



Ultrasound Technology

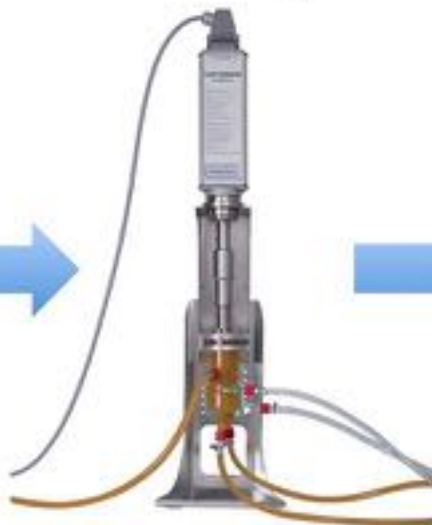
Hielscher Ultrasonics

High-Power Ultrasonic Devices for Lab and Industry

Ultrasonic Homogenizers



Ultrasonic Lab Device
Feasibility



Bench-Top Ultrasonicator
Optimization



Industrial Ultrasonic System
Commercial Production

www.hielscher.com

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Hielscher Ultrasonics– Your Expert for Ultrasonic Processes

Hielscher Ultrasonics is the top supplier for high power ultrasound devices. Hielscher offers various ultrasonic processors for the use in lab, bench-top and industry. Important applications are homogenizing, emulsifying, dispersing, de-agglomeration as well as the sonochemistry and sono-catalysis.

Ultrasonic Homogenizing:

Hielscher homogenizers are very efficient for the reduction of soft and hard particles. By intense cavitation forces, ultrasound reduces small particles (solids or liquids) in a liquid to improve uniformity and stability.

Ultrasonic Emulsifying:

Emulsions are dispersions of two or more immiscible liquids. Highly intensive ultrasound supplies the power needed to disperse a liquid phase (dispersed phase) in small droplets in a second phase (continuous phase). In the dispersing zone, imploding cavitation bubbles cause intensive shock waves in the surrounding liquid and result in the formation of liquid jets of high liquid velocity. As ultrasonication can produce very small droplets of almost uniform size in batch and production process, ultrasound is an effective method to create stable emulsions and even microemulsions.



Ultrasonic Dispersing & Deagglomeration:

The dispersing power of ultrasound is well-known and a reliable and efficient method to mix powders into liquids. High power ultrasound grinds and deagglomerates particles held together by attraction forces of physical and chemical nature down to micron and nano size and disperses the individual particles fine and evenly in the liquid. Generally, ultrasound produces very narrow particles size distribution.

Sono-Chemistry:

Sonochemistry is the application of ultrasound to chemical reactions and processes. The mechanism causing sonochemical effects in liquids is the phenomenon of acoustic cavitation.

High power ultrasound

- increases the reaction speed and reaction output,
- provides a more efficient energy usage,
- improves the performance of phase transfer catalysts or makes an avoidance of phase transfer catalysts possible,
- increases the reactivity of reagents or catalysts,
- offers sono-chemical means for switching of the reaction pathway,
- enables to use crude or technical agents,
- and activates metals and solids.

Sono-Catalysis:

Ultrasonication affects the catalyst reactivity during catalysis by enhanced mass-transfer and energy input. In heterogeneous catalysis, where the catalyst is in a different phase to the reactants, ultrasonic dispersion increases the surface area available to the reactants. Ultrasonication contributes to heterogeneous and homogeneous catalysis in many ways. Cavitation erosion on particle surfaces generates unpassivated, highly reactive surfaces. Short-lived high temperatures and pressures contribute to molecular decomposition and increase the reactivity of many chemical species. Ultrasonic irradiation can be used in the preparation of catalysts, e.g. to produce aggregates of fine-size particles.



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UP50H – Compact Lab Homogenizer

www.hielscher.com/up50

<p>Ultrasonic Lab Device UP50H</p>	 <p>UP50H - compact light-weight ultrasonic device</p>	 <p>UP50H at stand ST1-16</p>
<p>Technical Details</p>	<p>UP50H: Compact ultrasonic lab device (50W, 30kHz) for handheld and stand-mounted operation, automatic frequency tuning, amplitude adjustable from 20 to 100%, pulse adjustable from 0 to 100%, dry running protected, with 9-pin DSUB interface, light-weight, in portable case, IP40 grade, titanium horn</p>	
<p>Applications</p>	<p>Homogenization, Dispersing & Deagglomeration (e.g. nano particles), Wet-milling, Emulsifying, Lysis & Cell Disintegration, Extraction, Degassing, Sonochemistry</p>	
<p>Advantages</p>	<p>Performance: With 50 watts power, the UP50H is much more powerful than an ultrasonic bath or tank. Flexibility: For handheld or stand-mounted use, with various accessories for optimal adaption to your process. Quality: The UP50H device fullfills the highest quality standards. All devices are designed, engineered and manufactured in Germany.</p>	

Items:

- Ultrasonic Processor UP50H ◦ 115 volts ◦ 230 volts
- Sonotrode MS3 (tip diameter 3mm)
- Sonotrode MS7 (tip diameter 7mm)
- Stand ST1-16
- ST1-Clamp
- PowerMeter PowMet ◦ 115 volts ◦ 230 volts

UP100H – Compact Ultrasonic Lab Device

www.hielscher.com/up100

Ultrasonic
Lab Device
UP100H



UP100H - compact light-weight
ultrasonic device



UP100H at stand ST1-16

Technical
Details

UP100H: Compact ultrasonic lab device (100W, 30kHz) for handheld and stand-mounted operation, automatic frequency tuning, amplitude adjustable from 20 to 100%, pulse adjustable from 0 to 100%, dry running protected, with 9-pin DSUB interface, light-weight (1.1kg), in portable case, IP40 grade, titanium horn

Applications

Sample Preparation, Homogenization, Dispersing & Deagglomeration (e.g. nano particles), Wet-milling, Emulsifying, Lysis & Cell Disintegration, Extraction, Degassing, Sonochemistry

Advantages

Performance: With 100 watts power, the UP100H is much more powerful than an ultrasonic bath or tank.
Flexibility: For handheld or stand-mounted use, with various accessories for optimal adaption to your process.
Quality: The ultrasonic lab device UP100H fullfills the highest quality standards. All devices are designed, engineered and manufactured in Germany.



Items:

- Ultrasonic Processor UP100H ◦ 115 volts ◦ 230 volts
- Sonotrode MS3 (tip diameter 3mm)
- Sonotrode MS10 (tip diameter 10mm)
- Stand ST1-16
- ST1-Clamp
- PowerMeter PowMet ◦ 115 volts ◦ 230 volts

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UP200Ht – A Powerful and Smart Ultrasonic Lab Device

www.hielscher.com/up200ht

<p>Ultrasonic Device UP200Ht</p>	 <p>UP200Ht – comfortable use as handheld homogenizer</p>	 <p>UP200Ht with acrylic sound protection box</p>
<p>Technical Details</p>	<p>UP200Ht: 200 watts, 26kHz; for handheld and stand-mounted use; automatic frequency tuning, amplitude adjustable from 20 to 100%, pulse adjustable from 0 to 100%, with colored touch-screen & digital control, operation and control via LAN, automatic data recording, dry running protected, IP41 grade, titanium horn \varnothing 10mm, amplitude at horn 70μm, in portable case</p>	
<p>Application</p>	<p>Homogenization, Dispersing & Deagglomeration (e.g. nano particles), Emulsifying, Lysis & Cell Disintegration, Extraction, Degassing, Sonochemistry</p>	
<p>Advantages</p>	<p>Performance: With 200 watts power, the UP200Ht is much more powerful than an ultrasonic bath or tank.</p> <p>Flexibility: For handheld or stand-mounted use, with various accessories for optimal adaption to your process.</p> <p>Comfortable Operation: The light-weight device is ergonomically designed. The operation settings can be adjusted via the colored touch-screen. All functions are easily and intuitively reachable through one main menu.</p> <p>Quality: The UP200Ht device fullfills the highest quality standards. All devices are designed, engineered and manufactured in Germany.</p>	

Items:

- Ultrasonic Processor UP200Ht \circ 115 volts \circ 230 volts
- Sonotrode S26d2 (tip diameter 2mm)
- Sonotrode S26d7 (tip diameter 7mm)
- Sonotrode S26d14 (tip diameter 14mm)
- Stand ST1-16
- Sound Protection Box SPB-L, made from acryl glass



color touch-screen

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UP200St – A Powerful and Robust 200 Watts Ultrasonic Device for Lab and Small Scale Production

www.hielscher.com/up200st

Ultrasonic
Device
UP200St



UP200St – digital homogenizer
with acrylic sound protection box



UP200St for stand-mounted and
hand-held use

Technical
Details

UP200St: 200 watts, 26kHz; for handheld and stand-mounted use; separated generator and transducer (UP200St-T + UP200St-G) fulfilling IP51 + IP65 grade, automatic frequency tuning, amplitude adjustable from 20 to 100%, pulse adjustable from 0 to 100%, with colored touch-screen & digital control, operation and control via LAN, automatic data recording, dry running protected, titanium horn \varnothing 14mm, amplitude at horn 70 μ m, in portable case

Applications

Homogenization, Dispersing & Deagglomeration (e.g. nano particles), Emulsifying, Lysis & Cell Disintegration, Extraction, Degassing, Sonochemistry & Sono-Catalysis

Advantages

Performance: 200 watts power, very reliable & robust device for heavy duty operation
Flexibility: Handheld or stand-mounted use, with various accessories for optimal adaption to your process.
Comfortable Operation: The separated design of transducer and generator allows to place the generator safely outside the operation area.. The operation settings can be adjusted via the colored touch-screen. All functions are intuitively reachable through one main menu.
Quality: The UP200St device fullfills the highest quality standards. All devices are designed, engineered and manufactured in Germany.



Items:

- Ultrasonic Device UP200St (generator + transducer)
- Sonotrode S26d2 (tip diameter 2mm)
- Sonotrode S26d7 (tip diameter 7mm)
- Sonotrode S26d14 (tip diameter 14mm)
- Stand ST1-16
- Sound Protection Box SPB-L, made from acryl glass



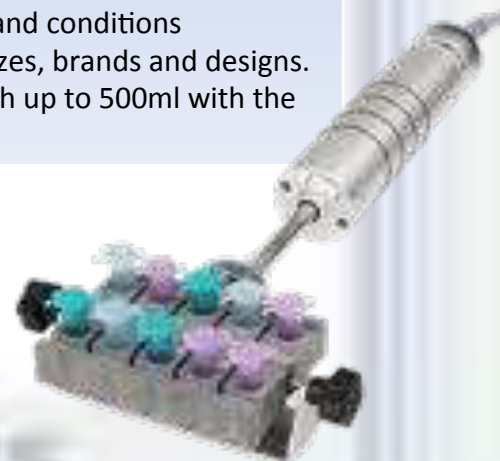
Digital Ultrasonic Device UIP200St and VialTweeter

www.hielscher.com/VialTweeter

<p>Ultrasonic Processor UP200St with VialTweeter</p>	 <p>UP200St with VialTweeter</p>	 <p>UP200St-T, VialTweeter & VialPress</p>
<p>Technical Details</p>	<p>UP200St processor: 200 watts digital ultrasonic processor, with touch display and automatic data recording, ultrasonic frequency 26kHz (auto scan), countdown (timer): 0.1sec to 99 days, shutdown when final energy input reached (Ws, Wh, kWh), autom. calibration of the amplitude-dependent idle power, data recording: amplitude, power, time, temperature on internal SD-Card (1GB), display and remote control via browser on PC/MAC without software installation, remote control via PLC</p> <p>VialTweeter: S26d11x10 block sonotrode, stainless steel, for UP200St, simultaneous sonication of up to 10 EppendorfVials, for vials and test tubes of 0.5ml, 1.0ml, 1.5ml or 2.0ml volume, e.g. 12x32mm or 15x45mm, other vial sizes available on request</p>	
<p>Applications</p>	<p>Sample Preparation, Mixing & Blending, Homogenization, Emulsifying, Dispersing & Dissolving, Disintegration & Cell Disruption, Deagglomeration & Particle Size Reduction, Degassing</p>	
<p>Advantages</p>	<ul style="list-style-type: none"> • Performance: up to 10 watts into each of the ten vials • Efficiency: <ul style="list-style-type: none"> - higher efficiency than ultrasonic bath or tank as the energy goes only into the liquid in the vials -time saving: the power levels allow for sophisticated sonication processes in short time, similar to direct sonication by a homogenizer -simultaneous sonication of up to 10 vials under same conditions • Flexibility: <ul style="list-style-type: none"> - the ultrasonic processor UP200St can be used with VialTweeter for indirect sonication or with sonotrode for direct probe sonication - various accessories allow use in manifold applications and conditions - VialTweeter is suitable for vials of the most common sizes, brands and designs. Possibility for indirect sonication of a single vessels with up to 500ml with the mountable VialPress 	

Items:

- Ultrasonic Processor UP200St o 115volts o 230volts
- VialTweeter S26d11x10 block sonotrode
- VialPress



Digital Ultrasonic Device UP400St (400 watts, 24kHz)

www.hielscher.com

Stand-mounted Ultrasonic Device UP400St



UP400St

400 W powerful ultrasonicator



The UP400St features a color touch-display, SD-card slot, LAN port and temperature sensor

Technical Details

UP400St: 400 watts, 24kHz; for stand-mounted use; automatic frequency tuning, amplitude adjustable from 20 to 100%, pulse adjustable from 0 to 100%, with colored touch-screen & digital control, operation and control via LAN, automatic data recording, dry running protected, IP41 grade, titanium horn, in portable case

Applications

Homogenization, Dispersing & Deagglomeration (e.g. nano particles), Wet-milling & Grinding (e.g. nano materials), Emulsifying, Lysis & Cell Disintegration, Extraction, Sonochemistry

Advantages

Effectiveness: High-power lab device for sonication of larger volumes from 5 mL up to 4L in the batch and approx. 10 to 50 litres per hour with flow cell.
Flexibility: Beaker sonication and continuous sonication for applications in lab & bench-top scale and for small production.
Simplicity: The operation settings can be adjusted via the colored touch-screen. All functions are easily and intuitively reachable through one main menu. The UP400St is simple to use and easy to clean.

Items:

- Ultrasonic Processor UP400St o 115 volt o 230 volt
- Sonotrode S24d7 with 7mm tip diameter
- Sonotrode S24d14 with 14mm tip diameter
- Flow Cell FC22K stainless steel, volume approx. 15ml
- Sonotrode S24d22D with seal for flow cell FC22K
- Stand ST1-16
- Sound Protection Box SPB-L, made from acryl glass



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SonoStep – Multi-Functional Ultrasonic Device with integrated Stirring and Pumping Functions

Ultrasonic
Device
UP200St-TD
with
SonoStep



generator UP200St + transducer TD +
top piece SonoStep

www.hielscher.com/SonoStep



TD + SonoStep for combined
pumping, stirring & sonication

Technical
Details

The **SonoStep** is the perfect device for reliable and comfortable sample preparation. The three essential functions of continuous **sonication, stirring and pumping** are integrated in a compact device. Ultrasound, and centrifugal pump are integrated into an agitated stainless steel beaker.

The 200 watts digital ultrasonic generator is equipped with touch display and automatic data recording, ultrasonic frequency 26kHz (auto scan); countdown timer, shutdown when final energy input reached (Ws, Wh, kWh); auto-calibration of the amplitude-dependent idle power; data recording: amplitude, power, time, temperature on internal SD-Card; display+remote control via browser on PC/MAC without software installation, remote control via PLC.

Applications

Small Volume Processing & Sample Preparation before Analysis: **Sonication, Stirring and Pumping** in one device

Advantages

• **Performance:**

- Consistent sonication with up to 200 watts for sample preparation.
- The SonoStep **pumps, stirres** and **sonicates** the sample in recirculation.
- Mixing/ Dispersing/ Deagglomeration + **De-aeration** by Power Ultrasound
- Direct connection to the analytical device for most accurate measurements.
- No sample loss, no cross-contamination

• **Efficiency:**

- effortless sample preparation by simple setup and operation of one device
- time saving: the power levels allow for sophisticated sonication in a short time, similar to direct sonication by a homogenizer with the advantage that the SonoStep delivers the sonicated sample directly to the analytical device
- direct connection of the SonoStep with the analytical device, e.g. for particle measurement

• **Flexibility:**

- Simple setup and operation
- Quick-locking mechanism for fast and simple cleaning
- Simply exchanable hose or pipe connections
- Cuphorn and flow cell for specific applications are additionally available

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Bench-top & Industrial Ultrasonic Systems



- UIP500hdT (500W)
- UIP1500hdT (1 kW)
- UIP2000hdT (1.5 kW)
- UIP4000hdT (2 kW)
- UIP16000 (16 kW)



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UIP2000hdT – Powerful Industrial Ultrasonic Device

www.hielscher.com/uiip2000

<p>Ultrasonic Processor UIP2000hdT</p>	 <p>UIP2000hdT transducer and generator</p>	 <p>UIP2000hdT installation</p>
<p>Technical Details</p>	<p>Ultrasonic processor UIP2000hd (2000W, 20kHz) consisting of transducer and generator; digital control, color touch display, intelligent data recording on internal SD card, automatic frequency tuning, amplitude 25 micron, amplitude adjustable from 20 to 100%, dry running protected, remote control via browser on PC or MAC without software installation, transducer IP65 grade, titanium horn</p>	
<p>Applications</p>	<p>Homogenization, Dispersing & Deagglomeration (e.g. nano particles), Wet-milling & Grinding (e.g. nano materials), Emulsifying, Lysis & Cell Disintegration, Extraction, Sonochemistry & Sonocatalysis</p>	
<p>Advantages</p>	<p>Effectiveness: High-power, high performance ultrasonic device with 2000 watts power, various recirculation setups for continuous processing, Reproducibility: Exact reproducibility by full control over the parameters „ Amplitude, Pressure, Temperature, Viscosity, and Concentration“ Scalability: All results achieved can be scaled up linearly. Industrial Grade: Full industrial grade, for heavy-duty operation and permanent use 24 hours per day (24h/7d), scale-up by cluster installation</p>	

Items:

- Ultrasonic processor UIP2000hdT
 - o 115 volts
 - o 230 volts
- Sonotrode BS4d34 (tip diameter 34mm)
- Sonotrode BS4d40 (tip diameter 40mm)
- O-Ring-Flange RFLA100
- Flow Cell FC100L1-1S w/ cooling jacket
- Flow Cell Insert34
- Booster Horn B4-2
- Stand ST2
- Sound Enclosure



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