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General Classification of SONOREACTORS

We have a number of options to address **flow-through Sonochemistry**. As you can see there are many elements we can use in our reactor-chamber designs. We can offer complete systems built for your needs or for clients with the capability to construct the chamber parts we may also consider selling just the ultrasonic components.

In addition to some standard components you will find that we are offering some very unique technology. For example if you decide on the very high surface power density probe solution please note that ours is the highest power system available. None of the leading industry brands are offering the same level of power output to the liquid. This is very important for some Sonochemical testing where you need to test low power as well as very high power.

Our Pipe-Clamp solution is a technology that will only function with our MMM generators. We can design clamps to fit nearly any size pipe and drive 1 to 5 converters and clamp assemblies from one generator.

SONOREACTORS Group A: HVPD

- High Volumetric (typically 5 to 50, or even until 1000 W/dm³) and low surface Power Density (typically 0.5 to 2 W/cm²)
- Large radiating surface/s (transducer arrays)
- Multifrequency, sweeping and single frequency systems

SONOREACTORS Group B: HSPD

- High Surface-Power-Density of ultrasonic radiation: HSPD
Typically 100 W/cm² or higher (until 500 W/cm²)
- Small radiating surface and very high intensity of radiation, like a torch
- Single frequency, single-Probe Systems

SONOREACTORS Intermediary Group C: Between A & B

- High Volumetric (typically 5 to 50 W/dm³) and moderate-to-high surface Power Density (2 to 20 W/cm²)
- Large radiating surface/s
- Multi-frequency and single frequency systems
- Single-Probe Systems, transducer arrays, tubular, solid rod and combinations with Clamp-On reactors...

SONOREACTORS Intermediary Group D: A+B in-line

- Combinations of two independently operating reactors (A and B) mutually connected in-line.

We need to learn more about your application to give better advice on the equipment that will best meet your needs. Please tell us: What kind of liquid material you wish to treat? Do you prefer to use the effects of even cavitation or a combination high acoustic power plus cavitation to break particles? Will you need to treat a large volume or small volume? Is your need for batch treatment or continuous flow?

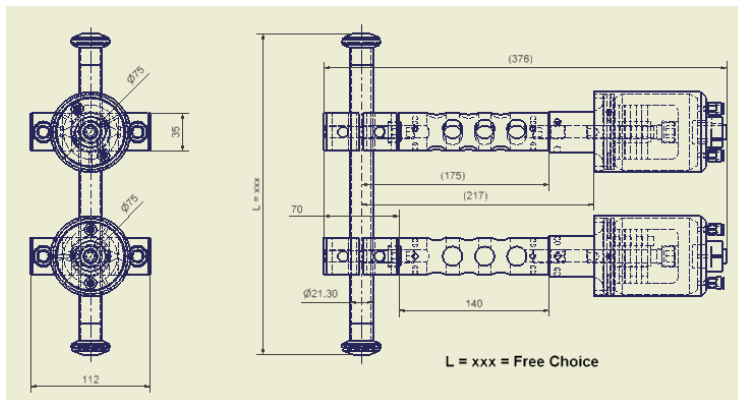
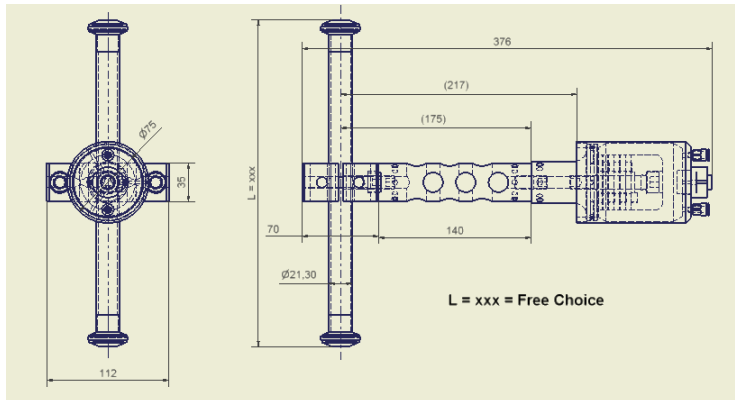
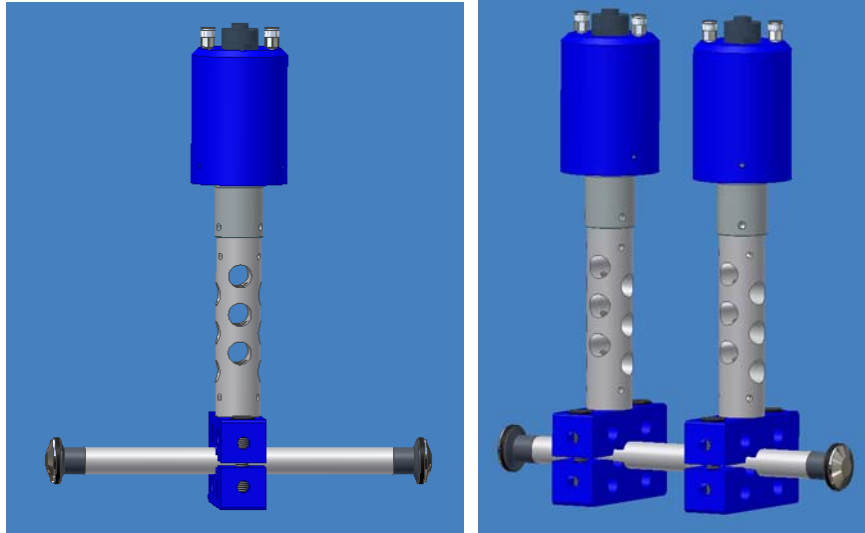
Please visit our website for more details and have a look at our production line technology, or contact us directly with any inquiries.

Applications of Flow-through Ultrasonic Reactor Systems:

- **Sonochemistry**
- **For organic and/or inorganic materials processing**
- **Homogenization** - making uniform mixtures of liquids or liquid suspensions.
- **Emulsification** - processing foods, pharmaceuticals, and cosmetics.
- **Dissolution** - dissolving solids in solvents.
- **Degassing** - removing gases from solutions without heat or vacuum.
- **Reaction Acceleration** - cavitation accelerates chemical and physical reactions.
- **Cracking in petrochemical technologies & biodiesel production**
- Cylindrical **360° internally radiating** chamber.
- Internal or external **liquid atomizing or powder making** sonotrode.
- **Powders production in liquid phase** by precipitation (minimizing the particle sizes including surface treatment).
- **Disruption and Cell Lysing** - will break open biological tissues and cells to extract enzymes and DNA, **prepare vaccines**. This technology provides a method for **ultrasonically lysing cells and spores** in a liquid flowing continuously or intermittently through a cylindrical reactor.
- **Transdermal Drug Delivery** (no more needles).
- **Bioengineering and genetic research** (extracting cells' fluids).
- **Activation of seeds:** almost 100% successful germination and healthier plants.
- **Filtering**
- **Sterilization**
- **Extractions from organic and inorganic materials**
- **Food products treatment**
- **Electroplating & Electrochemistry processes optimization**
- **Fine Particle Dispersion** - e.g. nanoparticles processing
- **Nano-particles & nano-emulsions technologies**
- **Cells disruptors**
- **Atomizing low and high viscosity liquids**
- **Liquid food processing**
- **Liquids processing on high temperatures (until 250°C)**

Clamp-On Tubular MMM Reactors

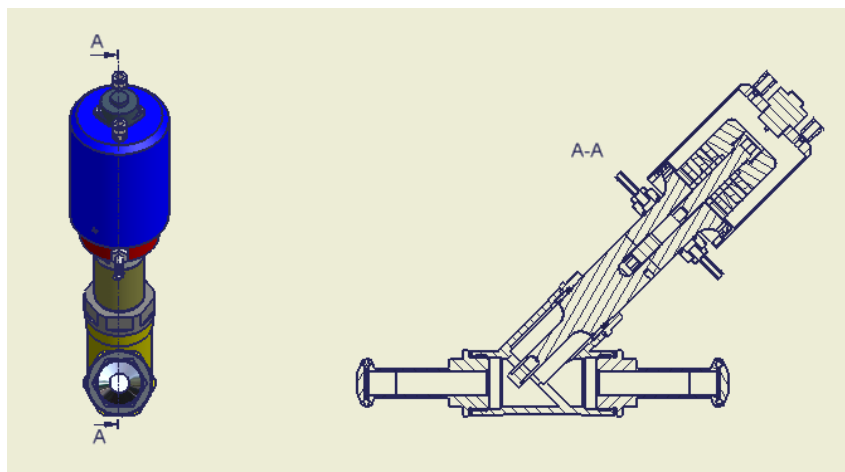
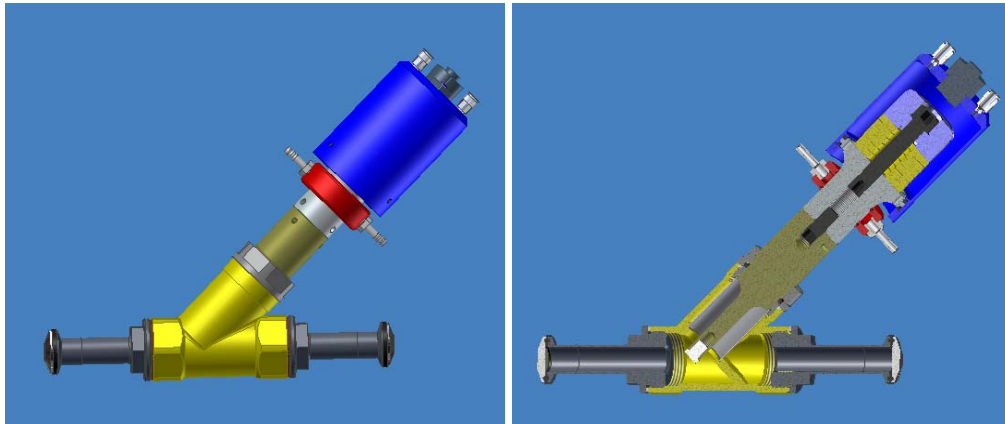
MMM frequency SONOREACTORS Group A: HVPD



http://mastersonics.com/documents/mmm_applications/liquids_processing/tubular_clamp_on_reactors.pdf

Y-Flow-Cell Probe Reactor

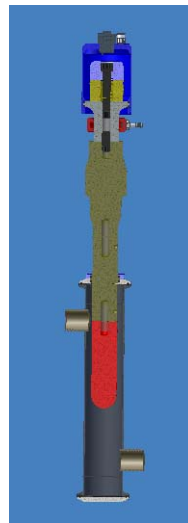
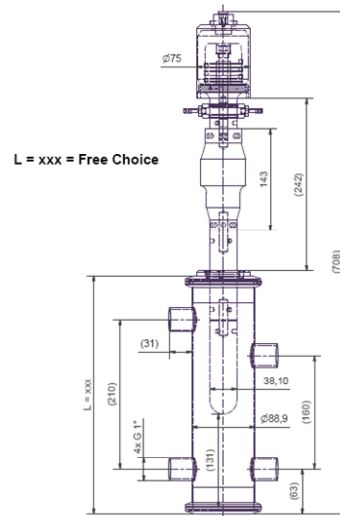
Fixed frequency SONOREACTORS Group B: HSPD



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Heavy Duty, High Intensity Probe SONICATOR

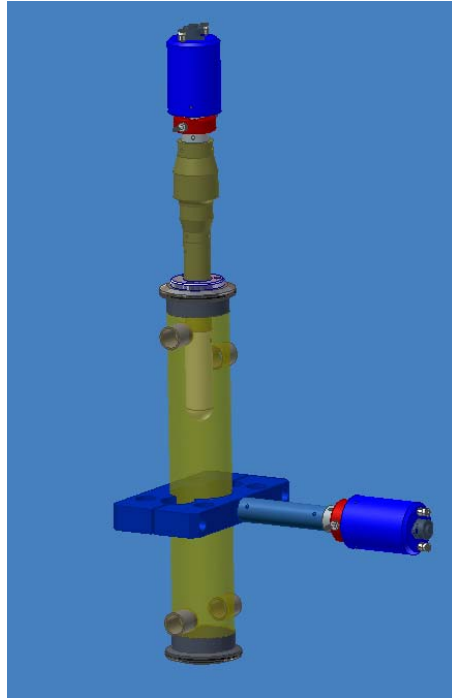
Fixed frequency Intermediary Group C
Between A & B: HVPD-&-HSPD



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Heavy Duty, High Intensity Probe SONICATOR & Clamp-On Reactor

Fixed and MMM frequency Intermediary Group C
Between A & B: HVPD-&-HSPD

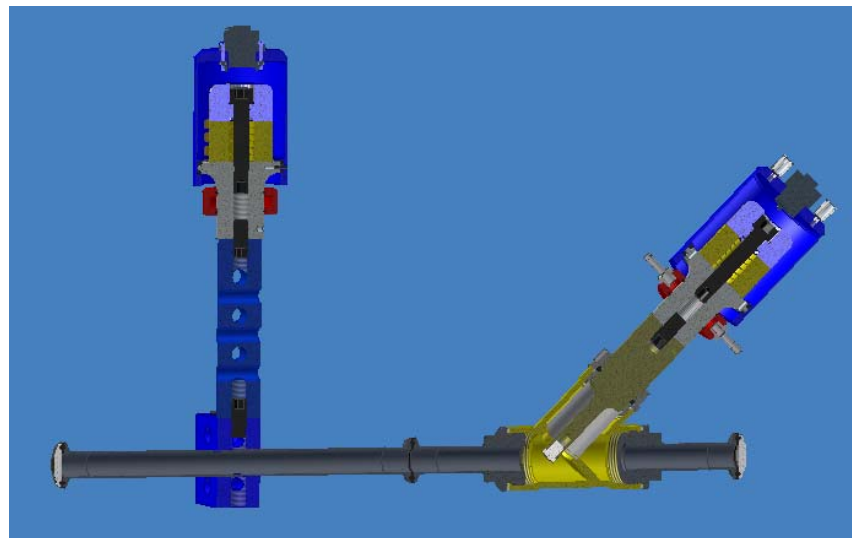
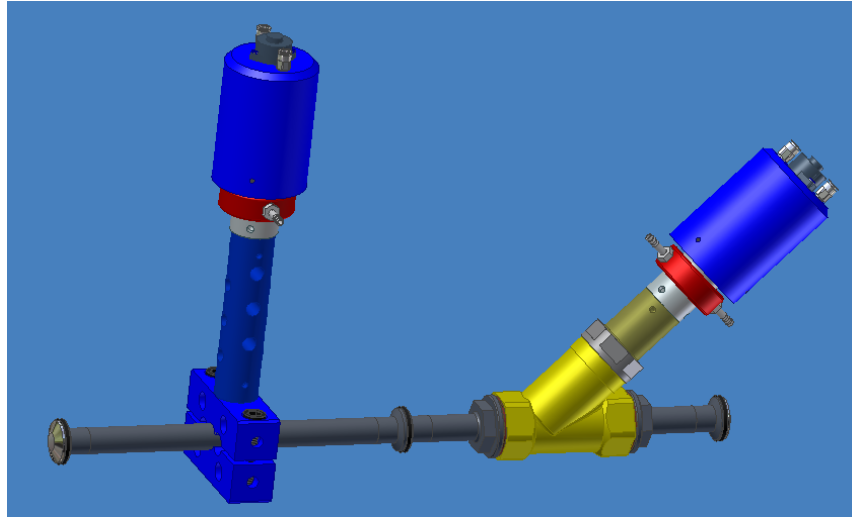


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Clamp-On & Y-Flow-Cell Reactor

SONOREACTORS Group D (A+B inline: HVPD+HSPD)
Fixed and MMM frequency Group: A & B in-line



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