

OVERVIEW

ACQUA is a dual channel analysis system for diagnosis of acoustic and/or electric transmission paths up to 24 kHz. By means of predefined modifiable measurement descriptors measurement data can be gathered and evaluated in a simple and quick manner. All telecom specific analyses comply with the international standards of ETSI, ITU, TIA, 3GPP, GCF, PTCRB, DECT Forum, GSMA, CTIA.

The system includes a dual channel signal generator and a dual channel analyzer. In combination with measurement frontends a wide range of single components, complete terminals and transmission networks can be analyzed via fully synchronized digital in- and outputs.

A variety of options allows the individual tailoring of the software to specific fields of application which may range from the evaluation of frequency responses to psychacoustic models and speech quality analysis systems.

DESCRIPTION

ACQUA is a Windows® based software package for speech quality measurements and analyses of components, terminals and networks. 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 authorities such as ETSI, ITU, TIA, 3GPP, GCF, PTCRB, DECT Forum, GSMA, CTIA. These standards 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 user can view the settings of the measurement descriptors in a clearly structured and comprehensible form. The measurement descriptors can be modified by the user or can be protected against modification.

Reports can be generated from the measurement and analysis results which can be edited 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 automatization and the ease of use of ACQUA allow the fast conduction of complex test suites with minimal requirements on user interaction.

Features:

- Analyses in the time domain, determination of level, level vs. time, delay etc.
- Analyses in the frequency domain, determination of transmission functions, loudness ratings, echo loss, distortions, background noise, out-of-band signals etc.
- 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 202396-3, TS 103 106)
 - EQUEST
 - TOSQA
 - PESQ (ITU-T P.862)
 - POLQA (ITU-T P.863)
 - „Relative Approach“
 - GCF/PTCRB

- SNRi & TNLr (ITU-T G.160)
- 3GPP 26.132 (ANR-Tests, Speech-based Double Talk)
- STITEL, STIPA, RASTI
- 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)
- 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 dB_V , dB_{SPL} , dB_{Pa}

APPLICATIONS

- Conformance tests
- Research & development
- Speech quality measurement and optimization (algorithms and systems)
- Quality control

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)
- Speech
- Test signals according to ITU-T Rec. P.501, e.g. Composite Source Signal (CSS)
- Any test signal can be defined and edited by the user
- Any test signal can be imported

PRODUCT VERSIONS

ACQUA Full-License (Code 6810)

Full version with maximum range of features (cf. feature list on page 3).

Network licensing:

- **License:** Code 6810 is not available as remote license for network dongle
- **Options** (ACOPTs, cf. below): most of the ACOPTs are available as remote license for network dongle (at an extra charge)

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 ACOPT or which are taken from an (encrypted) standard.

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.

Network licensing:

- **License:** available as remote license for network dongle (at an extra charge). Code 6830N: new license; Code 6830UGN: upgrade of existing license
- **Options** (ACOPTs, cf. below): most of the ACOPTs are available as remote license for network dongle (at an extra charge)

ACQUA Compact (Code 6860.xx etc.)

This version forms part of all ACQUA Compact systems which are available as bundles consisting of software, measurement front ends, measurement standards and (if required) further components for specific measurement tasks.

In comparison with the full-license version, the ACQUA Compact software is limited regarding SMD types, result administration, result editing and offline analysis.

A variety of compact systems is available. Detailed information can be found in a separate data sheet on ACQUA Compact systems. Optionally, ACQUA Compact can be upgraded to the full-license version with "UG ACQUA Compact" (Code 6834).

Network licensing:

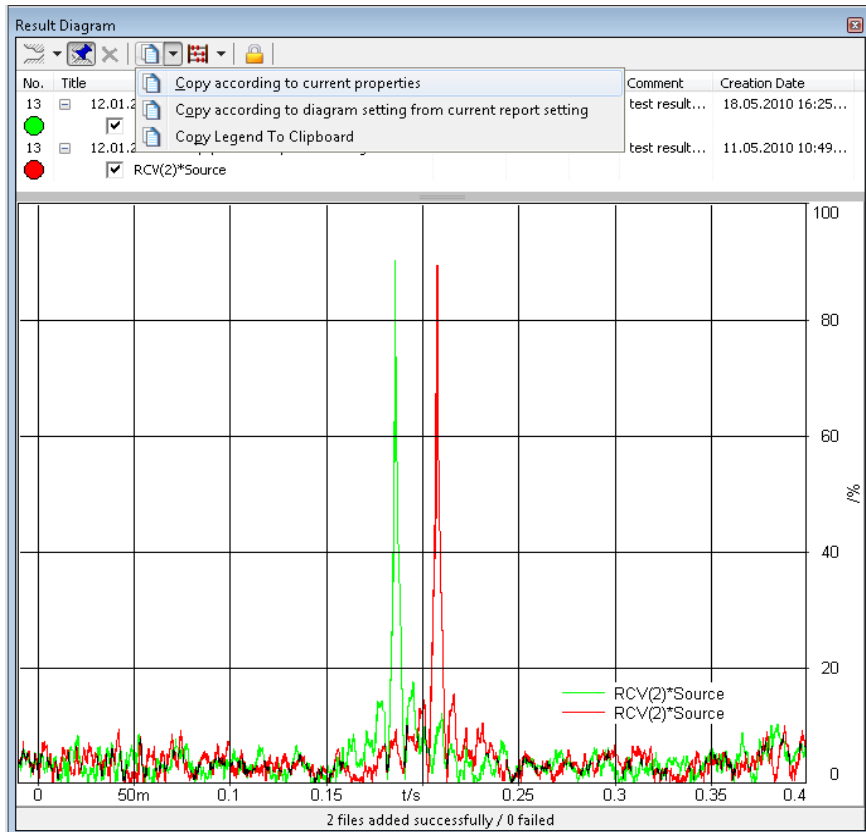
Network dongle and remote licenses are not available for ACQUA Compact systems.

OPTIONS

A variety of options allows the individual tailoring of the software to specific fields of application. The currently available options are described in detail in a separate data sheet (D68xx). The following list therefore only gives a short summary:

- ACOPT 01 (Code 6811)⁺ – Signal Generator and Editor
- ACOPT 02 (Code 6812)⁺ – Signal Analysis
- ACOPT 03 - ACOPT 08 (Codes 6813 - 6818): *No longer available. Can be replaced by ArtemiS Suite. Details upon request.*
- ACOPT 09 (Code 6819)⁺ – SLVM P.56
- ACOPT 10 (Code 6820) – TOSQA
- ACOPT 11 (Code 6821)⁺ – CLIP
- ACOPT 12 (Code 6822)⁺ – DTMF
- ACOPT 14 (Code 6824) – TBR 21
- ACOPT 15 (Code 6825) – TBR 37
- ACOPT 16 (Code 6836) – PESQ
- ACOPT 17 (Code 6839)⁺ – Relative Approach
- ACOPT 18 (Code 6840)⁺ – Remote Control ACQUA via COM Interface
- ACOPT 19 (Code 6842)⁺ – Online Analysis
- ACOPT 20 (Code 6843)⁺ – Quality Pie
- ACOPT 21 (Code 6844) – 3QUEST
- ACOPT 22 (Code 6847) – ES 203 021
- ACOPT 23 (Code 6848) – GCF
- ACOPT 24 (Code 6849) – PTCRB
- ACOPT 25 (Code 6852)⁺ – Psychoacoustic SMDs
- ACOPT 26 (Code 6853)⁺ – Roomacoustics
- ACOPT 27 (Code 6854)⁺ – Speech Transmission Index (STITEL, STIPA, RASTI)
- ACOPT 28 (Code 6855)⁺ – SNRI & TNLRCalculation acc. to ITU-T G.160 (App. II, Amd. 1)
- ACOPT 29 (Code 6856) – EQUEST
- ACOPT 30 (Code 6857) – POLQA
- ACOPT 31 (Code 6858) – Batch Calculator Tool
- ACOPT 32 (Code 6859)⁺ – Speech-based Double Talk
- ACOPT 33 (Code 6864) – Turntable Support

⁺ also available as remote license for network dongle (when ordering, add "N" to code number for new licenses or add "UGN" for upgrades of existing licenses, e.g. "Code 6855N" for ACOPT 28 new license or "Code 6855UGN" for ACOPT 28 license upgrade)



Result diagram window

FEATURE LIST

The following table gives an overview of the differences regarding the support of various features in the three versions "Full-License" (Code 6810), "Workplace" (Code 6830 and 6830N) and "Compact" (Code 6860.xx etc.), as well as showing the ACOPTs available as network license:

| Data and results | Full | Workplace | Compact |
|--|-----------|-----------|-----------------|
| 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 | Full | Workplace | Compact |
|---|------|-----------|---------|
| 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 |
| Call impedance | □ 14 | — | — |
| CLIP | □ 11 | — | — |
| Digital multimeter | □ 14 | — | — |
| 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 |
| Pulse dialing | □ 14 | — | — |
| Relative Approach | □ 17 | □ 17 | □ 17 |
| Room acoustics (ISO 3382 · ITU-T P.340) | □ 26 | □ 26 | □ 26 |
| SNR improvement (ITU-T G.160) | □ 28 | □ 28 | □ 28 |
| Speech transmission index (IEC 60268-16) | □ 27 | □ 27 | □ 27 |
| Voltage vs current | □ 14 | — | — |
| Wideband noise analysis | □ 14 | — | — |

| Options | Network | Full | Workplace | Compact |
|--|---------|-----------------|-----------------|---------|
| ACOPT 01 Signal generator and editor | ◆ | □ | □ | — |
| ACOPT 02 Signal analysis | ◆ | □ | ■ | — |
| ACOPT 09 Speech level voltmeter (ITU-T P.56) | ◆ | □ | □ | □ |
| ACOPT 10 TOSQA | — | □ | □ | □ |
| ACOPT 11 CLIP (ETSI 300 778-1) | ◆ | □ | — | □ |
| ACOPT 12 DTMF | ◆ | □ | □ | — |
| ACOPT 14 ETSI TBR 21 | — | □ | — | — |
| ACOPT 15 ETSI TBR 37 | — | □ | — | — |
| ACOPT 16 PESQ (ITU-T P.862) | — | □ | □ | □ |
| ACOPT 17 Relative Approach | ◆ | □ | □ | □ |
| ACOPT 18 Remote control via COM interface | ◆ | □ | □ | □ |
| ACOPT 19 Online analysis | ◆ | □ | □ | — |
| ACOPT 20 Quality pie (ITU-T P.505) | ◆ | □ | □ | □ |
| ACOPT 21 3QUEST (ETSI EG 202 396-3, TS 103 106) | — | □ | □ | □ |
| ACOPT 22 ETSI ES 203 021 | — | □ | — | — |
| ACOPT 23 GCF | — | □ | — | □ |
| ACOPT 24 PTCRB | — | □ | — | □ |
| ACOPT 25 Psychoacoustics (ISO 532 A/B · DIN 45631) | ◆ | □ | □ | □ |
| ACOPT 26 Room acoustics (ISO 3382 · ITU-T P.340) | ◆ | □ | □ | □ |
| ACOPT 27 Speech transmission index (IEC 60268-16) | ◆ | □ | □ | □ |
| ACOPT 28 SNR improvement (ITU-T G.160) | ◆ | □ | □ | □ |
| ACOPT 29 EQUEST | — | □ | □ | □ |
| ACOPT 30 POLQA (ITU-T P.863) | — | □ | □ | □ |
| ACOPT 31 Batch Calculator Tool | — | □ ⁵⁾ | □ ⁵⁾ | — |
| ACOPT 32 Speech-based Double Talk (TS 26.131/132) | ◆ | □ | □ | □ |
| ACOPT 33 Turntable Support | — | □ | □ | □ |

| | |
|------|-----------------------------|
| ■ | Included |
| □ | Optional |
| □ xx | Optional, requires ACOPT xx |
| ◆ | Available |
| — | Not available |

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

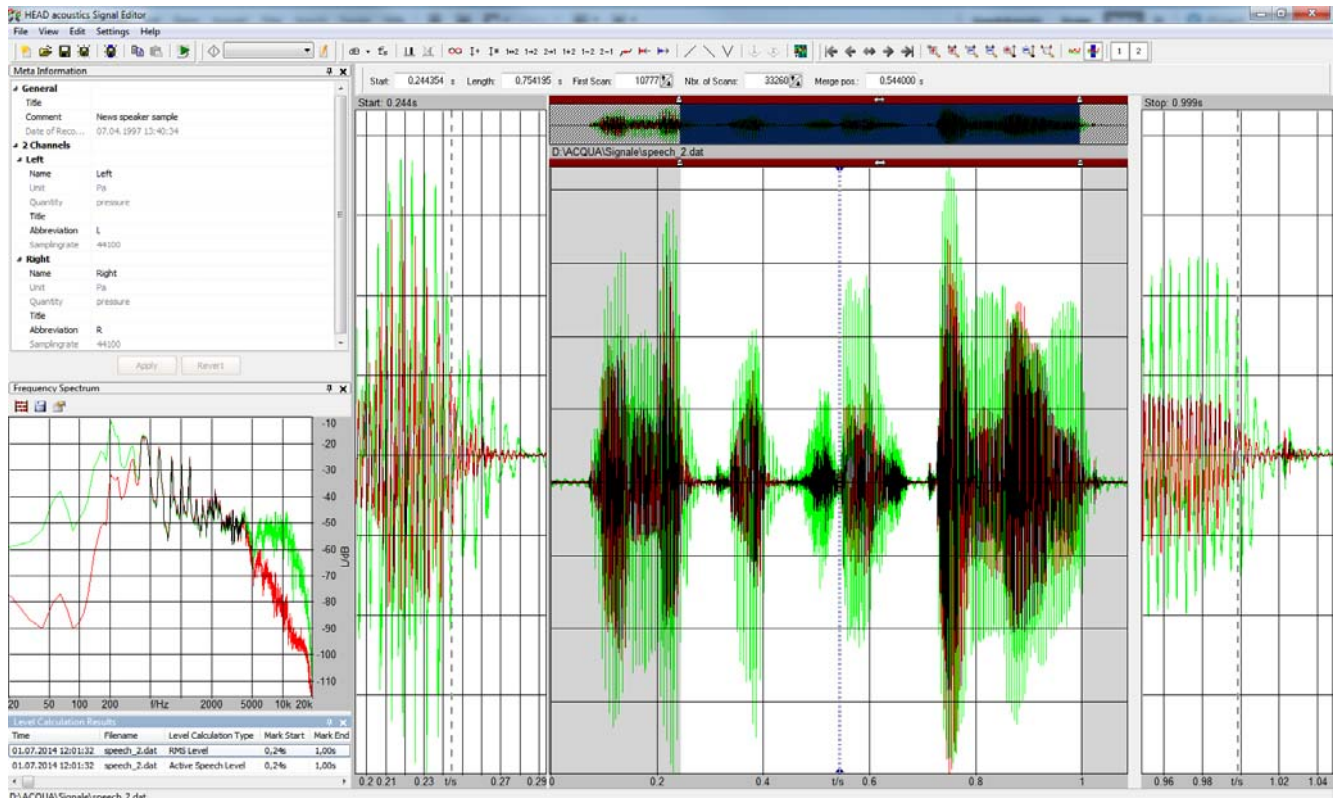
2) Conversion to and from the following formats: ASCII · Wave · MS Excel (*.xls) · Matlab · PCM

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 longitudinal conversion loss · Script · Sidetone masking rating · Text (info) · Time distance · Time response · Variation of level · Variation of loudness rating

5) For 3QUEST, EQUEST, PESQ, POLQA, SNRI, Speech-based Double Talk and TOSQA, the respective ACOPTs (21, 29, 16, 30, 28, 32 and 10) are needed in addition.

For automated double talk, no ACOPT is needed in addition.



Signal editor window (requires ACOPT 01)

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)
- **SMA** 1 year software maintenance and update contract (optionally renewable on a yearly basis)

The ACQUA version „Workplace“ (Code 6830) additionally includes the ACQUA option ACOPT 02 and the digital sound board DSB II (Code 2406). Optionally, a network dongle is available instead of the local dongle (upon request, at an extra charge).

The ACQUA Compact systems (Code 6860.xx etc.) are bundles consisting of compact software, measurement front ends, measurement standards and (if required) further components for specific measurement tasks. The individual delivery items are described in a separate data sheet.

ACCESSORIES

The following accessories are optionally available:

- **DSB II** (Code 2406): digital sound board (PCI)
- **DSB III** (Code 2407): digital sound board (PCIe)
- **Multiple Serial Card RS232** (PCI)

Depending on the measurement task, one or several 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.

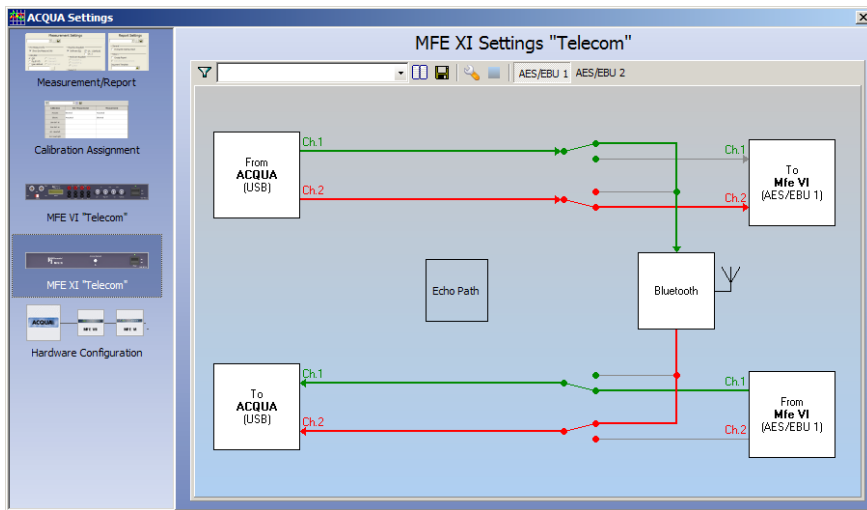
If ACQUA is installed on notebooks, the digital sound board (DSB) cannot be used. Instead, the use of PEQ V (Code 2492) or MFE VI.1 (Code 6462) is required.

SYSTEM REQUIREMENTS

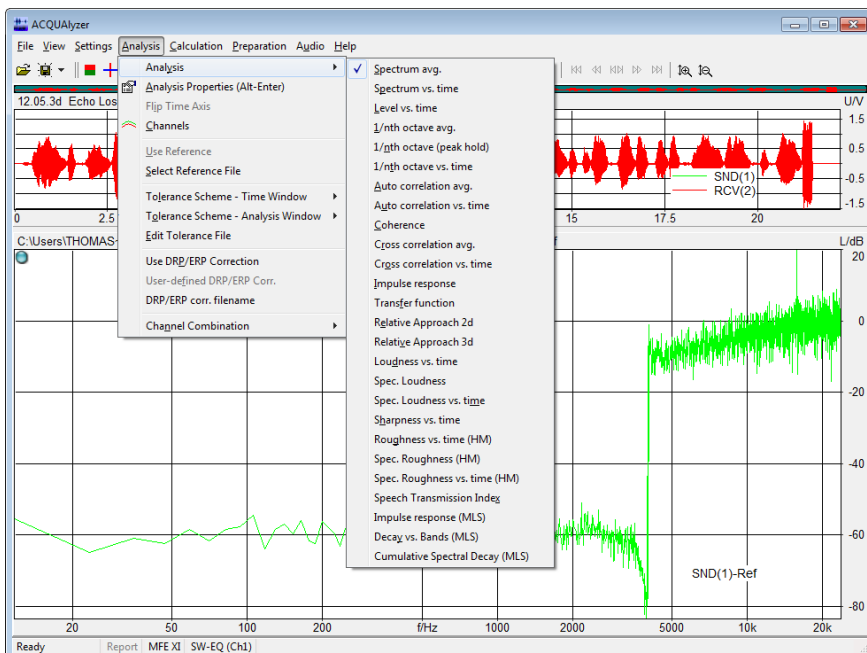
The PC which ACQUA is installed on has to fulfill the following minimum specifications:

- Pentium IV compatible processor with 2.0 GHz or faster
- Min. 1 GB RAM (2 GB or more recommended)
- NTFS file system required
- Free hard disk capacity required for installation of all components: 1 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)
- For use of MFE II and soundboard: 2 free PCI slots required
- Microsoft® Windows® 7 Professional/Ultimate or Windows® 8/8.1 Pro, English or German version, including all current service packs
- Microsoft® Office (2003 or later, 2013 not supported), 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



Intuitive hardware configuration and front end control



Wide range of analysis possibilities in ACQUAlyzer

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