



# ULTRASONIC INDUSTRIAL DEVICES



## an extensive spectrum of devices for various applications

The Dr. Hielscher GmbH develops and manufactures compact laboratory devices as well as a wide product range of ultrasonic processors for industry.

Hostile operational conditions and small space at the location make a conventional separation between the generator and the transducer necessary. There are also economical advantages, if only the transducer is designed for the specific conditions of the application e.g. for food industry standard or with explosion proof, and to house the generator separately in a cabinet.

The power spectrum for the industrial applications reaches at the time from 12 up to 16,000 watts per processor. With that spectrum most application cases can be achieved.

In addition to that, our standard product range can be enlarged with application-specific designs.

The power of up to 50 watts is sufficient to homogenize or to nebulize small



samples.

Higher power of approx. 500 watts is used for cutting, welding and sieving and in particular for the treatment of liquids as well as for special cleaning tasks.

Large-scale liquid volumes or big surfaces to be cleaned demand accordingly higher ultrasonic power. It is more cost effective to use one powerful industrial processor instead of a large number of small devices. That led to the development of our big ultrasonic processors, that are the most powerful continuous processors worldwide, which are incited by piezo ceramics, with a power of up to 16kW per unit.

This opens the way to a rational industrial use of high-efficiency ultrasound in various application fields e.g. in the chemical industry, the food industry, the piece-part production or in sewage sludge plants.

## survey of our ultrasonic processors

type		power (Watt)	frequency (kHz)	amplitude adjustment	pulse	application
LAB	UP50H / UP100H	50/100	30	20-100%	yes	lab, small sample sizes (see brochure on lab equipment)
	UP200H / UP200S	200	24	20-100%	yes	lab, medium sample sizes (see brochure on lab equipment)
	UTR200	200	24	20-100%	yes	lab, specialized applications (see brochure on lab equipment)
	UP400S	400	24	20-100%	yes	lab, large samples (see brochure on lab equipment)
	UM20-1.6	20	1,600	no	no	nebulizing, micro cleaning (see brochure on megahertz devices)
INDUSTRY	UIP12	12	60	20-100%	*	homogenizing, cell disruption, nebulizing
	UIP25	25	40	20-100%	*	homogenizing, cell disruption, nebulizing, excitation
	UIP50	50	30	20-100%	*	homogenizing, desagglomerating, degassing, cleaning
	UIP250(D)	250	24	20-100%	*	homogenizing, emulsifying, cleaning
	UIP500(D)	500	20	20-100%	*	reducing of germs, emulsifying, cleaning, excitation of tubes
	UIP1000(D)	1,000	20	20-100%	*	emulsifying, desagglomerating, excitation of bottles; cutting
	UIP2000(D)	2,000	20	20-100%	*	cleaning of wires and tapes, dispersing
	UIP4000(K, D)	4,000	20	50-100%	no	wire cleaning, emulsifying, de-watering, intensive cleaning
	UIP8000(K)	8,000	20	50-100%	no	disintegration of sewage sludge, emulsifying, excitation of tools
UIP16000(K)	16,000	20	50-100%	no	disintegration of sewage sludge, emulsifying	
SPECIAL	UIS250(L)	250	24	20-100%	no	excitation of laboratory sieving towers and industrial sieves
	UIS500	500	20	20-100%	no	excitation of industrial sieves
	UIW300	300/100**	40	20-100%	no	welding of plastics (smaller applications)
	UIW800	800/300**	40	20-100%	no	welding of plastics
	UIC400	400	20	20-100%	no	cutting (plastics, paper, cardboard, food, etc.)
	UIC500	500	20	20-100%	no	cutting (plastics, paper, cardboard, food, etc.)
UIC1000	1,000	20	20-100%	no	cutting (plastics, paper, cardboard, food, etc.)	

\* on request, \*\* in pulsed operation / in continuous operation, (K) special version for sewage disintegration, e.g. UIP8000K, (D) special version for wire cleaning, e.g. UIP1000D, (L) special version for lab use, e.g. UIP250L

## UIP12 / UIP25

## small devices in customized designs

The ultrasonic processor UIP12 has a maximum power of 12 watts and works with a frequency of 60kHz. The UIP25 is operated with 25 watts and 40kHz.

The higher the frequency the smaller the transducer we can design. Furthermore, the two standard versions can be modified in various ways in order to customize them. A lot of factors have to be considered, especially the integration of the ultrasound components into the existing machines or devices.

These modifications affect mainly the power and the frequency, the geometry of the transducer and the sonotrode, the configuration and the electric interfaces of the generator.

Applications include disintegrating, homogenizing or nebulizing of small test samples for analytical purposes, the automatic coating of plant leaves with pesticides in test laboratories, the permanent cleaning of sensors, the excitation of nozzles of a filling machine for an exact portioning or the cutting of

textile ribbons directly at the loom. If the ultrasonic processor is manufactured as handheld device both an ergonomic friendly design and the safety standards e.g. in the medicine or food industry have to be considered.



UIP12 (90kHz) as OEM-component



UIP25 with sonotrode for nebulizing

## UIP50 / UIP250

## assistant in laboratories and in industries



UIP50 as OEM-component



UIP50 for the cleaning of sensors

The ultrasonic processor UIP50 with a power of 50 watts and a frequency of 30kHz as well as the UIP250 with 250 watts and 24kHz are alternatives to the laboratory devices with similar power. They are used for hostile operation conditions. The robust aluminium housing of the transducer with its degree of protection (IP54) withstands dust, dirt, higher temperatures and humidity. The generator, supplied in a housing or as plug-in module for a cabinet, can be located outside the hazard zone.

The oscillating-free flange of the transducer permits positioning accurately in machines or robot arms. For the sonication of liquids at higher temperatures of up to 300°C and pressures of up to 300 atm we offer longer sonotrodes with pressure-tight flange connections.



UIP250 with mini flow cell

## UIP500 / UIP1000

## versatile and powerful

The ultrasonic processors UIP500 (500 watts) and UIP1000 (1000 watts) work with a frequency of 20kHz. The input of such ultrasound waves at this frequency into liquids creates an intense cavitation effect. Continuous ultrasonic systems are also available, with flow cells, that have a capacity of approx. 100 liters per hour; almost production scale. Where required, the transducer and in special cases the generator as well can be explosion-proof. These ultrasonic processor models are used for the treatment of liquids (homogenizing, de-agglomerating, disintegrating, reducing of germs and degassing) as well as for the intensive cleaning of wires, tapes, small parts or bores. Another application field is the excitation of tubes or reactor walls for a permanent cleaning or for the improvement of the fluidity. The excitation of tools reduces the feed forces required and improves the quality.

The degassing effect, when applied to bottles and cans is used for leak tests.

For use in the food or pharmaceutical industry, these ultrasonic processors are available with stainless steel housings.



UIP1000 and sonotrode with flange



flow cell for food (4 x UIP500)



UIP1000 with sonotrode for nebulizing

## UIP2000 proven high-efficiency



UIP2000 with flow cell/sound protection

Despite the enormous power of the ultrasonic processor UIP2000 (2000 watts, 20kHz), the device does not need any additional cooling by water or compressed air. The device works continuously in air. The robust design of the transducer, made of stainless steel and titanium, enables use under extreme conditions of dust, dirt, higher temperatures and humidity. The transducer and in special cases also the generator can be designed as ex-proof versions. According to the



UIP2000 and sonotrode with flange

operating needs the generator is located in a housing or in a cabinet and is equipped with control displays as well as with electrical interfaces.

Important applications for the UIP2000 are the intensive cleaning of continuous material such as wires, tapes and profiles, of single components or bigger bores. Sonotrodes are chosen to match to the application.

The treatment of sewage sludge for a better gas yield, the production of very fine emulsions and suspensions, the extracting and homogenizing as well as the reducing of germs are applications with this device in large scale. Corresponding sonotrodes e.g. the cascade sonotrode provide the required intensity of ultrasonic treatment of the liquid. Corresponding flow cells are offered for continuous operation. Sound protection casings complete the ultrasonic system based on UIP2000.

## UIP4000 industrial power in compact design

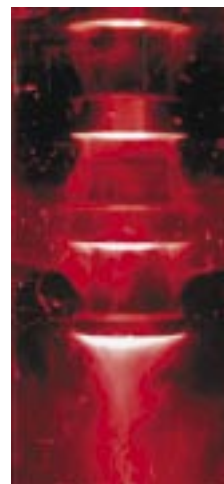


UIP4000 with flow cell/sound protection

The UIP4000 (4,000 watts, 20kHz) is used mainly for the industrial processing of liquids such as homogenizing, dispersing, disintegrating or deagglomerating.

The new modular concept of the UIP4000 provides you with a powerful and yet very space-saving system. This self-contained design reduces the work required for installation, operation and maintenance to a minimum level. Furthermore, multiple UIP4000 modules can be easily combined to form more powerful clusters. The flow cell as well as the ultrasonic transducer are located in a double-walled stainless steel cabinet that comes with a very effective sound insulation. In addition to that, it protects the ultrasonic unit against external forces such as dust, heat, or aggressive gases.

If required, the UIP4000 can be used for the sonication of liquids in custom-specific reactors.



cavitation at cascade sonotrode

## UIP8000 and UIP16000 giants for challenging tasks

The UIP8000 and the UIP16000 are the by far most powerful ultrasonic processor world-wide providing a continuous power of 8 and 16 kilowatts at an efficiency of more than 80%.

The development of such powerful systems stems from the demand for the ultrasonic treatment of liquids in larger scale. Whether emulsifying oil in water, disintegrating sewage sludge, deagglomerating nanoparticles or reducing germs, the needed ultrasound power usually raises proportionally to the liquid, which is to be treated in a certain time.

It is more cost-effective to compose a large ultrasonic system for example a system of 80kW with a flow rate of ten cubic metres per hour of 5 ultrasonic processors with a power of 16kW each than with 40 ultrasonic processors with a power of 2kW each.

The robust design of the transducer allows the use under heavy duty industrial conditions. The processor can also be delivered as explosion proof

design. The generator as the transducer and the flow cell are housed in two connected compact stainless steel cabinets. This makes the UIP8000 as well as the UIP16000 a self contained, robust and easy to install equipment. The standard footprint of such a 8 or 16kW unit is just 600mm x 1200mm.

If required, the generator cabinet can be located remotely in a max. distance of 10m from the transducer with the flow cell.

The system includes an independent cooling system that completely avoids the contact between aggressive air or dust in the production site and the electric components of the ultrasonic processor. The operation of the ultrasonic processor can be controlled and monitored by means of power meters and status displays as well as remotely via electric interfaces.



## ultrasonic flow systems unlimited potential

The ultrasonic effect in liquids is based mainly on the phenomenon cavitation. A huge amount of small vacuum bubbles are created, that implode immediately after they arose, which act upon the surrounding droplets or particles by means of shock waves and liquid jets. This kind of ultrasonic treatment can be realized in batch or in flow. In the end it is important, that a homogeneous sonication of the liquid is guaranteed. The very high power of the ultrasonic processors allows for amplitudes of 100 micron and therewith a high energy density even for large volume streams. The ultrasound can be transmitted in closed vessels by means of an oscillating-free flange, which is fixed at the sonotrode, and also under higher temperatures or pressures. Flow systems have been proven to be the right technique for the sonication of liquid volumes in large-scale. Such a flow system consists of modular components i.e. of the necessary number of ultrasonic processors,

tube-shaped flow cells and cascade-shaped sonotrodes with oscillating-free flanges. The cabinets for the generator and the sound protection casings for the flow cells are supplied customized according to the respective operating conditions.

Please ask for more information.



48kW flow system (24 x UIP2000)



10kW ultrasonic flow system/sound protection (5 x UIP2000)

## UIS250(L) / UIS500 sieving in laboratories and industries

Besides the classical low frequency vibrators, the use of ultrasonics has proven particularly efficient for the sieving. This technique accelerates the process or, in cases of difficult material, renders it possible at all. The ultrasonic processor UIS250 (250 watts, 24 kHz) is suited for laboratory sieves and medium-sized industry sieves. For industry sieves with a size from 0.5m<sup>2</sup> upwards the UIS500 (500 watts, 20kHz) should be used. The Dr. Hielscher GmbH has developed the world-wide unique ring sonotrodes for the excitation of laboratory devices, with which the adjoining sieves and by means of the clamping device even more sieves are excited horizontally. If the material is particularly difficult to sieve there is the possibility of an additional sieving pump with which vertical movements are created. The ring sonotrode and the clamp are adjusted to the commercial diameters of laboratory sieves as for example the diameter of 200mm. Simi-

lar to the construction of the laboratory sieving tower, the transducer is also installed outside the industrial sieves. Therewith a contact between the material to be sieved and the transducer is avoided, which is an advantage, in particular decisive regarding thermo-sensitive powder. The transducer can also be supplied as ex-proof version. Please ask for our detailed sieving information for laboratories or industries.



UIS500 at sieve frame



UIS250L at lab sieve tower

## UIC400 to UIC1000 ultrasonic cutting



UIC1000LB with long blade (800mm)



ultrasonic cutting system (8 blades)

The ultrasonic processors UIC400, UIC500 and UIC1000 with a power of 400, 500 or 1000 watts, respectively, and a frequency of 20kHz are developed especially for cutting tasks. This cutting method is nowadays a proven technique, in particular for cutting plastic sheets, textiles, cardboards, rubber, plastics and food. In general ultrasonic cutting means the excitation of a cutting tool or of the counter-bearing. The main advantage is the significant better cutting quality. Lower feed force permit higher cutting speed. Sludge cakings at the blades are removed by the ultrasonic oscillations. The lower wear of the tools and the resulting longer durability have a cost-saving effect.

Exchangeable blades, which are selected to the cutting criteria of the respective application case such as the material, shape and length, are used as tools. The ultrasonic processors can also be constructed for the use in the food industry.



UIC400 with short blade

## UIW300 / UIW800 ultrasonic welding and gluing

The ultrasonic processor UIW300 achieves in steady state a power of 100 watts and in pulsed operation 300 watts. The UIW800 achieves 300 watts or 800 watts, respectively. Both ultrasonic processors work with a frequency of 40kHz, which is of advantage for welding and gluing.

With such ultrasonic energy, the thermoplastic material will be preheated and becomes soft or liquid. This effect is used for forming and connecting the individual materials. It is also satisfactory, if only one component is thermoplastic or if a thermoplastic adhesive is applied between the components. The advantage of the ultrasonic welding compared to thermal welding is a shorter time cycle, a higher quality, lower energy consumption as well as the avoidance of heat and damaging steam effects. The ultrasonic processors weld straight pieces or surfaces. The sonotrodes i.e. the welding heads can be customized according to the geometry of the lines or surfaces. The



UIW300 and UIW800

transducer is also offered with explosion proofing. The ultrasonic processors can be used manually or can be integrated in a semiautomatic welding device or as component in a processing machine. In processing machines a combination of cutting and welding, supported by an automatic distance control, is used successfully.

Please ask for more information.

## our product and application spectrum



ultrasonic laboratory processors



ultrasonic industry processors



megahertz processors



ultrasonic sieving in the laboratory



industrial ultrasonic sieving



cutting and welding



ultrasonic dispersing systems



wire-, tape- and profile cleaning



intensive cleaning

Please visit our website at [www.hielscher.com](http://www.hielscher.com), ask for the respective information or contact us. We will be pleased to advise you.



**Your contact:**

Dr. Hielscher GmbH (Sales Dept.)  
Am Dobelbach 19  
D-70184 Stuttgart, Germany

**or:**

Hielscher USA, Inc.  
19, Forest Rd.  
NJ 07456, Ringwood, USA

Tel +49 (0) 711 2348 199  
Fax +49 (0) 711 2348 198  
Email [info@hielscher.com](mailto:info@hielscher.com)  
Web [www.hielscher.com](http://www.hielscher.com)

Tel +1 (973) 616 9136  
Fax +1 (973) 616 9131  
Email [usa@hielscher.com](mailto:usa@hielscher.com)  
Web [www.hielscher.com](http://www.hielscher.com)