-	◊	◊	◊

5) For 3QUEST, 3QUEST-SWB/FB, EQUEST, PESQ, POLQA, SNRI, Speech-based Double Talk and TOSQA, the respective ACOPTs (21, 35, 29, 16, 30, 28, 32 and 10) are needed in addition. For automated double talk, no ACOPT is needed in addition.

●	Included
◊	Optional
◊xx	Optional, requires ACOPT xx
□	Available
-	Not available