

HA - 3001

HORN ANALYZER



EPCC / PRODUCTS / APPLICATION / SOFTWARE / ACCESSORIES / CONSUMABLES / SERVICES

Analytical Technologies Limited

An ISO 9001 Certified Company

www.analyticalgroup.net

Horn Analyzer is the key instrument for effective manufacturing, quality control and maintenance of power ultrasonic transducers, converters, boosters, horns and acoustic stacks.

►► Software

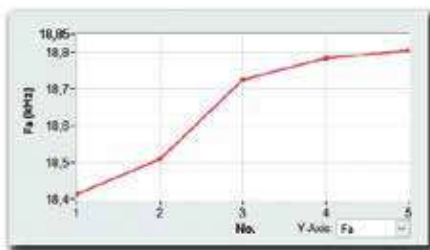
HA determines the resonance and antiresonance frequencies and impedances of the device under test by doing a frequency sweep. See the last page for information on how to use these results.

The HA Analyzer provides:

- High technology with excellent benefit-cost ratio.
- High return on investment with the reduction of maintenance costs.

►► How it works

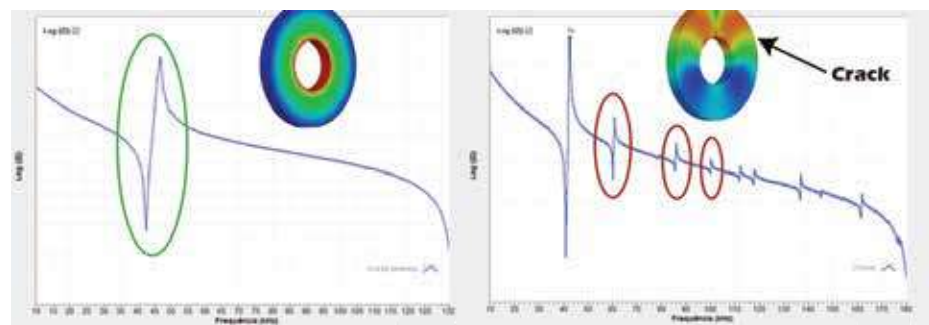
HA determines the resonance and antiresonance frequencies and impedances of the device under test by doing a frequency sweep. See the last page for information on how to use these results.



HA Software allows the step-by-step monitoring of frequency and other parameters variation along the machining process, as well as a function of time and temperature.

Piezo ceramics testing for cracks detection

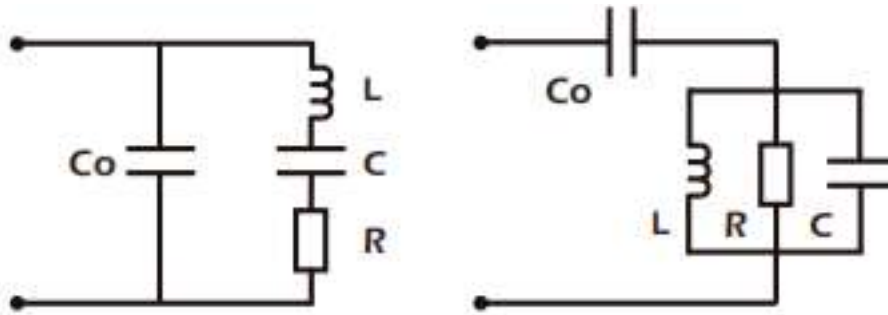
By using the “PiezoHolder” accessory, it is possible to test piezoelectric ceramics for internal cracks detection, perform the quality control of new ceramics and reuse recovered ones with reliability.



Measurements showing the pattern of a ceramic with no cracks (left graph) and of one with an internal crack (right graph). The presence of cracks is easily identifiable by additional resonances.

►► Calculate the equivalent circuit and the quality factor

The HA Software is able to calculate the Butterworth-Van Dyke (BVD) series and parallel equivalent circuit of the device under test, and from this equivalent circuit, the quality factor Q .



►► Technical specifications:

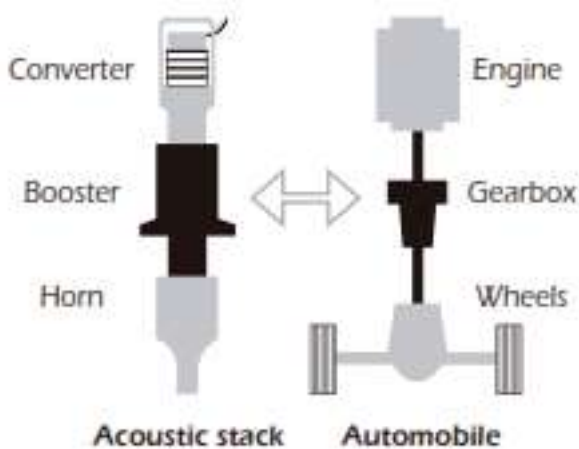
Frequency range:	1 - 200 kHz with 1 Hz resolution
Frequency uncertainty:	$\pm 0.05\%$ @ 25 °C
Impedance range:	0.1 Ω – 999.9 k Ω
Impedance uncertainty:	$\pm 3\%$ @ 20 kHz within the range 0.1 Ω - 10 k Ω
Memory:	01 (last measurement)
Dimensions and weight:	26 x 25 x 10 cm / 3.8 kg

The HA Analyzer calibration and functional test may be easily performed by using the “HA Calibration Kit”. This accessory is especially interesting for critical applications, eg. for the quality control of medical equipment. The “HA Calibration Kit” consists of a 10 k Ω precision resistor and a standard 100 kHz resonator.



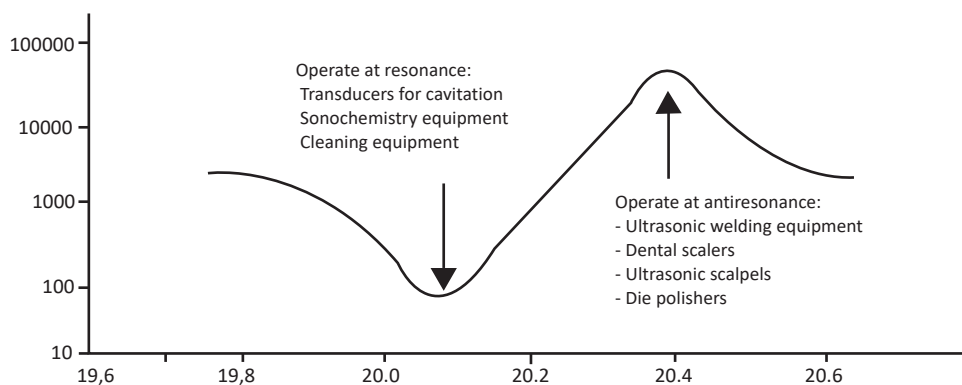
►► Power ultrasonic technology

Power ultrasonic stacks convert electrical energy into vibration. To understand its operation principles we can compare the ultrasonic stack with an automobile [1]. The converter performs the energy conversion as the engine; the transformer adjusts the ratio between force and speed as the gearbox; and finally, the horn directs and applies the energy as the wheels do. In the automobile, all the mechanical parts must match perfectly each other in order to improve the energy transmission efficiency as much as possible. The same occurs with ultrasonic systems where the key matching parameters are the frequency and parts coupling.



►► Operational modes

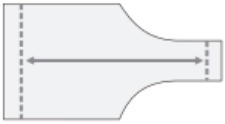
Transducers, converters and acoustic stacks have two operating frequencies that are easily identifiable on its electrical impedance curve. The impedance maximum corresponds to the antiresonance frequency, where the vibration speed and amplitude are maximum. Ultrasonic welding systems usually operate at this frequency. The impedance minimum corresponds to the resonance frequency, where the vibration force is maximum. Ultrasonic cleaning systems usually operate at this frequency.



►► Horn tuning

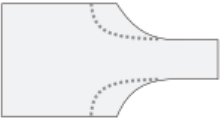
Ultrasonic horns must be tuned to work properly, avoid overheating and to have a long useful life. The usual tolerance is $\pm 0.25\%$ with regards to the nominal value, for instance, $20,000 \pm 50$ Hz.

To increase the horn frequency:

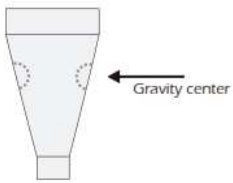


- Reduce the length.

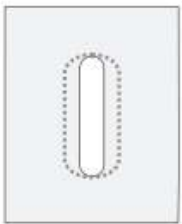
To decrease the horn frequency:



Advance the radius position,



Grooves on the gravity center,

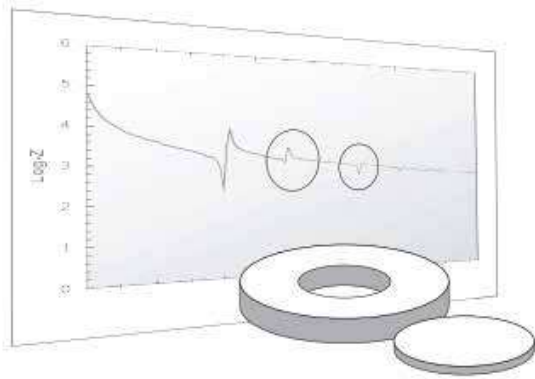


Widen the slots.

To perform the tuning, use the HA Analyzer together with the HA Software interleaved with the parts machining.

►► Piezo ceramics testing

The piezoelectric ceramics are the transducers and converters core and should be tested for internal cracks, even the new ones. The testing consists of the impedance curve measurement for the detection of anomalous resonances, which indicates the presence of cracks.



►► Preventive maintenance

Source of downtime and loss, faults in ultrasonic welding equipment are reduced by predictive and preventive maintenance. Frequency deviations indicate wear, and impedance deviations indicates problems of coupling and damaged interfaces. These problems are solved by polishing the interfaces and re-tightening the stack parts.



In addition to preventive maintenance, it is important to also conduct inspections of new and refurbished parts

HPLC Servicing, Validation, Trainings and Preventive Maintenance :

HPLC Servicing :HPLC Servicing : We have team of service engineers who can attend to any make of HPLC promptly @the most affordable cost.

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Validations :Validations :We have protocols for carrying out periodic Validations as per GLP/GMP/USFDA norms.

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Counter



Optical Emission
Spectrophotometer



DSC/TGA



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Chemistry Analyzer



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Reader/Washer



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Urine Analyzer



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system

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