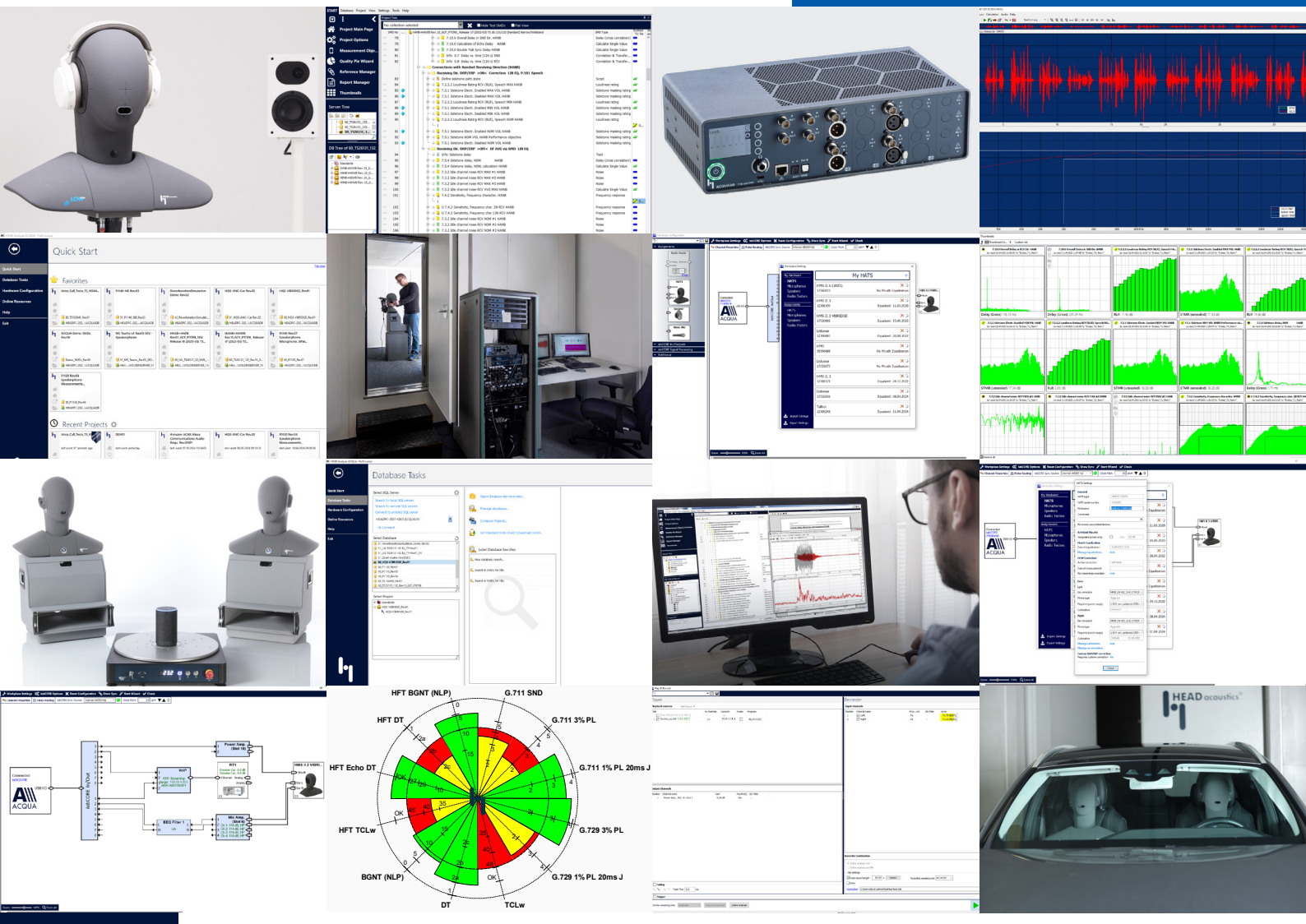Code 6810

ACQUA

Advanced Communication Quality Analysis Software

OVERVIEW

ACQUA

Code 6810

Advanced Communication Quality Analysis Software

ACQUA is the essential software for voice and audio quality testing. It provides precise analysis of acoustic and electric audio signals.

ACQUA provides two main approaches for measuring and analyzing. Primarily, there is the database-driven approach with automated measurement sequences for fast and efficient gathering and evaluation of measurement data. HEAD acoustics provides ACQUA standards as SQL databases complying with international standards of, e.g., ETSI, ITU-T, 3GPP, TIA, GSMA, or CTIA. Additionally, recordings, measurements, and analyses are executable manually as standalone operation with the integrated ACQUAlyzer tool.

In combination with the *lab*CORE multichannel hardware platform, a wide range of single devices, complete terminals, and transmission networks can be analyzed via analog and fully synchronized digital interfaces. Calibrating, controlling, and specifying hardware, as well as signal routing between devices and interfaces is easily determined in the general user interface of ACQUA.

A variety of ACQUA Options (ACOPTs) extends ACQUA for specific applications, analyses, and calculations.

KEY FEATURES

Analyses of multi-channel audio files in time domain and frequency domain

Configuration and control of measurement hardware

Application of predefined test suits for automated and guided measurement sequences according to international telecommunication standards

Data integrity and reproducibility due to archiving of measurement sequences and results in SQL databases

Digital real-time equalization of any artificial mouth/ loudspeaker

Calibration of input sensors

Manual analysis of compatible and appropriate audio files

APPLICATIONS

Acoustic and electroacoustic voice and audio quality testing

Conformance testing according to telecommunication standards

Quality control

Research and development

DETAILS

ACQUA is the measurement and analysis software for testing and analyzing the voice and audio quality of telecommunication devices (mobile phones, hands-free terminals, ANC headsets, smart speakers, car audio systems, etc.) with different transmission technologies such as packet switching or circuit switching technologies, Bluetooth®, USB, or A²B. It provides tools for generation, modification, and conduction of measurement sequences. ACQUA has various analysis and calculation methods for post-processing the measurement results. Furthermore, measurement data and analysis data can be archived in the database structure of ACQUA.

## ACQUA – DATABASES

ACQUA Standards

ACQUA standards provide complete implementations of all relevant international standards for voice and audio quality, i.a., 3GPP, ITU-T, ETSI, ISO, IEC, TIA, GCF, CTIA, and GSMA. HEAD acoustics provides the ACQUA standards in SQL databases for automated testing according to specified requirements.

HEAD acoustics Quality Standards

These test suites are developed by HEAD acoustics for special applications. They help manufacturers measuring and assessing their devices beyond international specifications to optimize the product quality. HEAD acoustics Quality Standards are also provided as SQL databases and applied in the same manner as ACQUA standards.

SQL Server

All databases are stored on a local SQL server or a network SQL server. Thus, ACQUA stores and records measurement sequences, results, and reports automatically. The included database administrator provides features to download, add, or remove databases from SQL servers.
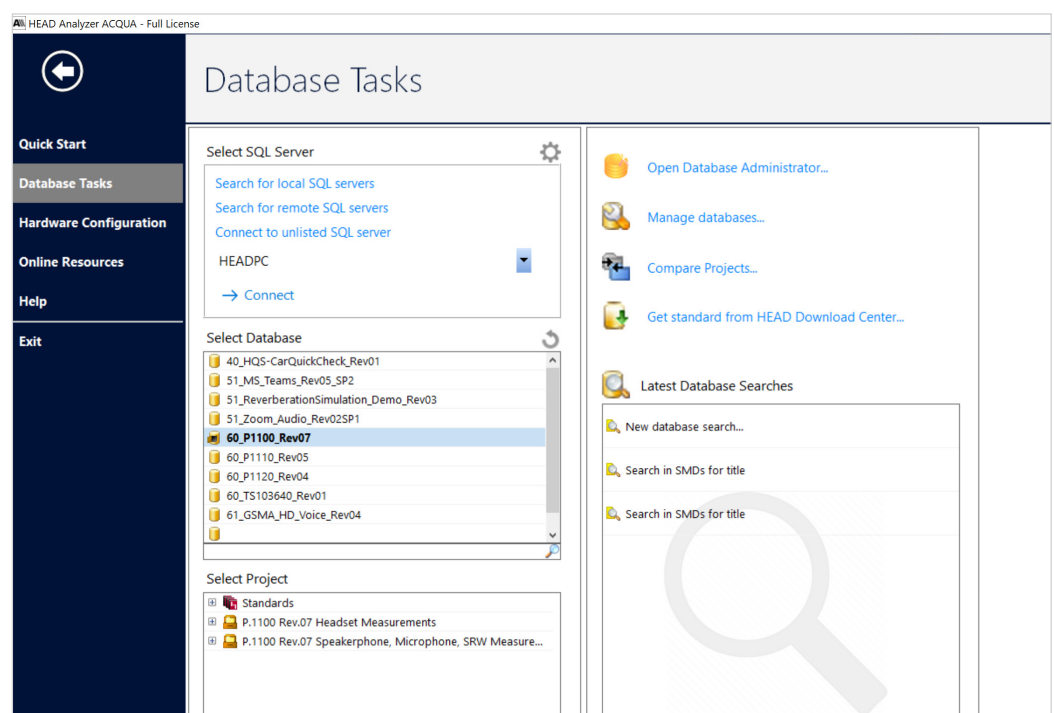
ACQUA – PROJECTS

ACQUA standards or HEAD acoustics Quality Standards comprise of projects. The projects are visualized, edited, and executed in the ACQUA project tree. Measurements and analyses of the project are presented in a tree structure. They are executable individually, consecutively, or according to a customized selection. After conducting measurements or analyses, the results are immediately accessible. Furthermore, the report generator helps creating measurement reports in common document types (*.pdf, *.docx).

The parameters of measurements and subsequent analyses are specified and determined in existing standards. ACQUA standards and HEAD acoustics Quality Standards provide read-only projects for standard compliant testing as well as editable projects. Customized projects can be created from scratch and are fully editable.

Each project provides the possibility to create several measurement objects (device under test). Thus, measurements of a project can be conducted for multiple measurement objects and results are comparable within the project tree.
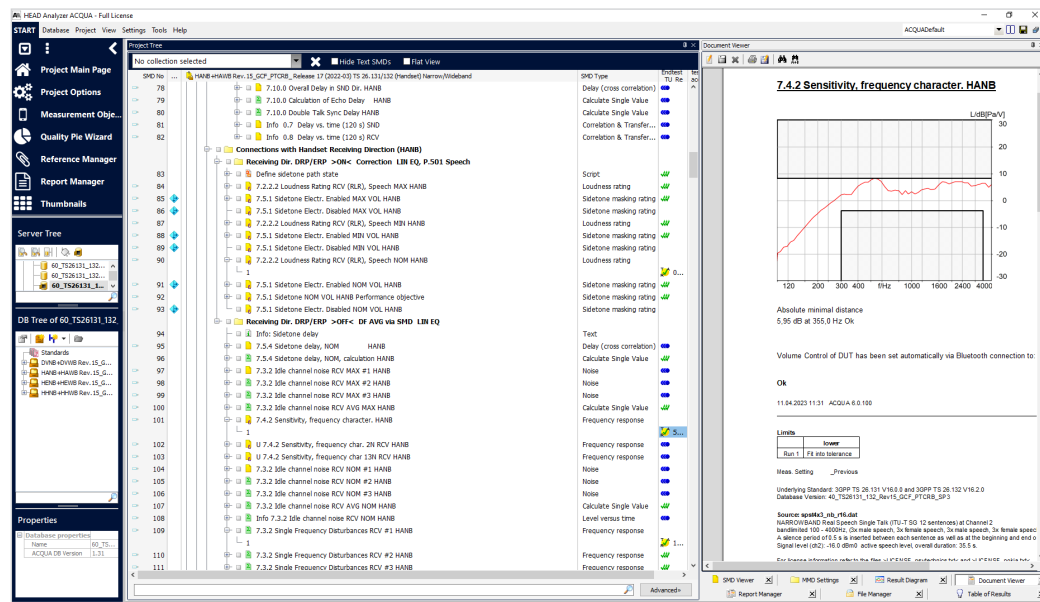
ACQUAlyzer

ACQUAlyzer is a view and analysis tool for audio data files. It provides extensive signal processing and analysis. The interface presents measurement/analysis results in the time domain (diagram), frequency domain (diagram), and/or as calculated values (numeric). HEAD acoustics data formats (*.dat, *.hdf, *.fft) as well as common audio file formats (*.wav, *.txt, *.pcm, *.raw, *.mp3) can be loaded directly into ACQU-Alyzer for analysis. When executing measurements and analyses in an ACQUA database, ACQUAlyzer presents the results of the latest measurement/analysis. Furthermore, ACQUAlyzer includes tools for playing and recording multi-channel audio files with the current hardware configuration.
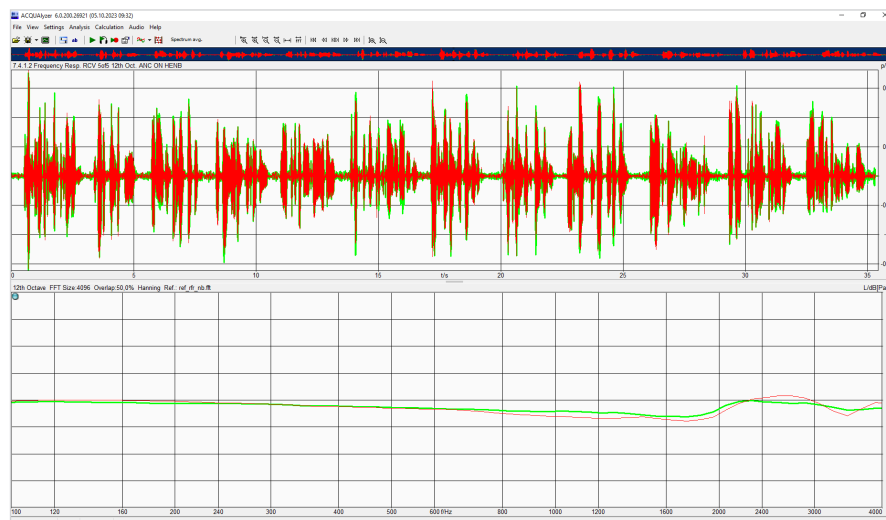
HARDWARE CONFIGURATION

Measurement Configuration with Signal Routing

The hardware configuration user interface provides a clear visual representation of applied devices and interfaces in the measurement configuration. Interfaces of *lab*CORE and other devices are represented by blocks. These blocks can be arranged in the specified configuration area via drag and drop. They have connection pins for connecting to other blocks. The connection of blocks determines the signal routing within *lab*CORE and between hardware devices. Furthermore, settings for applied devices and interfaces can be adjusted. A wizard supports creating new configurations by providing configurations for common measurements. Configurations can be saved, imported, and exported.

Workplace Settings

The workplace settings specify properties for measurement equipment appearing in the hardware configuration. This includes calibrations, equalizations, correction factors for artificial heads, microphones, loudspeakers, and radio testers. The assigned properties are applied to the equipment during measurements. An import/export function enables to migrate or share the workplace settings to another ACQUA system or a new installation on another computer.
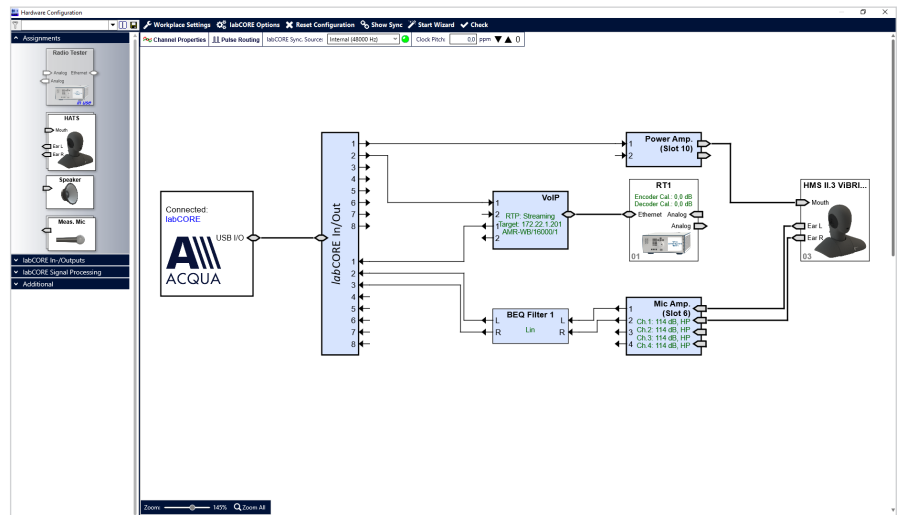
ACQUA VERSIONS

ACQUA Full License

Full version of ACQUA including the maximum range of available features.

ACQUA Workplace

ACQUA Workplace saves valuable laboratory capacity. It enables to prepare measurements and analyses. Execution of measurements is not possible. All kinds of measurements can be specified, opened, and edited without restrictions – even if the required licenses for ACOPTs or ACQUA standards are not available. ACQUA Workplace is also available as network license. ACQUA Workplace can be upgraded to ACQUA Full License.

ACQUA Compact

ACQUA Compact is a cost-effective solution for specific measurement tasks. It includes ACQUA Compact and the *lab*CORE hardware platform. ACQUA Compact has a limited range of functions compared to ACQUA Full License:
   › Two measurement objects per project
   › No archiving of time signals into the database
   › Limited possibilities of manual signal analysis if using ACQUAlyzer
   › Some ACOPTs are not available

ACQUA Compact can be upgraded to ACQUA Full License.

ACQUA FEATURE LIST

ACQUA Version	Full License	Workplace	Compact
Database archiving:			
› Report	✔	✔	✔
› Analysis data	✔	✖	✔
› Time data	✔	✔	✖ [1]
Import/export data with conversion[2]	✔	✔	✔
MP3 import and export	✔	✔	✖
Signal recording	✔	✖	✔
Report generator[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
Create and edit SMDs	✔	✔	✔
Basic SMD types[4]	✔	✔	✔
Optional SMD types	ACQUA options required.		

✔   Included

✖   Not included

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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.

ACQUA OPTIONS

ACQUA is extendable by ACQUA Options (ACOPTs) for executing special analyses and features. ACOPTs enable, e.g., advanced signal analysis capabilities, metrics, and tools for extending the functional scope of ACQUA. Detailed information on ACQUA options is available on the ACQUA Options overview data sheet.

The table indicates the availability of ACQUA options for the different ACQUA versions and possible application via network license.

ACOPT		ACQUA	ACQUA Work-place	ACQUA Compact	Network License
01	Signal Generator and Editor	✔	✔	✖	✔
02	Signal Analysis	✔	included	✖	✔
09	Speech Level Volt Meter (ITU-T P.56)	✔	✔	✔	✔
10	TOSQA	✔	✔	✔	✖
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)	✔	✔	✔	✖
23	GCF	✔	✔	✔	✔
24	PTCRB	✔	✔	✔	✔
25	Psychoacoustics	✔	✔	✔	✔
26	Room Acoustics	✔	✖	✔	✔
27	Speech Transmission Index (STI)	✔	✔	✔	✔
28	Signal-To-Noise Ratio Improvement (SNRI) and Total Noise Level Reduction (TNLR) (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	✔	✔	✔	✔
34	Speech Intelligibility Index (SII)	✔	✔	✔	✔
35	3QUEST – SWB/FB (ETSI TS 103 281, Model A)	✔	✔	✔	✖
36	MDAQS – Multi-Dimensional Audio Quality Score	✔	✔	✔	✖
37	ABLE – Assessment of Binaural Listening Effort (ETSI TS 103 558)	✔	✔	✔	✖
38	LEAP – Listening Effort from Acoustic Parameters	✔	✔	✔	✖
39	Steady-State Analyses for Level, Distortion, Intermodulation	✔	✖	✔	✖

✔   Available

✖   Not available

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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.

OPTIONS

ACOPT 01 (Code 6811)
› Option Signal Generator and Editor

ACOPT 02 (Code 6812)
› Option Signal Analysis

ACOPT 09 (Code 6819)
› Option SLVM P.56

ACOPT 10 (Code 6820)
› Option TOSQA

ACOPT 11 (Code 6821)
› Option CLIP

ACOPT 12 (Code 6822)
› Option DTMF

ACOPT 16 (Code 6836)
› Option PESQ according to ITU-T P.862

ACOPT 17 (Code 6839)
› Option Relative Approach

ACOPT 18 (Code 6840)
› Option ACQUA COM Remote Control

ACOPT 19 (Code 6842)
› Option Online Analysis

ACOPT 20 (Code 6843)
› Option Quality Pie according to ITU-T P.505

ACOPT 21 (Code 6844)
› Option 3QUEST – 3fold Quality Evaluation of Speech in Telecommunication (Narrowband/Wideband)

ACOPT 23 (Code 6848)
› Option GCF

ACOPT 24 (Code 6849)
› Option PTCRB

ACOPT 25 (Code 6852)
› Option Psychoacoustics

ACOPT 26 (Code 6853)
› Option Room Acoustics

ACOPT 27 (Code 6854)
› Option Speech Transmission Index: RASTI/STIPA/STITEL

ACOPT 28 (Code 6855)
› Option SNRI and TNLR Calculation according to ITU-T G.160

GENERAL REQUIREMENTS

System Requirements

Computer
› Multi-core processor
› 8 GB RAM (recommended: 16 GB RAM)
› NTFS
› Free disk space 1.5 GB

Operating system (one of the listed)
› Windows 11 x64
  » Pro, Enterprise, Education; version 21H2 or newer; languages: US, Western European
› Windows 10 x64
  » Pro, Enterprise, Education; version 1809 or newer; languages: US, Western European

Additional software (optional)
› Microsoft Word (2007 or later, languages: English or German)
› Alternatively: Open Office or Libre Office

SCOPE OF DELIVERY

The scope of delivery depends on the acquired ACQUA version.

ACQUA

ACQUA (Code 6810)
› ACQUA Standard: Basic Analysis Software
› Full license version

USB license dongle
› Sentinel HL

SMA ACQUA (Code SMA6810)
› 1 Year SMA for ACQUA
› Software maintenance (SMA) and update contract (optionally renewable on a yearly basis)

Continued on next page

ACOPT 29 (Code 6856)
› Option EQUEST – Echo Quality Evaluation of Speech in Telecommunication

ACOPT 30 (Code 6857)
› Option POLQA – Perceptual Objective Listening Quality Analysis

ACOPT 31 (Code 6858)
› Option ACQUA Batch Processing (Respective ACOPT Required)

ACOPT 32 (Code 6859)
› Option Speech-based Double Talk Analysis

ACOPT 34 (Code 6865)
› Option Speech Intelligibility Index according to ANSI S3.5-1997

ACOPT 35 (Code 6866)
› Option 3QUEST – Super-wideband/Fullband according to ETSI TS 103 281, Model A

ACOPT 36 (Code 6867)
› Option MDAQS – Multi-Dimensional Audio Quality Score

ACOPT 37 (Code 6869)
› Option ABLE – Assessment of Binaural Listening Effort according to ETSI TS 103 558

ACOPT 38 (Code 6871)
› Option LEAP – Listening Effort from Acoustic Parameters

ACOPT 39 (Code 6872)
› Option Steady-State Analyses for Level, Distortion, Intermodulation

UG ACQUA Workplace (Code 6862)
› Upgrade ACQUA Workplace > ACQUA Full license

UG ACQUA Compact (Code 6834)
› Upgrade ACQUA Compact > ACQUA Full license

SCOPE OF DELIVERY

ACQUA Workplace

ACQUA Workplace (Code 6830)
› Workplace Analysis Software
USB license dongle
› Sentinel HL
SMA ACQUA Workplace (Code SMA6830)
› 1 Year SMA for ACQUA Workplace
› Software maintenance (SMA) and update contract (optionally renewable on a yearly basis)

ACQUA Compact

ACQUA Compact (Code 6860)
› Compact Test System
USB license dongle
› Sentinel HL
SMA ACQUA Compact (Code SMA6860)
› 1 Year SMA for ACQUA Compact
› Software maintenance (SMA) and update contract (optionally renewable on a yearly basis)
*lab*CORE (Code 7700)
› Modular multi-channel hardware platform

ASIO
COMPATIBLE

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VST
COMPATIBLE

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HEAD acoustics

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