

Ultrasound Technology
Certificated DIN EN ISO 9001

UP200St Operating Manual

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Imprint

Ultrasonic Processor UP200St

Ultrasonic processors for laboratory use

Purpose and application

The Operating manual explains the Ultrasonic Processor UP200St's layout and its operating deploying standard sonotrodes for laboratory and industrial use.

Please, read the safety instructions with special care and observe them.



Ensure this manual is stored near the Ultrasonic Processor UP200St workplace. The operating manual should always be within reach in order to resolve any problem that might arise.

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1 Description of the product

Ultrasonic Processor UP200St has been developed for laboratory use.

The ultrasonic transducer converts electric power into ultrasound, which is transmitted by means of the various sonotrodes onto the medium to be treated. The Ultrasonic Processor can be used manually as well as mounted on a support.

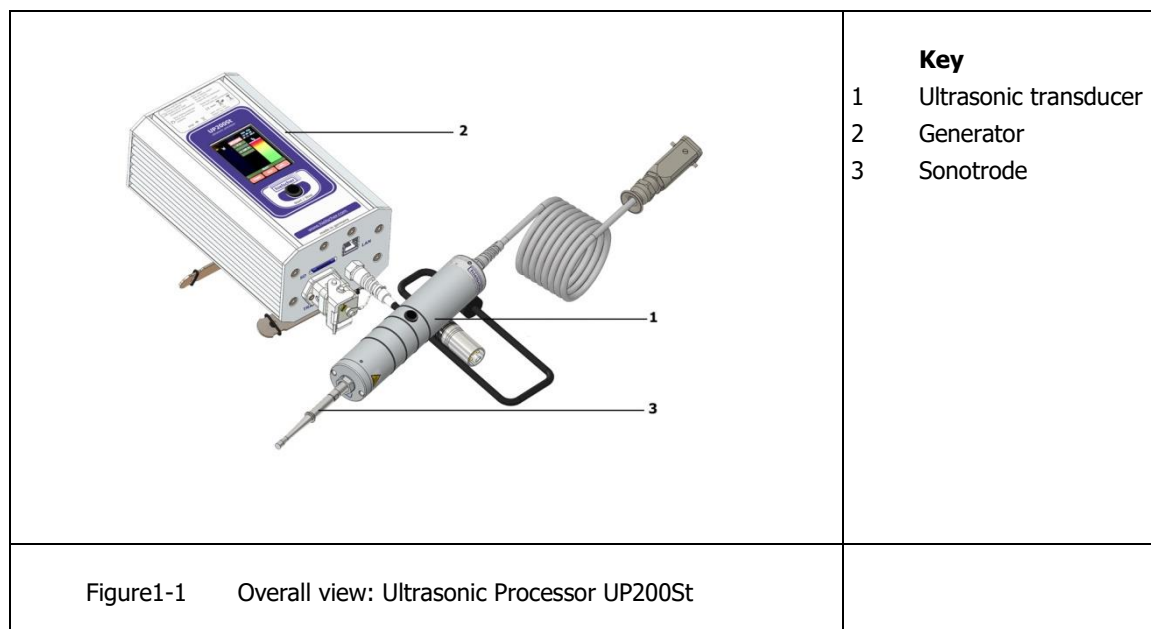
1.1 Concepts used in this manual

This Operating manual is only valid for the Ultrasonic Processor UP200St. The following concepts are used:

Ultrasonic processor	Complete ultrasonic system consisting of an ultrasonic transducer and generator - converts electric power into mechanical oscillations and transfers these to the sonotrode. In the UP200St ultrasonic transducer and generator have been mounted in separate casings.
Sonotrodes	Ultrasonic processor tools, screwed to the ultrasonic transducer, transfer the mechanical oscillations to the medium to be treated.

1.2 Overall view

The ultrasonic processor is supplied in a portable case, which also contains all accessories and necessary tools.





1.3 Areas of use

The areas in biology, medicine, chemistry and technology in which the Ultrasonic Processor UP200Ht may be deployed are legion.

Even if highly effective, the ultrasonic processor does not need cooling and is suitable for continuous Operating. The processor's mechanical amplitude is adjustable between 20% and 100%. The set value will remain constant under all operating conditions. This feature enables even continuous use in air.

The sonotrodes are impedance-matched and consequently may be used without amplitude limiting.

Temperature-sensitive samples can be treated in high-intensity pulse mode. The duty cycle between pause and ultrasonic action can be set from 10% to 100%, where 10% is taken to mean an ultrasound action of 0.1 second with a 0.9 second pause.

Degree of protection for generator IP20, observe sound converter IP65	
<i>Use generator only in closed rooms!</i>	
Risk of explosion	
<i>The ultrasonic processor is not permitted for use in explosive areas.</i>	

The ultrasonic processor UP200St is used for the following tasks:

Sonochemistry

The ultrasonic processor can be used for Sonochemistry with the usual laboratory containers. To this end suitable laboratory containers should be chosen both for the media to be treated and for the size of the sonotrodes.

Biology, medicine and chemistry laboratories

The Ultrasonic Processor UP200St may be used for laboratory operating such as:

- disintegration or homogenization of liquids
- intensive cleaning of flat substrates
- FIA (Flow Injection Analysis) in biochemistry

Other areas of application

Other possible application areas depend on the sonotrodes available. In case of doubt, please contact Hielscher Ultrasonics GmbH customer service. For address and telephone number please see par 7.1 "Service address and telephone".

The equipment supplied depends on your order. In particular, the sonotrodes and accessories supplied with the ultrasonic processor depend on their planned use.

Hielscher Ultrasonics GmbH supplies electrical connections for the supplied power unit as specified for the user country according to the customer's order see par 1.6 "Technical data". **The electrical connections may not be changed by the user of the ultrasonic processor!**


1.4 Standard equipment, standard supply

The plastic portable case with foam lining contains:

- Ultrasonic Processor UP200St with SD-card (1 GB incl.)
- Power unit with country-specific power cable and connection cable to the ultrasonic processor
- LAN cable to 3m RJ45 power connection cable and crossover-adapter
- Open-end wrench SW9 and SW17 for mounting the sonotrodes
- Allen wrench SW5 for mounting the feet
- PT100 temperature sensor TProbe150
- Boss head clamp, Cross clamp with support bar
- This Operating manual and additional guidance

Special tools

For use and mounting of accessories, please consult the separate documents supplied.

	
<p>Figure1-2 Ultrasonic processor UP200St with plastic portable case</p>	

1.5 Designation

Manufacturer	Hielscher Ultrasonics GmbH
Name	UP200St
Conformity	CE-mark (see for specification "Declaration of Conformity" in the appendix to this Operating manual)
Year of manufacture	See serial number on side of device, example: xxmmyyxxx

1.6 Technical data

Technical specifications

Ultrasonic Processor	UP200St
Efficiency	> 90 %
Working frequency	26 kHz
Control range	± 500Hz
Output control	20% - 100%, in 1% steps
Pulse-duty cycle	10% - 100% as related to a second, in steps of 0.1 second 100% – continuous Operating
Maximum amplitude	9 - 240 µm (PK-PK) depending on sonotrode type
Maximum energy density	up to 1000 W/cm ² in water depending on sonotrode type (see Table5-1 Power output in water and rapeseed oil")
Test certificates	See "Declaration of Conformity"

Electrical Data

Connection values	<p>Power supply: 220W AC-DC Industrial Adaptor AC-DC Industrial desktop adaptor with 3 pin IEC320-C14 input socket; Output 24VDC at 9.2A with DIN 4 pin plug with lock; Class I Input: 100-240V AC, 4A, 50/60Hz Output, max.: 24V DC ± 3%, 9.2A, 221W max.</p> <p>Processor: Input: 24V DC ± 3%, 9.2A Output, max.: 200W</p>
Mains fluctuations	± 10%
Surge category	I
Output/nominal power	200 W
Operating safety	
Protection level	I, grounded device
Overvoltage category	I
Degree of pollution	2
Protection degree	Ultrasonic transducer: IP65 Generator: IP20

Admissible ambient conditions

Temperature range	+5 ... +40 °C
Relative air humidity	10 - 90 %, not condensing
Tolerated corrosives	none
Ambient air pressure	700hPa - 1200hPa
Maximum rate of ambient pressure air change:	100hPa/hr
Maximum installation height	< 2000m

Device data

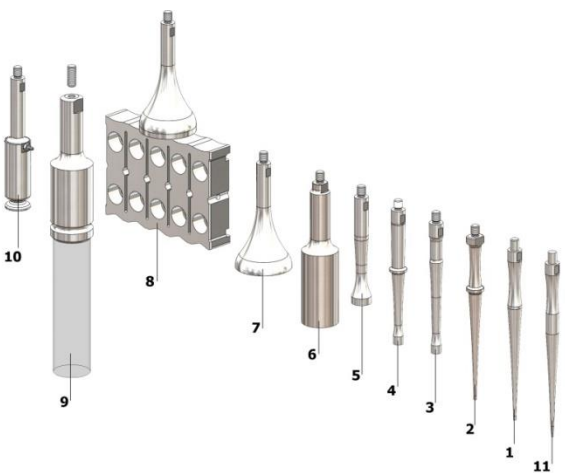

Dimensions	Ultrasonic transducer:	Ø45mm x 300mm
	Generator:	260mm x 115mm x 82mm
	Power unit with plug:	250mm x 85mm x 50mm
Weight	Transducer:	about 0.8 kg
	Generator:	about 1.5 kg
	Power unit:	about 1.1 kg

1.7 Available sonotrodes and accessories

The following accessories are regularly available. Please check the date of this Operating manual version and if expedient consult the Hielscher Ultrasonics GmbH Customer Service about recently added accessories.

Standard sonotrodes and accessories

The Ultrasonic Processor UP200St standard sonotrodes are deployed according to their size and ultrasonic performance.

	<p>Key</p> <ul style="list-style-type: none"> 1 Sonotrode S26d2 2 Sonotrode S26d2D 3 Sonotrode S26d7 4 Sonotrode S26d7D 5 Sonotrode S26d14 6 Sonotrode S26d26 7 Sonotrode S26d40 8 Vialtweeter sonotrode VT26d11x10 9 Glass sonotrode S26d26G 10 nebulizer sonotrode S26d18S 11 Sonotrode S26d1spec
	<p>Key</p> <p>Vialtweeter Sonotrode VT26d11x10</p>
<p>Figure1-3 Standard sonotrodes</p>	

For special applications Hielscher Ultrasonics GmbH develops and supplies on request appropriate sonotrodes as well as accessories.

Other accessories

Noise protection box **SPB-L** Noise reduction box, reduces continuous sound pressure level with 25dB. The noise protection box contains an adjustable support plate for the medium container.


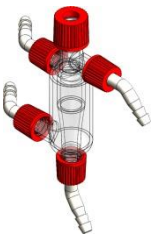
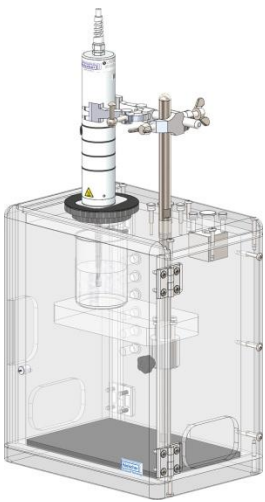
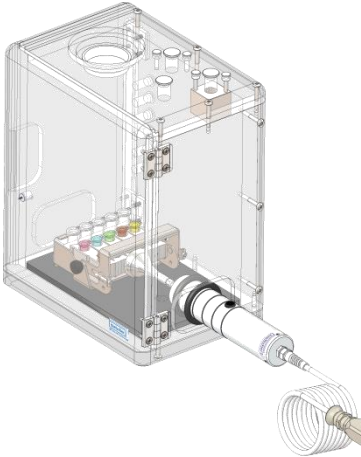

Noise protection box **adapter necessary** for use of UP200St in noise protection box SPB-L

Support **ST1-16** Stainless steel support Pedestal 300 mm x 150 mm, Diameter support bar 16mm

Flow cell **FC7K** For use with sonotrodes S26d2D and S26d7D stainless steel, autoclave-resistant, **with** cooling

Glass flow cell **FC7KG** can be used with sonotrodes S26d2D and S26d7D Duran ®-glass, autoclave-resistant, with cooling






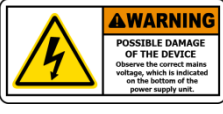









Clamping device **VialPress** for Sonication of plastic vessels, on the face of the sonotrode Vial tweeter VT26d11x10 see Figure1-3 "Standard sonotrodes"




 <p>FC7K</p>	 <p>FC7KG</p>	<p>Key FC7K - Flow cell with cooling FC7KG - Glass flow cell with cooling</p>
 <p>SPB-L</p>	 <p>SPB-L-VT</p>	<p>Key Sound protective boxes</p>
		<p>Key Clamping device "VialPress" for Vial 5ml</p>
<p>Figure1-4 Optional accessories</p>		

2 Safety




2.1 Symbols used

Symbols in this manual

IEC		ANSI
	Warns for immediate danger to life and limb (risk of severe injury and death).	
	Warning for a possibly dangerous situation that may lead to body lesions.	
	Warning for possible damage to objects without risk to persons.	
	Electric current!	
	Warning of possible feedback voltage when opening the plug - connection between the generator and transducer!	
	Explosion hazard!	
	Hot surface! Do not touch!	
	Wear protective gloves!	
	Eye and ear protection!	

	Read the Manual!	 
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Symbols on the device

	CE Conformity mark
	Hot surface! Do not touch!
	Warning of possibly dangerous situation with the result of injuries.

2.2 Appropriate use

Ultrasonic Processor UP200St is exclusively designed for ultrasound treatment of liquid media or of immersed solid media (both with immersed sonotrode tip) among other ends, for:

- disintegration or homogenization of liquids
- intensive cleaning of flat substrates
- FIA



The ultrasonic processor may only be used with the sonotrode tip a few millimeters above the liquid surface, or immersed down to the maximum allowed immersion depth (Table5-1 Power output in water and rapeseed oil”) of the sonotrode type used.

Any other use than that mentioned here deviates from the specifications and may cause hazards.

Any use not described here is not allowed and deviates from the warranty agreements and obligations between Hielscher Ultrasonics GmbH and other parties. Hielscher Ultrasonics GmbH does not accept any liability for damage, loss and/or lesions or death that may result from use deviating from the instructions in this Operating manual.

2.3 Safety instructions

It will be explicitly pointed out, that only original replacement and accessory parts are to be allowed to use. In case of non-compliance the warranty expires. The operating safety of the devices can be endangered when using other parts.

<p>Safety!</p>	
<p><i>Please use original replacement and accessory parts, only!</i></p>	
<p>Warning! California Residents Prop 65 Information</p>	
<p><i>This product can expose you to chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to „P65Warnings.ca.gov“.</i></p>	

General instructions



- Check your ultrasonic processor for any damage before use!
- Lay out the cable in a way that prevents it from being stepped on or stumbled over.
- Do not cover the ventilation apertures in the casing. Prevent liquids from penetrating into the casing!
- Never cover the power unit. Prevent liquids from penetrating into the power unit!

Risk of burns

- Do not touch horn and sonotrode during Operating. Risk of burns! After a long-time Operating, let the ultrasonic transducer cool off before touching its parts. At continuous operating especially the horn and the sonotrode may heat up to 100°C.

Danger of electric current

- Ensure the feed power corresponds with the specifications. See the data plate on the power unit.

<p>Note the supply voltage!</p>	 <div style="border: 1px solid black; padding: 2px; width: fit-content;"> <p>⚠ WARNING</p> <p>POSSIBLE DAMAGE OF THE DEVICE</p> <p>Observe the correct mains voltage, which is indicated on the bottom of the power supply unit.</p> </div>
<p><i>The ultrasonic processor may only be operated with the supply voltage on the bottom of the power supply unit!</i></p> <p><i>Any other supply voltage can destroy the device and lead to dangerous situations!</i></p>	
<p>Attention! Observe possible feedback voltage!</p>	 <div style="border: 1px solid black; padding: 2px; width: fit-content;"> <p>⚠ DANGER</p> <p>RISK OF ELECTRIC SHOCK BY FEEDBACK VOLTAGE</p> <p>Do not touch the pins off the transducer plug</p> </div>
<p><i>When disassembling or opening the cable connection transducer generator, there is the risk of an applied feedback voltage on the plugs and sockets!</i></p>	

- Do not open the ultrasonic processor's casing. Danger of electric shock!
- Never lift a device or its parts by its cable!
- Protect all electrical cables from heat, oil, solutions and sharp edges.

Danger from sound waves


- Never aim a switched-on ultrasonic processor at persons!
- Wear a proper ear and eye protection during operating or operate the ultrasonic processor inside the noise protection box SPB-L.
- Avoid using the ultrasonic processor in the presence of animals. Animals often have a larger frequency reach than people.

Handling of dangerous substances

- The owner is responsible for establishing procedures for the handling of dangerous substances. This includes cleansing of the sonotrodes and specification of admissible detergents (differentiating between those used for cleansing after operating involving dangerous substances and those after other operating). The owner of the ultrasonic system is to bring these procedures to the operators' knowledge and ensure their being observed.

Danger caused by ultrasonic treatment of media


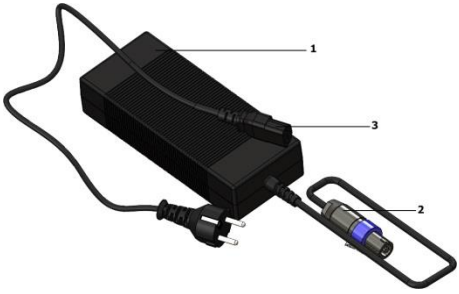
- Please be aware that ultrasonic treatment involves an energy transfer to the medium. This causes the treated medium to heat up.
- Be aware of the risk of bursting containers, especially when glass, earthenware, ceramic and other brittle containers are used.
- Be aware that treating a medium with ultrasound may cause the liquid's squirting, nebulizing (aerosol build-up!) or foaming up.

<p>Attention! Wear ear protection! Sound pressure level up to 100dB possible without protective measures!</p> <p><i>Depending on the used vessel, the sonicated liquid, the volume, the setting of the amplitude and the type of the used sonotrode a sound pressure level up to 100 dB can be occur.</i></p> <p><i>Use suitable sound insulation measures!</i></p>	
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3 Construction and function

3.1 Construction

The ultrasound processor consists of the ultrasonic transducer, the generator and the power unit. The ultrasonic transducer and the generator have been mounted in separate aluminum casings. The sonotrode is screwed onto the ultrasonic processor next to the horn.

	<p>Key</p> <ul style="list-style-type: none"> 1 Ultrasonic transducer UP200St 2 Generator UP200St 3 Sonotrode
	<p>Key</p> <ul style="list-style-type: none"> 1 Power unit 2 Plug to ultrasonic transducer 3 Power cable
<p>Figure3-1 Ultrasonic processor UP200St</p>	

3.2 Function

When electrically powered the ultrasonic processor generates longitudinal mechanical oscillations (reversed piezoelectric action) with a 26 kHz frequency. The processor's power output may be selected between 20% and 100% of maximum amplitude see 1.6 "Technical data".

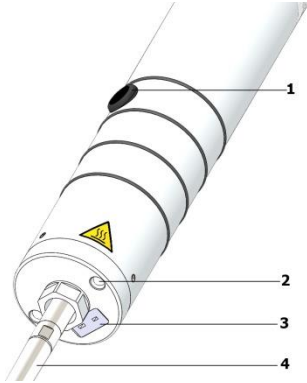

The oscillations are transferred by the sonotrode, screwed to the horn, and acting as a $\lambda/2$ -ultrasonic crystal, through its front surface onto the medium to be treated. When using an ultrasonic processor UP200St the medium must always be a liquid. Ultrasonic action causes cavitation in the liquid that may be used for various purposes see 1.3 "Areas of use". Solid bodies are immersed in a liquid before ultrasonic treatment, the liquid transferring the oscillations onto the surface of the substance (e.g. to remove a paint coating). The transferred ultrasonic

power density depends on the shape of the sonotrode and the size of the sonotrodes front surface.

The variety of available sonotrodes ensures an optimal choice for solving various tasks.

A LAN-interface enables monitoring, documenting and configuration of all important ultrasonic processor settings by means of a computer.

3.3 Controls and indicators

	<p>Key</p> <p>1 "START/STOP"-button 2 LED lighting 3 Temperature sensor bush 4 Sonotrode</p>
<p>Figure3-2 Ultrasonic transducer UP200St controls and indicators</p>	
	<p>Key</p> <p>1 Control panel with main menu 2 "Start/Stop"-button 3 LAN 4 SD card slot 5 Supply cable power unit 6 Plug to ultrasonic transducer 7 Safety clip</p>
<p>Figure3-3 Controls UP200St generator</p>	

The individual main menu elements have the following functions:

- Setting of amplitude by touching the "AMPL" slide control; the set value is shown in the main menu as a percentage; the device will keep amplitude continuously constant.
- ON/OFF indicator or error messages
- Change between input amplitude setting (AMPL.) or power setting (POWER)

- Touching the BIG button will activate extended display. Now the device's power consumption, duration of ultrasound emission, energy input and Operating mode are shown. Touching the display surface it will switch back to main menu.
- Setting of pulse duty-cycle with pulse bar.
- Setting of power by touching the power bar; the device will keep power constant.
- The status field shows the basic settings

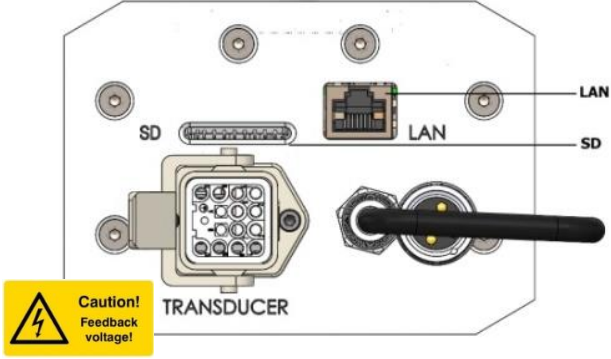
Touching the SETTINGS button in the main menu will activate extended setting mode. On this menu level various settings and device pre-settings can be changed. The two arrow buttons above allow for navigation through the various menu levels. Touching the BACK button you will return to the main menu.

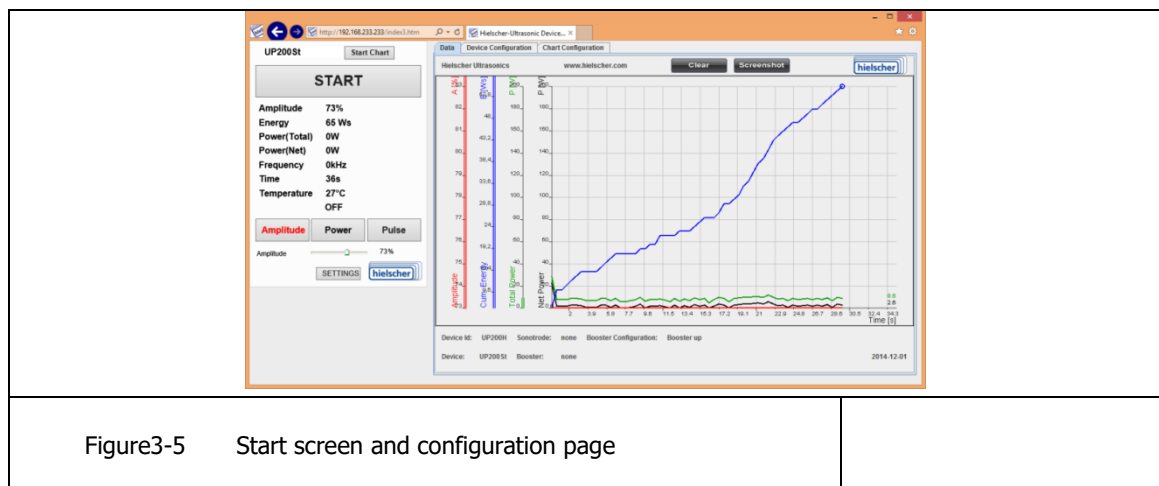
3.4 Interfaces

The ultrasonic processor is provided with an SD-card reader and a LAN-interface (Ethernet) for connecting with a computer (see Figure3-4 SD and LAN interface for memory card”).

Using an SD-card you can record in 100ms-steps process-related values, such as amplitude or energy input etc., in a text file.

The ultrasonic processor can be directly connected with, and controlled by, a computer or a network through a LAN connection. The ultrasonic processor supports various browsers such as Firefox, Internet Explorer and Opera. You can assign a network address (IP address) using the display of the device. Inserting the network address in the browser's address list establishes a connection. The factory-set network address is 192.168.233.233 (see Figure3-5 Start screen and configuration page”).

	<p>LAN</p> <p>Transmission rate 10Mbit/s</p> <p>Factory setting: IP address: 192.168.233.233</p> <p>Subnet mask: 255.255.255.0</p> <p>SD</p> <p>Memory card Type SDHC with max. 32GB memory size, FAT32 formatted</p>
<p>Figure3-4 SD and LAN interface for memory card</p>	



Using the LAN-interface you can control and monitor the most important ultrasonic processor settings. The most important settings are shown in a diagram.

The ultrasonic processor can be directly connected to a computer's network port or inserted into an existing Ethernet-network.

Minimum conditions for the use of a LAN-interface

An up-to-date browser is required for smooth Operating!

Direct connection with a Personal Computer

Avoid being connected with another network using the same subnet-ID, as this may cause network conflicts. In case of doubt, you should also deactivate the wireless LAN (WLAN) in your computer. In some cases additional firewall or anti-virus-software configuration is to be carried out to ensure smooth communication with the ultrasonic processor. To this end please contact your network administrator or our technical support service.

To ensure correct communication, the network configuration of the Operating system used must correspond with the default settings. For a direct connection between a PC and an ultrasonic processor you will need the network cable and network cross-over adapter in your supply package. The cross-over adapter may be connected either to the network port of your computer or that of the ultrasonic processor. Subsequently the adapter port can be connected with the remaining port by means of the network cable. The ultrasonic processor will now be able to exchange data with the computer. Start up your Internet browser. Now you can insert the IP address or NetBios of the ultrasonic processor in the address list in order to enter the website with the device controls. Please take care that when changing e.g. an IP address by means of the ultrasonic processor display, you will have to insert this address instead of the factory setting into the browser.

Factory settings:

IP address: 192.168.233.233
NetBios name: ULTRASONICS


If you are not able to operate the device using the default values (factory settings), you will have to find the IP address by means of the ultrasonic processor display. When inserting the address into the browser, mind to omit leading zero's in the IP address as read by the ultrasonic processor, as, depending on the way

the DNS is read, these zeros could be interpreted as characters, not as figures. For instance, an address read in the display as 192.168.001.050 is to be written as 192.168.1.50. The leading zero's on the device display serve only to enhance insertion on the touch screen.

A guide to menu on the display and reset to factory settings refer to the Operating manual supplied separately for integrated software.

In case of technical problems please contacts your administrator or the Hielscher Ultrasonics GmbH technical support service see 7.1 "Service address and telephone".

Integration into a local network

<p>Network</p>	
<p><i>In case this knowledge is not available, please contact your network administrator and our technical support service.</i></p>	

For integrating an ultrasonic processor in a local network, professional knowledge of network processes is indispensable. In case this knowledge is not available, please contact your network administrator and our technical support service. In some cases additional firewall or antivirus-software configuration is to be carried out to ensure smooth communication with the ultrasonic processor.

When using a network DHCP server, the computer will automatically receive its IP address from the server. This address is subsequently to be inserted into your browser's address list.




Beside integration in a network with a DHCP server, the ultrasonic processor may also be operated in a network with static (fixed) IP addresses. To this end the device is to be configured with a static IP address and proper subnet mask. As described in par. "Direct connection with a Personal Computer" the device is to be connected with a computer and the necessary settings are to be inserted by means of your browser. Besides inserting an unequivocal NetBios name and an IP address together with an appropriate subnet mask, you will also have to activate the option DHCP Server OFF in order to avoid network collisions.

Attention! When using several ultrasonic processors in one network, please be careful to always use different IP addresses and NetBios names. Improper differentiating may cause network malfunctioning that will impede correct functioning of your device.

4 Mains connection

The ultrasonic processor is to be connected through the power unit to mains inserting a safety plug into the outlet socket. Connection values are country-specific, so please consult the data plate on the ultrasonic processor's casing.

Please pay attention to:

<p>Connection values</p> <p><i>When connecting the ultrasonic processor to mains, please mind the specified connection values!</i></p> <p><i>See the data shield on the power supply.</i></p>	 <p>WARNING POSSIBLE DAMAGE OF THE DEVICE Observe the correct mains voltage, which is indicated on the bottom of the power supply unit.</p>
<p>Removable power cable</p> <p><i>Only use the supplied power cable or a tested, approved power cable with the properties required for use.</i></p> <p><i>The use of power cables with insufficient values can lead to dangerous situations!</i></p>	 <p>WARNING Hazardous voltage. Disconnect power before servicing.</p>
	<p>Key</p> <ol style="list-style-type: none"> 1 Power adaptor 2 Cable to generator 3 Power cable country-specific

5 Sonotrodes and immersion depths

Select the proper sonotrode according to the following criteria:

- the task to be fulfilled
- the volume to be treated
- the immersion depth required

Sonotrodes vary according to the ultrasonic power transferred by them, or to the ultrasonic power density with respect to the sonotrode front surface.

	<p>Key</p> <p>1 Sonotrode S26d2 2 Sonotrode S26d2D 3 Sonotrode S26d7 4 Sonotrode S26d7D 5 Sonotrode S26d14 6 Sonotrode S26d26 7 Sonotrode S26d40</p> <p>9 Glass sonotrode S26d26G 10 Nebulizer sonotrode S26d18S 11 Sonotrode S26d1spec</p> <p>Red line = maximum immersion depth</p>
<p>Figure5-1 Selected standard sonotrodes</p>	
	<p>Nebulizer sonotrode S26d18S</p>
<p>Figure5-2 Nebulizer sonotrode</p>	

Note:

The smaller the sonotrode front surface A , the less powerful the input sonotrode performance P ($P_{u/s} \sim A_{front}$).

Amplitude s and ultrasonic power density N however increase with decreasing front surface, whereas the cavitation intensity at the sonotrode tip increases (s , $N_{u/s} \sim 1/A_{\text{front}}$).

Please consult the supplied data sheets for special characteristics, application possibilities and mounting indications of the sonotrodes supplied. Attention! Different media will require a different energy input at equal ultrasonic treatment conditions.

The following two tables show values for immersion depth and power input for standard sonotrodes in water or rapeseed oil at room temperature. The UP200St limit value is 200W. When exceeding this value the device will shut off after an "Overload" message.



Please note! The maximum immersion depth of the sonotrode made of glass is **half of the glass cylinder**.

Type	Amplitude [μm] 100%	Power [W] in Water 15°C at a 50% / 100% Amplitude setting			Power P/A [W/cm ²] 100%	
		Immersion depth 5mm	Half sonotrode	Whole sonotrode	Immersion	depth
S26d2 – S26d2D Diameter 2mm	210	9 / 32	15 / 57	26 / 95		1019
S26d7 – S26d7D Diameter 7mm	175	32 / 90	39 / 100	50 / 130		234
S26d14 Diameter 14mm	90	70 / 160	95 / 170	100 / 200		104
S26d26 Diameter 26mm	20	45 / 90	66 / 190	115 / 200		17
S26d40 Diameter 40mm	9	30 / 70	55 / 120	Power limit		5
S26d26G Diameter 26mm	20	40 / 100	45 / 110	50 / 130		24
nebulizer sonotrode S26d18S	nebulizer performance: water 114ml/min, 20°C					
Type	Amplitude [μm] 100%	Power [W] in Rapeseed oil 20°C at a 50% / 100% amplitude setting			Power P/A [W/cm ²] 100%	
		Immersion depth 5mm	Half sonotrode	Whole sonotrode	Immersion	depth
S26d2 – S26d2D Diameter 2mm	210	9 / 40	36 / 103	42 / 130		1270
S26d7 – S26d7D Diameter 7mm	175	50 / 135	75 / 200	105 / Power limit		355
S26d14 Diameter 14mm	90	100 / Power limit	Power limit	Power limit		over 130
S26d26 Diameter 26mm	20	Power limit	Power limit	Power limit		over 37
S26d40 Diameter 40mm	9	Power limit	Power limit	Power limit		over 16
S26d26G Diameter 26mm	20	100 / 120	110 / 140	130 / 160		30
nebulizer sonotrode S26d18S	nebulizer performance: oil 10,5ml/min, 20°C					
Table5-1 Power output in water and rapeseed oil						





Please note! The amplitude values listed in the following tables are measured as **Peak-Peak (Pk-Pk) values**.

6 Commissioning


6.1 Room requirements

The ultrasonic processor has been designed for normal laboratory rooms or workplaces with laboratory-like facilities.

<p>Use in an environment with explosion hazards</p> <p><i>Do not use the ultrasonic processor in an environment with explosion hazards! This will cause explosion danger and consequently high risk for life and limbs!</i></p>	
<p>Corrosive environment conditions</p> <p><i>In case of corrosive environment conditions, the generator is to be additionally protected. Corrosive substances in the air may corrode the circuit boards and damage the generator.</i></p> <p><i>IP20</i></p>	

6.2 Mounting the pedestal to the generator


To optimize its use and Operating, please mount the supplied pedestal to the generator.

	
<p>Figure6-1 Mounting the pedestal to the generator</p>	

6.3 Mounting and dismounting the sonotrodes

Requirements

For mounting or dismounting a sonotrode, you need open-ended wrenches SW9 and SW17. These tools are part of the supply package.

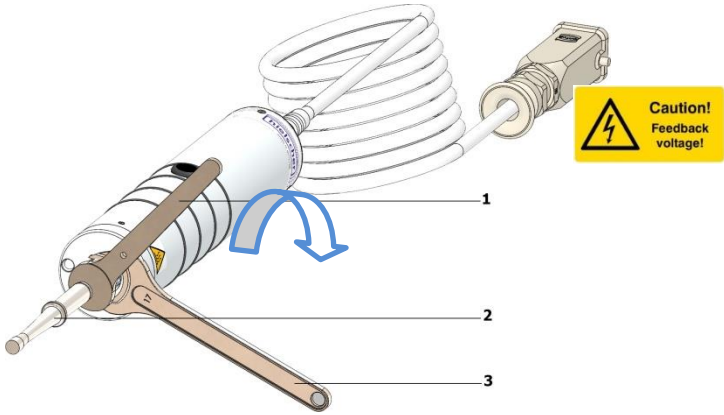
<p>Contaminated or damaged connection surfaces</p>	
<p><i>The connecting surfaces of sonotrode and horn must be clean, free of grease, dry and undamaged. Screw the sonotrode tight to the horn of the ultrasonic processor.</i></p> <p><i>If the sonotrode is not tightly screwed on, the power transfer from ultrasonic processor to sonotrode will be compromised.</i></p>	

Mounting the sonotrode

The sonotrode is to be connected very tightly to the ultrasonic processor's horn. Mount the sonotrode to the ultrasonic processor as follows:

1. Disconnect the power supply unit from the mains
2. Screw the sonotrode hand-tight into the horn's thread-hole.
3. Place the open-ended wrench SW9 into the sonotrodes wrench flat
4. Place the ultrasonic processor on a stable underground (table) and fix it with open-ended wrench SW17.
5. Place the open-ended wrench SW9 and turn the wrench clockwise and tighten the sonotrode (about 15 Nm).



	<p>Key</p> <p>1 Open-ended wrench SW9</p> <p>2 Open-ended wrench SW17</p> <p>3 Sonotrode</p>
<p>Figure6-2 Mounting the sonotrode</p>	

Dismounting the sonotrode

Dismounting the device in reverse order of mounting


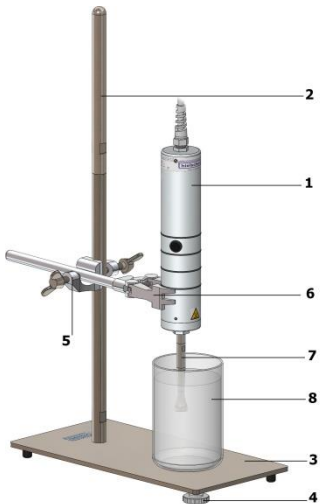
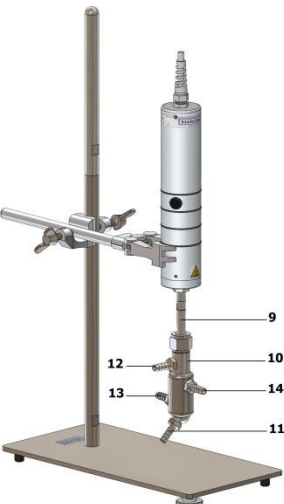
1. Unscrew the sonotrode (counter-clockwise).
2. Manually unscrew the sonotrode from the horn until it comes off.
3. Please check the front surfaces of the sonotrode and the horn for damage and clean the surfaces.

6.4 Mounting at the support

For mounting the ultrasonic processor on its support you need support clamp STH and the boss head clamp see par 1.4 "Standard equipment, standard supply". This boss head clamp will fit to any support with a bar diameter of 0.5 inch. The bar should be of at least 300mm height.

Mounting the ultrasonic processor to its support:

1. Fix the boss head clamp at the height of your choice to the support bar.
2. Place the ultrasonic processor with mounted sonotrode in the support clamp.
3. Insert the support clamp loosely into the boss head clamp
4. Slide the boss head to the appropriate Operating height for the mounted sonotrode with respect to the medium container.

<p>Mind the maximum immersion depth</p> <p><i>Do not immerse the sonotrode in excess of its maximum immersion depth into the medium!</i></p> <p><i>Maximum sonotrode immersion: See Figure5-1 "Selected standard sonotrodes"</i></p>	
<div style="display: flex; justify-content: space-around;">   </div>	<p>Key</p> <ul style="list-style-type: none"> 1 Transducer 2 Support bar 3 Support plate 4 Adjustable base 5 Cross clamp 6 Clamp STH 7 Sonotrode S26dxx 8 <u>Beaker glass</u> 9 Sonotrode S26dxD for use with flow cell 10 Flow cell FC7K 11 Medium inlet 12 Medium outlet 13 Cooling inlet 14 Cooling outlet
<p>Figure6-3 Mounting at the support</p>	

The sonotrode immersion depth may vary depending on duty. All immersion depths under the upper limit are allowed, including ultrasound treatment above the liquid surface, e.g. in order to nebulize liquids or to enrich the sample with air.

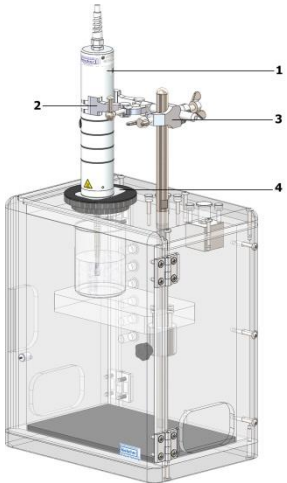
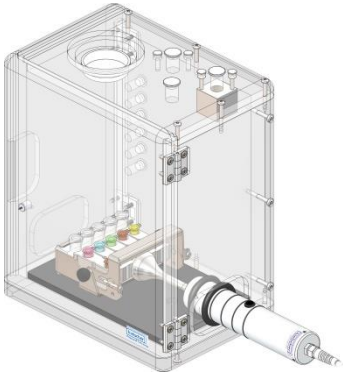

Please check maximum immersion depth in Figure5-1 "Selected standard sonotrodes".

5. Screw the support clamp and the boss head clamp tight


You can remove the ultrasonic processor at any time from the support bar and place it back into the same, reproducible working position.

6.5 Operating with a sound protective box SPB-L or SPB-L-VT


For continuous Operating over a longer period of time, it is recommended to use a sound protective box.

	<p>Key</p> <ul style="list-style-type: none"> 1 Ultrasonic transducer 2 Support clamp 3 Boss head clamp 4 Adapter UP200St
<p>Figure6-4 Transducer on support bar in SPB-L</p>	
	<p>Mounting with Vialtweeter Sonotrode VT26d11x10</p> <p>Please specify in your order!</p>
<p>Figure6-5 Transducer with VT26d11x10 in SPB-L-VT</p>	
<p>Contaminated or damaged connection surfaces</p>	
<p><i>The connecting surfaces of sonotrode and horn must be clean, free of grease, dry and undamaged. Screw the sonotrode very tight to the horn of the ultrasonic processor.</i></p> <p><i>If the sonotrode is not screwed tightly, the power transfer from ultrasonic processor to sonotrode will malfunction and the processor will change automatically to pulse mode.</i></p>	

6.6 Mains connection of the generator

<p>Check the electric connection values!</p>	
<p><i>Ensure the electric connection complies with the required connection values of the ultrasonic processor!</i></p>	
<p><i>For the connection data see the data plate on the device casing or 1.6 "Technical data" in this Operating manual.</i></p>	

The electric connection values of the device are written on the data plate on the bottom of the power unit.

	<p>Key</p> <p>1 Processor serial number</p> <p>2 Power unit</p>
<p>Figure6-6 Data plates on ultrasonic processor UP200St</p>	

1. Connect the ultrasonic processor to the generator and secure the connection with the safety catch.
2. Connect the generator with the supplied power unit.
3. Insert the power unit mains plug into a safety power outlet.

The ultrasonic processor's software will start up. During system start-up/booting you will see the welcoming screen. Subsequently the control panel will show the main menu (Figure3-5 Start screen and configuration page") showing the ultrasonic processor's operating readiness (standby-mode).

6.7 Operating


Select, depending on planned ultrasonic action time, manual mode (see par 6 "Commissioning") or support mounting (see 6.4 "Mounting at the support").

6.8 Manual mode – the correct grip

The ultrasonic processor is integrated in a casing that has been ergonomically adapted to the human hand. The device should be held in a way ensuring a clear view of the display (do not use the device headfirst).

6.9 Switching the ultrasonic processor on and off

Prepare your sample(s) before switching on the ultrasonic processor.




<p>Switching on using a medium amplitude setting</p>	
<p><i>Always use medium amplitude setting when switching on the ultrasonic processor. Once in Operating mode you can switch the ultrasound treatment value (amplitude, duty cycle) to a higher level.</i></p> <p><i>This way you will avoid unintentional foaming up or squirting of the sample liquid.</i></p>	


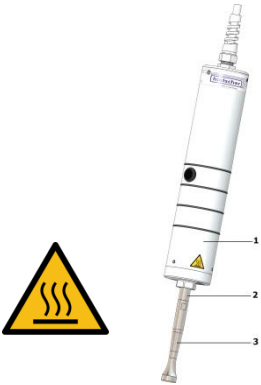
Requirements for switching on

- The samples to be treated have been prepared
- The ultrasonic processor has been connected to power (mains plug inserted in outlet)
- The control panel is active and lighted
- You are seeing the main menu

Switching on and off

When operating the ultrasonic processor, observe the following safety instructions:

<p>Injury risk from bursting glass containers in the laboratory</p> <p><i>Do not touch glass medium containers with the oscillating sonotrode!</i></p> <p><i>The sonotrodes oscillations may break the glass, ceramic, or earthenware containers and cause injuries!</i></p> <p><i>The ultrasound treatment will increase the medium's temperature. This may give rise to aerosols, vapors etc.</i></p>	
<p>Explosion hazard</p> <p><i>Application of ultrasound to inflammable samples only with sufficient ventilation and functioning suction hood!</i></p> <p><i>Neglect may cause explosion danger!</i></p>	
<p>Wear ear protectors!</p> <p><i>Wear appropriate ear protection when operating the ultrasonic processor for a longer period!</i></p> <p><i>Neglect may cause permanent hearing damage.</i></p>	

Danger of burning by a hot sonotrode!	
<i>Do not touch the sonotrode or the horn during operating! Sonotrode and horn may heat up to 100°C. Hot surfaces may cause danger of burns!</i>	
	Key 1 Transducer UP200St 2 Horn of the transducer 3 Sonotrode

1. In the control panel set amplitude on 50% using the slide control (see Figure3-2 "Ultrasonic transducer UP200St controls and indicators")

This way you will avoid unintentional foaming up or squirting of the sample liquid.

2. Immerse the sonotrode into the medium
Check your sonotrodes maximum immersion depth (see Figure3-5 Start screen and configuration page")
3. Press the ultrasonic processor's start button and keep it pressed until the end of the ultrasound treatment, or press the start button under the operating menu. The ultrasonic treatment ends when, depending on your setting, either the time set has ended or the power input has finished.

Switching without pre-set values in continuous operating

4. Press the start button underneath the control panel once and briefly (see Figure3-2 "Ultrasonic transducer UP200St controls and indicators").
To switch off the ultrasonic processor, press the start button another time.

6.10 Varying the operating settings

Change amplitude / ultrasound power

1. Amplitude size (and so the level of the ultrasound power input) is regulated by means of the main menu slide control for an amplitude of between 20% and 100%
2. The size of the maximum oscillation amplitude (100%) of a sonotrode depends on the device type.

Setting pulse operating

You can set the duty cycle for pulse operating by means of the Cycle key (Figure3-2 "Ultrasonic transducer UP200St controls and indicators").

For continuous ultrasonic action, set the slide to "1"; each other setting imposes shorter treatment times with corresponding pauses (see 3.3 "Controls and indicators").

6.11 Sonotrode discolouring and changes

During sonotrode Operating in liquid media the sonotrode surface may undergo some changes.

These changes may be discolorations but may also consist of small holes.

This is caused by tiny particles being extracted from the sonotrode front surface or other parts as a result of cavitation and absorbed by the medium.

In the long run this will cause the sonotrode to wear off. The resulting lifetime of a sonotrode depends essentially on the size of the mechanical amplitude, chemical and physical properties of treated media and the treatment settings (pressure, temperature).

The changes in the sonotrodes, within the aforementioned lifetime, do not however affect the sonotrodes' functioning and so do not represent a defect that involves liability.



7 Start screen of integrated software

After the ultrasonic processor is connected to the supply voltage, the software is loaded and the main screen appears in the display. The operating of the software, refer to the **separate** operating manual supplied.

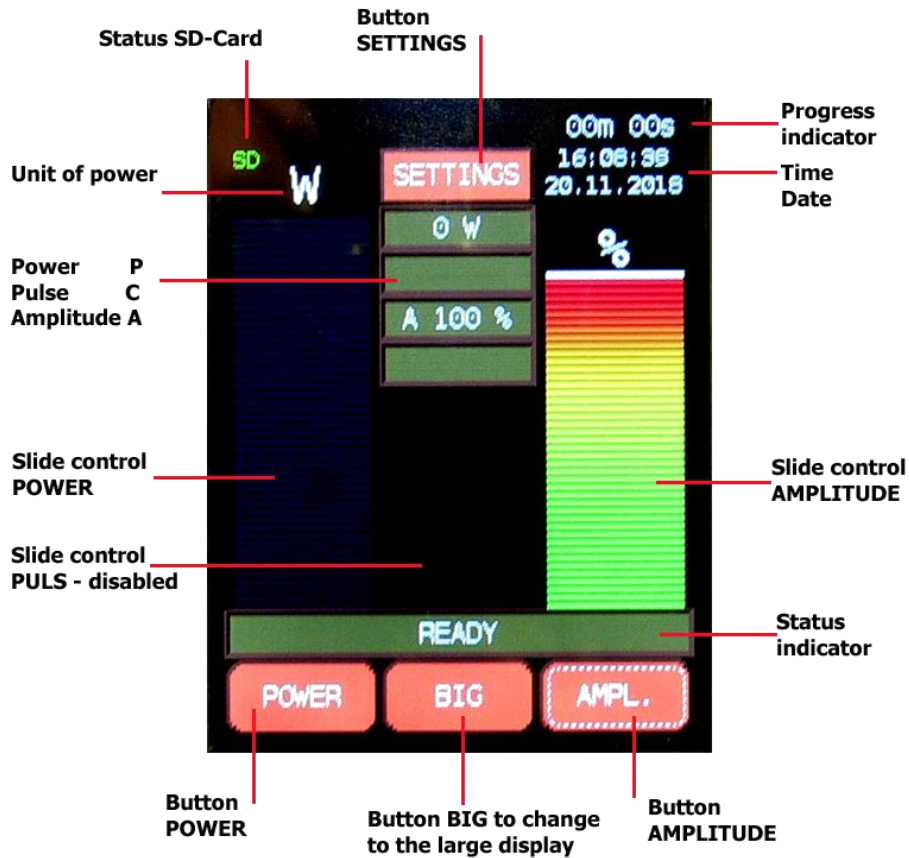


Figure7-1 Start screen

7.1 Service address and telephone

In case of complications our team can be reached during office hours. Mo. – Fri. from 08.30am to 05.30pm at the service telephone:

Hielscher Ultrasonics GmbH	Telephone	+49 (0) 33 28 / 437 3
Oderstrasse 53	Fax	+49 (0) 33 28 / 437 444
D-14513 Teltow	Email	service@hielscher.com
Germany		

8 Configuration of a LAN connection

In this chapter we give you some instruction for setting up an Ethernet connection between the ultrasonic processor UP200St and a computer. In this case with operating system: Windows 7© Professional.

Please contact prior to the start of the configuration of your network administrator!

Important! Connect the ultrasonic processor directly with the computer using the supplied Ethernet cable and crossover-adapter. The adapter is indispensable for network cards with less than 1 GBit/s.

Open the network access center in order to check existing network connections and select an appropriate connection for the ultrasonic processor.

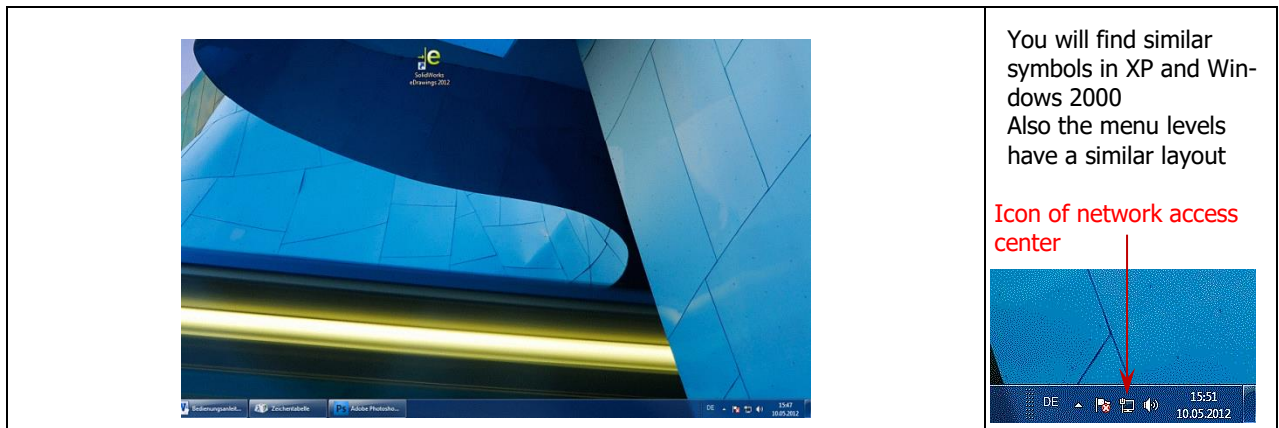
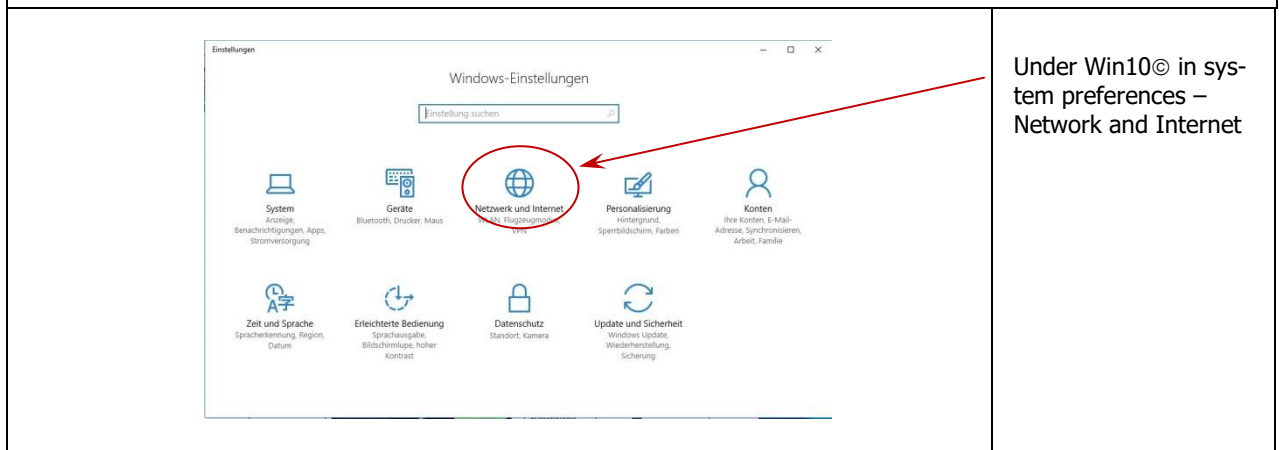


Figure8-1 Activating the network access center on computer



Click on the corresponding icon in the task list on Windows Desktop. The window of the network access center will open. Here all network connections of the computer will be shown.

8.1 Check for an existing connection

Check in the network access center whether a network connection between the computer and a network exists and how many network cards have been installed.

To check this, click on "Change adapter settings".

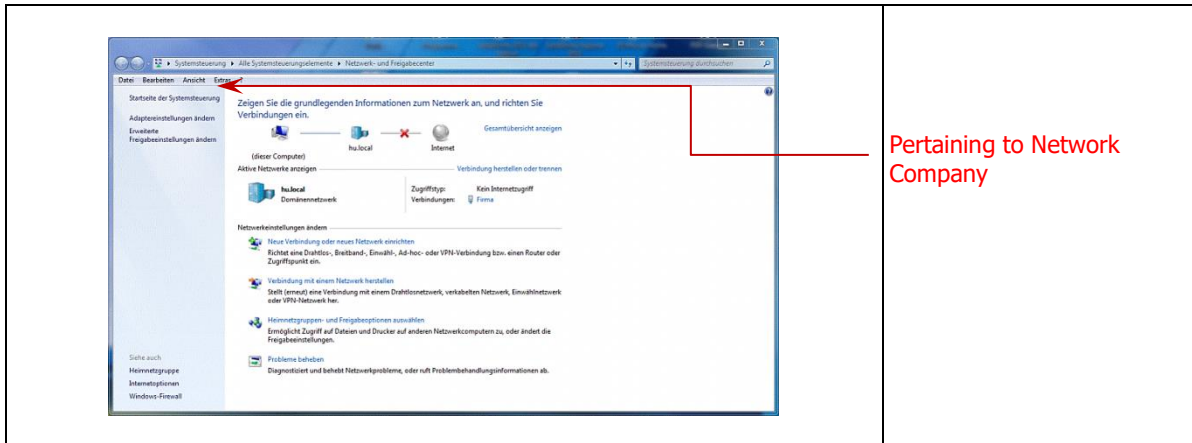


Figure8-2 Network access center

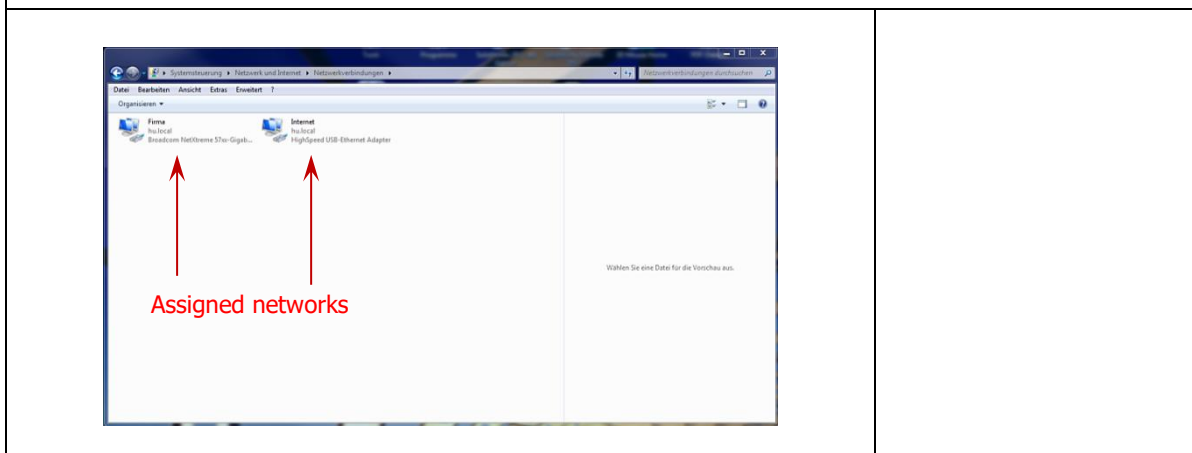
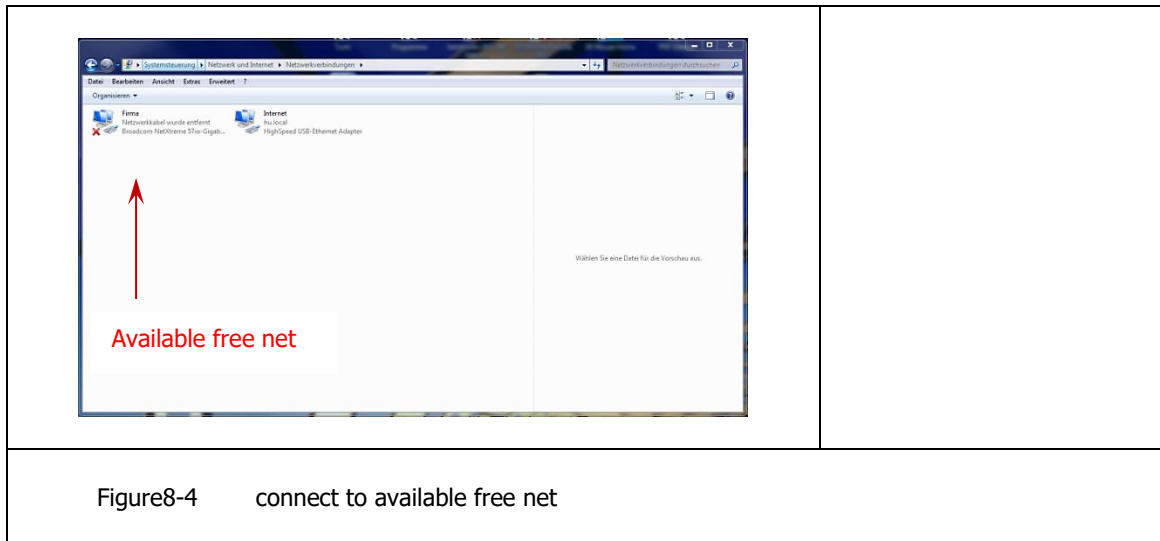


Figure8-3 Already assigned network connections

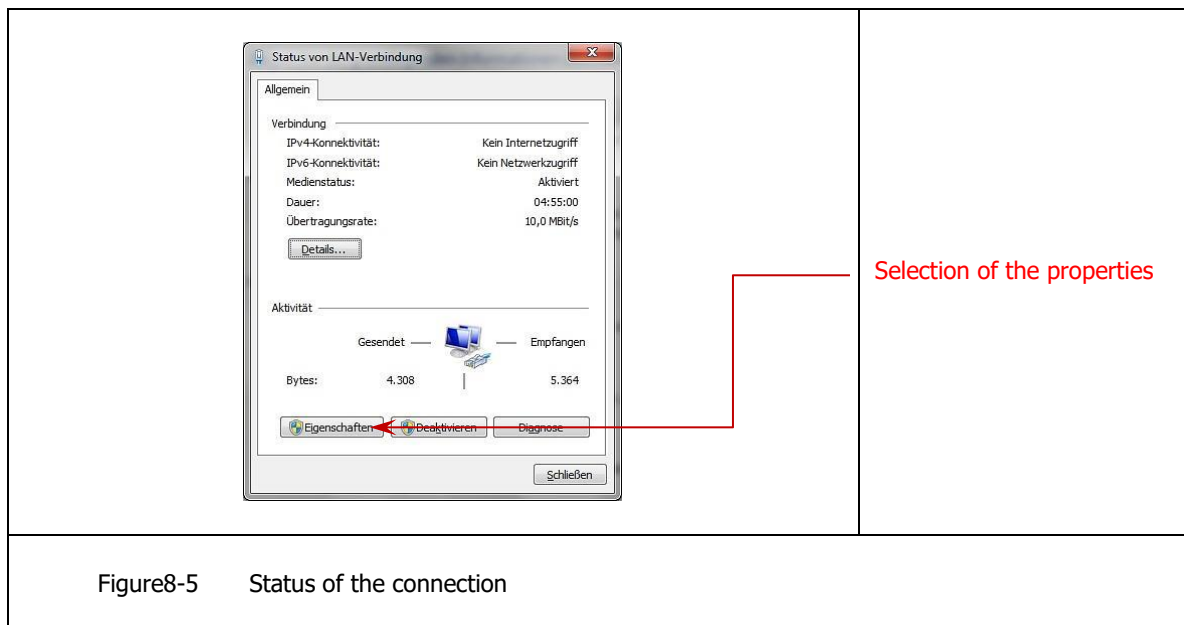
In the figure above no unoccupied network connection is available for connecting the ultrasonic processor with the computer.

Disconnect a connection from the computer. The freed connection will now be marked by a red X. You can use this connection for connecting the ultrasonic processor with the computer.



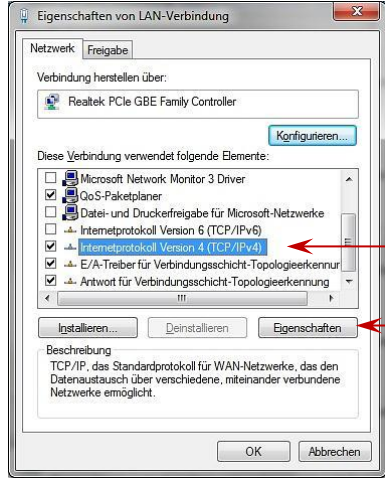
8.2 Determining the status of a network connection

In this window you will see properties and status of the selected connection.



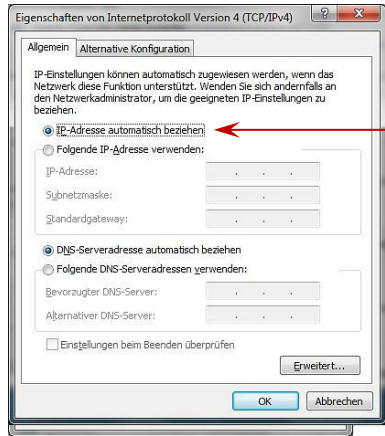
8.3 Selection of TCP/IPv4-protocol

In the property window select Internet protocol Version 4 (TCP/IPv4) and go to the properties button in the next window.

	<p>Subsequently you have two possibilities to configure your connection</p> <p>Selection of TCP/IPv4</p> <p>Selection of the properties</p>
<p>Figure8-6 Selection of TCP/IPv4</p>	

8.4 Connection with dynamic IP assignment

In this window you can determine how the ultrasonic processor's IP address will be generated. You can choose between an automatic (dynamic) address assignment and assignment of a fixed (static) IP address.

	<p>Automatic IP address assignment</p>
<p>Figure8-7 Dynamic IP assignment</p>	

With automatic assignment the ultrasonic processor will be assigned a new IP address at each new connection with the computer. This connection is preferable when the computer is not comprised in another network.

8.5 Connection with a static IP address

When the computer is part of a network, you should assign a static address to the connection. We recommend previously checking with your system administrator in which network your computer has been assigned which address.

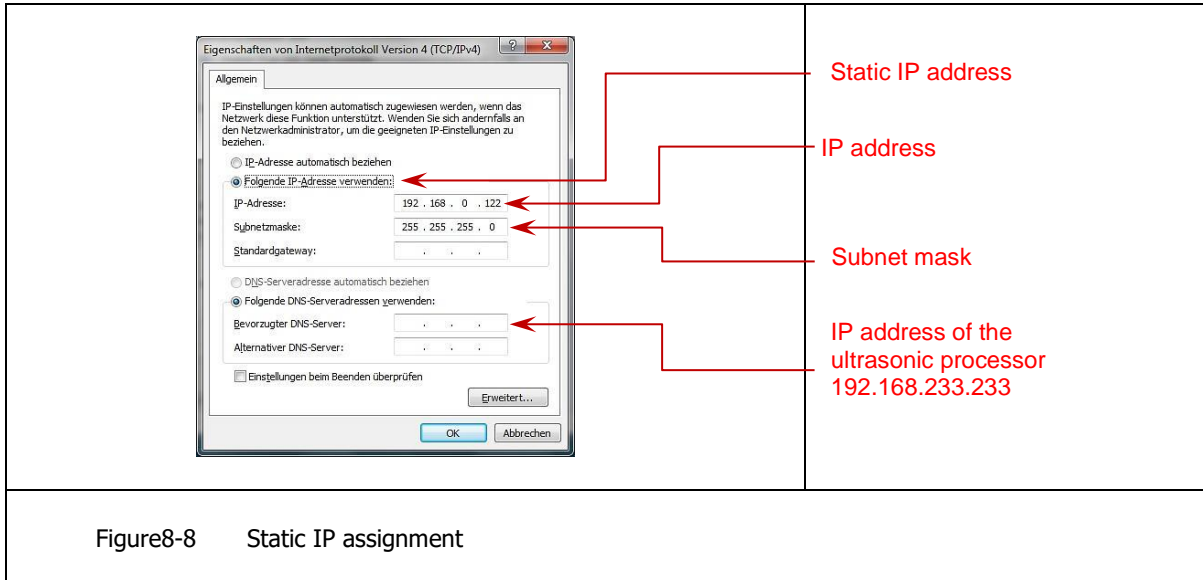


Figure8-8 Static IP assignment

In case of a subnet mask 255.255.255.000 the first three three-number blocks should correspond with the IP address in the ultrasonic processor memory. The last three-number block must be in the range 1 – 254, but it must not correspond with the ultrasonic processor's IP address as this would lead to an address conflict.

8.6 Working in the browser

Switch on the mains voltage at the ultrasonic processor. Start your browser and enter the address of your device.

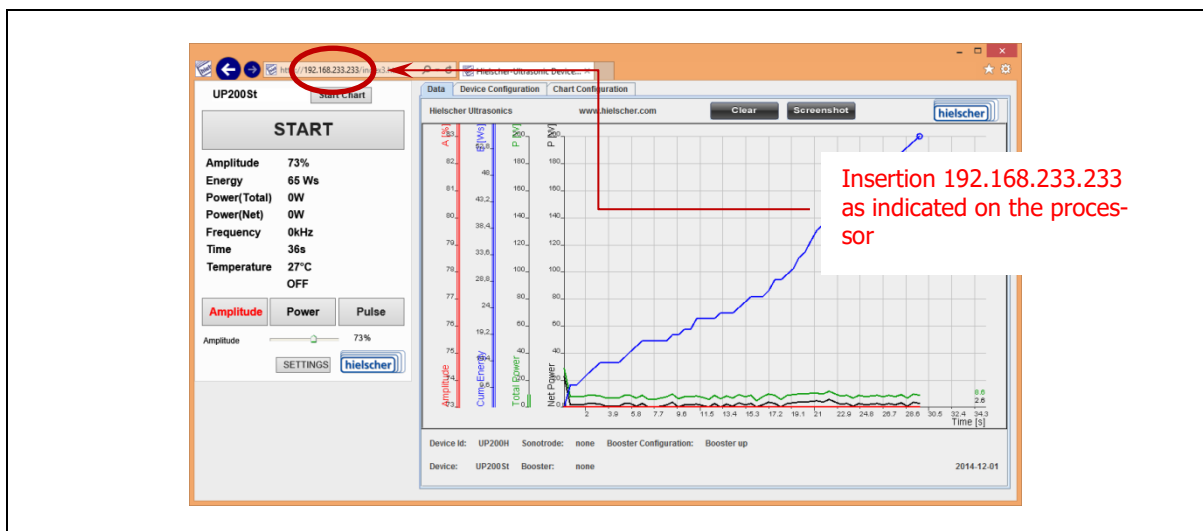



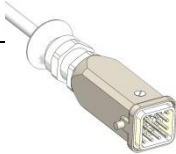

Figure8-9 Start screen of the Internet application

The surface operating is described in the **separate** software guide.

9 Maintenance

Ultrasonic processor UP200St is maintenance-free. The sonotrodes are consumable parts.

Cleaning

<p>Switch off power to the device!</p> <p><i>Before any cleaning operating can be carried out, ensure power feed to the device has been switched off!</i></p> <p><i>Danger of electric shock!</i></p>	
<p>Observe possible reverse voltage!</p> 	

Clean the ultrasonic processor with a damp cloth. You may add a mild detergent to the water.

The sonotrodes may be cleaned with a cloth moistened with some alcohol.

Make sure that no water or other liquids enter the housing of the ultrasonic processor! Should this be the case, accidentally, the ultrasonic processor for the control of the manufacturer must be sent with costs. Continued operating of the ultrasonic processor without checking the manufacturer is specifically not allowed! After cleaning, dry the ultrasonic processor surface thoroughly with a soft cloth.

Admissible detergents for the display and the casing are "isopropyl alcohol" or "ethyl alcohol".

Exchanging consumable parts

Substitute the sonotrodes when worn by cavitation. Worn sonotrodes have a rough and craggy surface.

Degree and velocity of wear depend on use and settings (e.g., amplitude, medium and pressure).

10 Decommissioning and transport

Putting the ultrasonic processor out of operating:

1. Shut off the power feed to the power unit, pulling the plug from the mains outlet.
2. Take off the power unit from the ultrasonic processor
3. Disconnect transducer and generator
4. Remove the ultrasonic processor from its support, if applicable
5. Dismounting the sonotrode
6. Clean the device



Before transporting or storing the ultrasonic processor, pack it safely, if possible in the original packing. Store the device in a dry room.

11 Disposal

In case of delivery free at domicile, Hielscher Ultrasonics GmbH will retrieve discarded devices without costs. We will dispose of it in an environment-friendly way, i.e. recycle its parts.

Please ensure that the devices are decontaminated - according to their use - before shipping them to the manufacturer.

Contaminated devices will only be disposed of **against payment!**

Before shipping devices back to us, please inform our customer service.

Used materials:

- Electrical and electronic components
- Ceramic material
- Titanium alloys
- Aluminum alloys
- Synthetic material

12 Declaration of Conformity

Declaration of Conformity

Hielscher Ultrasonics GmbH
Oderstrasse 53
D-14513 Teltow
Germany

Herewith we declare that the device as indicated hereunder and commercialized in the version as designed and construed by us complies with the basic safety and sanitary requirements of the following EC directives, which have all been converted into German law.

Any modification carried out without previous consultation with us, will render this statement invalid.

Device Ultrasonic processor

Type **UP200St**

Applicable EU Directives

2014/30/EC (Electromagnetic compatibility)

2014/35/EC (Low Voltage Directive)

2011/65/EC (RoHS-Directive II)

Exemption permit of the Category 9: Monitoring and control instruments in accordance with article 4 paragraph 3

Device type: industrial monitoring and control instruments

WEEE-Reg. - No.: DE 42652445

Harmonized standards used

EN 55011:2011 (Radio noise)

EN 61010-1-2011 (Safety Requirements)

EN 61010-2-51:2016 (Mixing and Stirring)

Date 2018_01_09

Signature



Thomas Hielscher

Chief Executive Officer

13 Protocol sheet

UP200St	Device no.:	Date: Company: Contact person:		
Accessory	Sonotrode		Flow cell	
	S26xx		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Setting amplitude control		%		
Power		W		
Medium				
Volume		L		
Pressure		bar		
Flow rate	<input type="checkbox"/> Yes <input type="checkbox"/> No	L/min		
Temperature input		°C		
Concentration				
Chem. Composition				
Process objective	Unit of measurement	Input	Objective	
	1			
	2			
	3			
Process data				
Power output		W/mm ²		
Temperature increase	on	°C		
Treatment time		min	<input type="checkbox"/> Constant <input type="checkbox"/> Interval	
Result	Unit of measurement			
	1			
	2			
	3			
Energy/volume		E/ V		
Notes:				

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