ACERTARA
acoustic laboratories

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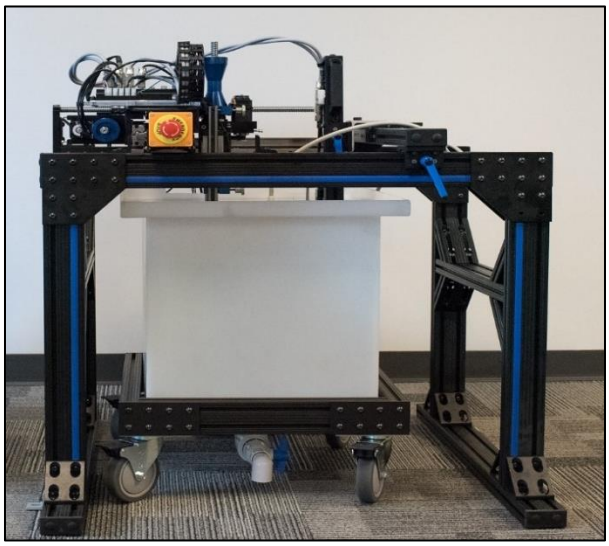
Acoustic Measurement System (AMS) and Software

Product Overview



Acertara's professional grade acoustic measurement system (AMS) has been designed using more than 20 years of acoustic output power and regulatory experience coupled with input from users, regulatory agencies, and notified bodies on a worldwide basis. Using today's cutting-edge precision mechanically engineered parts and materials the Acertara AMS is the gold standard for diagnostic and therapeutic ultrasound power testing. Our AMS product has been used to conduct testing according to such standards as IEC 60601-2-5, IEC 60601-2-37, EN 45502-1, IEC 61847, and ISO 14708-1. AMS is what we use in our ISO/IEC 17025:2017 accredited laboratory and has been used in over 1000 FDA 510(k) submissions. Easy to use, highly accurate, repeatable, and developed with unparalleled industry expertise, the Acertara AMS delivers the most effective acoustic measurement solution commercially available.

Key Specifications:

1) **Physical Dimensions of Tank Mainframe:**
   - L:57in, W:28in, H:33in, Weight ~ 150lb (depending on options)

2) **PC Requirements for optimal performance with AMS software:**
   - Operating System: Windows 10 Professional, Windows 7 Professional, or Windows XP Professional
   - USB Ports: Two (2) USB 2.0 or USB 3.0,
   - CPU: 64-bit or 32-bit; recommend 2GHz or higher,
   - RAM: 4GB minimum, recommend 8GB,
   - Hard Disk Space: 1GB required for the software installation; additional space will be required to store user's measurement data,
   - Display Resolution: 1280x768 or higher,
   - CD-ROM or DVD Drive (for installation)

Hardware and Software Features and Functions:

1) The fundamental hardware design electronics and mechanical elements are:
   - Integration with Tektronix, ethernet-enabled oscilloscopes (MDO, DPO, and TDS series)
   - Four (4) channel motor controller with encoders and 600W servo drivers
   - Emergency motor kill switch
   - 480 W, 48 V power supply
   - Six (6) adjustable motor limit switches
   - Three (3) rotary servo motors with 5000-line optical encoders
   - Modifiable rail structure with heavy-duty linear bearings
     - Resolution ≤ 20 µm in three dimensions
   - Hydrophone holder
   - Universal probe holder with adjustable gimbals

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- 45 cm × 45 cm × 45 cm polyethylene tank with drain and valve on casters
- Integrated thermistor to measure water bath temperature,
- PC pre-loaded with software and default connections to facilitate setup,
- Sixteen port ethernet hub
- Optional water filtration unit (Paratus)

2) The fundamental software elements are:

- Measurement and reporting of all relevant in-water acoustic parameters, such as the rarefactional pressure (p_r), pulse-intensity integral (PII), time average (I_{spta}) and pulse average (I_{spta}) intensities, and total power.
- Measurement and reporting of the corresponding derated parameters,
- Calculation of the mechanical and thermal indices (MI and TI),
- Measurement of ancillary reporting parameters such as center frequency, pulse duration and beam widths in two dimensions. Additional information includes the axial plot of intensity (in-water or derated) and MI, cross-axis beam plots, and raster (full two-dimensional) scans of the field,
- Automatic loading of hydrophone sensitivity and effective aperture as a function of frequency. The data is first loaded once by the user with an ancillary program. Once the program determines the effective center frequency of the probe under test, the appropriate hydrophone sensitivity is interpolated from the hydrophone data file. The effective hydrophone aperture is used to account for spatial averaging, using the method described by Preston, Bacon et al.[i]
- Beam alignment procedures, which involve operator adjustment to attain alignment to any degree desired (as a fraction of a wavelength).
    - Optional hardware package integrates with alignment routine to adjust the pitch and roll of the probe for fully automated alignment,
- Automatic oscilloscope gain adjustment to maximize waveform SNR,
- Automatic setting of optimal spatial step size for maximum speed with exceptional accuracy,
- Automatic setting of spatial scanning ranges, based on probe characteristics; this provides full accounting for non-linear beam characteristics,
- Automatic beam scanning routine to locate local maximum,
- Optimized waveform settling routines, which compensate for any hydrophone vibration after positioning movements and waveform averaging routines.

AMS also includes advanced features that make it especially suitable for more complex system testing and internal validation requirements among these are:

- The software uses a threaded python ‘back-end’ to interface with the motors, oscilloscope, and perform calculations,
- Under normal operation, the software uses an HTML ‘front end’ graphical user interface (GUI),
- Optionally, the software can be run without a front end accessing back-end commands directly to perform repeated tasks efficiently while unattended,
- R&D mode in the GUI allows a user to prescribe a unique measurement trajectory by loading a properly formatted excel spreadsheet.

All specifications are subject to change without notice.
AMS is designed and manufactured in the United States of America
For additional information contact: sales@acertaralabs.com