

# SONOREX • SONOPULS

High-power ultrasound in laboratories  
and for process engineering

- *thorough, accurate, gentle*
- *cost-saving*
- *environmentally-friendly*



Homogenizing



Cleaning of sieves



Sample degassing



Cleaning of pipettes



Sonochemistry

**BANDELIN**

55 years of experience in ultrasound technology

# Recommendations on ultrasonic cleaning

## How ultrasound works

Vibrations at frequencies exceeding 18 kHz (18,000 vibrations per second) are called ultrasound. As a result of these vibrations millions of smallest vacuum bubbles are formed in liquids. They implode during the high pressure phase and create highly effective pressure waves. This process is called cavitation and causes the removal of dirt particles from the objects to be cleaned.

Lower frequencies of ca. 20 kHz which are applicable in cell disruption, produce larger-diameter bubbles and stronger pressure waves than the higher frequencies of ca. 35 kHz which are used for intense but gentle cleaning.

To achieve the ultrasonic effect in liquids, the HF-generator converts the mains frequency to the corresponding frequency of the ultrasonic unit. This frequency is then transformed into mechanical vibrations by means of electro-mechanical transducers.

## Advantages of the ultrasonic cleaning

Ultrasonic cavitation removes dirt rapidly from items, thoroughly and deep from pores, even from difficult to reach places such as cavities or holes.

Ultrasound cleans only in a few minutes and exceeds in its efficiency other cleaning methods. Ultrasonic cleaning is also gentle because even slight damage like scratches are eliminated.

## Advantages in process engineering and sonochemistry

Cavitation not only can be used for various purposes, but an emulsion of oil and water can be kept longer through ultrasonic application compared to other manufacturing processes.

For sonochemical processes in an ultrasonic bath, the reaction vessel should have a thin bottom. Thus the ultrasonic energy, is radiated directly and effectively into the reaction vessel.

## How to select the proper unit

SONOREX ultrasonic baths work with the intense cleaning frequency of 35 kHz. The size and number of objects to be cleaned determine the size of the ultrasonic bath.

When selecting the unit, dimensions of the accessories, e. g. baskets have to be considered. To avoid overloading, it is recommended to choose a slightly larger unit. This also allows additional applications at a later stage.

## Should an ultrasonic unit have a heater?

Warm cleaning solutions reduce the cleaning time; dirt is removed faster. Units with heaters are the preferred choice for cleaning processes in laboratories.

Disinfectant solutions must not be warmed because protein coagulation starts at a temperature of 40 °C (104° F) and this poses an obstacle for some cleaning and all disinfection processes. Therefore, units without heaters are recommended for these applications.

## What kind of accessories should be used?

Objects to be cleaned and reaction vessels must not be placed on the tank bottom.





Insert baskets avoid the scratching either the parts to be cleaned or the tank bottom. Beakers are placed into positioning lids and are used for the cleaning of small objects or when working with aggressive solutions.

## Which cleaning agents are appropriate?

TICKOPUR and STAMMOPUR cleaning and disinfectant agents have been especially developed for the application in SONOREX ultrasonic baths. Water without any cleaning agent does not clean.

Household detergents or DI-water should never be used. It is necessary to use plastic insert tubs, when working with acids or removing acid residues. Flammable liquids must not be used directly in the ultrasonic tank.

# Overview on ultrasonic baths

Criteria for selection				
SONOREX	DIGITEC	DIGITAL 10 P	SUPER	LONGLIFE
Tank volume (litres)	0,9 - 90,0	3,0 - 28,0	0,9 - 58,0	1,9 - 90,0
Control elements	push-buttons	push-buttons	turning knobs	turning knobs
Time setting (min)	1- 30, continuous operation ∞	1 - 99, continuous operation ∞	1 - 15, continuous operation ∞	1 - 15, continuous operation ∞
Safety shut-down	after 12 hours	no	no	no
Heater	optional, version "H"	yes	optional, H-Version	yes
Heater, thermostatically adjustable	20 - 80 °C	20 - 80 °C	30 - 80 °C RK 31 H: 65 °C fixed	30 - 80 °C
Excess temperature signal	yes	no	no	no
Protection against delay in boiling	yes, optionally switch-on	no	no	no
Setting accuracy of bath temperature	±3,5 K	±1,5 K	±5 K	±5 K
Thickness of s/s tank/ material version "C"	0,8 mm, 1.4301  2 mm, 1.4571	0,8 mm, 1.4301  -	0,8 mm, 1.4301  2 mm, 1.4571	-  2 mm, 1.4571
Marking of filling level for safe dosage	yes	yes	yes	yes
Hard chromium-plated	DT 102 H	no	RK 102 H	no
Lifetime	normal, extended: version "C" hard chromium-plated	normal	normal, extended: hard chromium-plated	extended
Warranty period (years)	2, DT 102 H = 3	2	2, RK 102 H = 3	3
One-piece drain	yes, from DT 100 SH	yes, from DK 156 BP	yes, from RK 100 SH	yes, from RK 102 CH
Liquid protection	protected against spray	drip-proof	drip-proof	drip-proof
Protection class	IP 33	IP 32	IP 32	IP 32
Ultrasonic frequency (kHz)	35	35	35	35
Sweep	yes	no	yes	yes
PZT-transducers	yes	yes	yes	yes
Degas	yes	yes	no	no
Mains supply 230 V~, 50/60 Hz	yes	yes	yes	yes
Mains supply 115 V~, 50/60 Hz	yes	no	yes	yes
Data memory	1 program	10 programs	no	no
Interface	RS 232	no	no	no
PC software	yes	no	no	no
CE marked as medical device	yes	no	yes, except for RK 1050	yes, except for RK 1050

For units with larger volumes (SONOREX TECHNIK) see page 12.

## Modern high-power ultrasonic baths



- ❑ Cleaning of technical glassware like burettes, pipettes, petri dishes and laboratory flasks
- ❑ disinfection and cleaning at the same time
- ❑ Degassing of beer samples for analysis of alcohol contents, original worth, colour, pH value
- ❑ Degassing of food samples from cans for analysis of stannous contents
- ❑ Extraction of quaternary ammonium compounds (QAC) of wood
- ❑ Extraction of herbs samples for determination of aflatoxines (causing mold decay on food)
- ❑ Extraction of soil samples for determination of hydrocarbons
- ❑ Test method for freeze-thaw resistance of concrete: CDF test – through sonication, loosely adhering scaled particles are removed from surface

Internal tank dimensions (l x w x d) mm	Capacity litres	Type	Code No.	External dimensions (l x w x h) mm	Drain ball cock	Ultrasonic peak output * W	HF-output W <sub>eff</sub>	Heater power W	Current consumption A	Weight net kg
190 x 85 x 60	0.9	DT 31	3200	205 x 100 x 170	-	240	30	-	0.2	1.8
		DT 31 H	3220					70	0.5	1.9
150 x 140 x 100	1.8	DT 52	3205	175 x 165 x 230	-	240	60	-	0.3	2.6
		DT 52 H	3225					140	0.9	2.9
240 x 140 x 100	3.0	DT 100	3210	260 x 160 x 250	-	320	80	-	0.4	3.4
		DT 100 H	3230		-	320	80	140	1.0	3.6
		DT 100 SH	3236		hose	320	80	140	1.0	4.0
		DT 102 H	3235		1/4"	480	120	140	1.2	4.3
240 x 140 x 150	4.0	DT 103 H	3201	260 x 160 x 310	1/4"	560	140	200	1.5	4.6
Ø 240 x 130	5.6	DT 106	3270	Ø 265 x 270	1/4"	480	120	-	0.6	5.5
500 x 140 x 100	6.0	DT 156	3275	530 x 165 x 245	1/4"	640	160	-	0.7	6.1
500 x 140 x 150	9.0	DT 156 BH	3221	530 x 165 x 300	1/4"	860	215	600	3.6	7.3
300 x 150 x 150	5.5	DT 255	3215	325 x 175 x 295	1/4"	640	160	-	0.7	5.2
		DT 255 H	3240		1/4"	640	160	280	2.0	5.3
300 x 240 x 150	9.7	DT 510	3245	325 x 265 x 305	1/2"	640	160	-	0.7	7.0
		DT 510 H	3206		1/2"	640	160	400	2.5	7.6
300 x 240 x 200	13.0	DT 512 H	3226	325 x 265 x 350	1/2"	860	215	400	2.7	8.0
325 x 300 x 150	13.5	DT 514	3250	355 x 325 x 305	1/2"	860	215	-	1.0	8.2
		DT 514 H	3211		1/2"	860	215	600	3.6	8.8
325 x 300 x 200	18.7	DT 514 BH	3216	355 x 325 x 385	1/2"	860	215	600	3.6	9.8
500 x 300 x 200	28.0	DT 1028	3255	535 x 325 x 400	1/2"	1,200	300	-	1.4	14.3
		DT 1028 H	3231		1/2"	1,200	300	1,300	7.0	14.7
500 x 300 x 300	45.0	DT 1028 C	3295	540 x 340 x 500	1/2"	2,000	500	-	2.2	24.6
500 x 300 x 300	45.0	DT 1028 CH	3266	540 x 340 x 500	1/2"	1,200	300	1,450	7.7	23.7
Ø 500 x 195	38.0	DT 1040	3260	Ø 540 x 500	1/2"	1,200	300	-	1.4	20.5
600 x 500 x 200	58.0	DT 1050	3265	655 x 535 x 425	1/2"	2,400	600	-	2.7	31.0
600 x 500 x 300	90.0	DT 1050 CH	3271	640 x 540 x 530	1/2"	2,400	600	1,950	11.1	37.0

\*To achieve an improved efficiency, the ultrasound is modulated whereby in combination with SweepTec and depending on the tank model four times or eight times higher values of the HF-output are obtained as ultrasonic peak output.

## High-power ultrasonic baths with infrared interface - world-wide unique -

- ❑ Degassing of liquid
- ❑ Acceleration of slurring
- ❑ Emulsifying
- ❑ Sample preparation for analysis

### Interface for automation of laboratories

- RS 232 data interface to the laboratory PC allows processing of individual control tasks and integration into an automated laboratory line.
- Data log is disclosed and described in a detailed information for use.
- Infrared adapter IR 1 is used for connection.

**Infrared adapter IR 1**

Code No. 3623

### WINSONIC-DT remote control

- The PC program is designed for operating systems WIN 2000 and WIN XP in connection with the infrared adapter IR 1 allowing a comfortable operation and monitoring of DIGITEC units.
- The status window gives an updated overview on the working conditions.
- Start time and stop time as well as the respective bath temperature are automatically collected in log files. This way, a documentation of the cleaning process for quality assurance is possible.

### WINSONIC-DT remote control

consisting of:

software and infrared adapter IR 1

Code No. 3090



DT 102 H-RC with IR 1



starting screen

Internal tank dimensions (l x w x d) mm	Capacity litres	Type	Code No.	External dimensions (l x w x h) mm	Drain ball cock	Ultrasonic peak output* W	HF-output W <sub>eff</sub>	Heater power W	Current consumption A	Weight net kg
240 x 140 x 100	3.0	DT 102 H-RC	3071	260 x 160 x 250	¼"	480	120	140	1.2	4.3
300 x 150 x 150	5.5	DT 255 H-RC	3081	325 x 175 x 295	¼"	640	160	280	2.0	5.3
300 x 240 x 150	9.7	DT 510 H-RC	3091	325 x 265 x 305	½"	640	160	400	2.5	7.6
325 x 300 x 200	18.7	DT 514 BH-RC	3095	355 x 325 x 385	½"	860	215	600	3.6	9.8

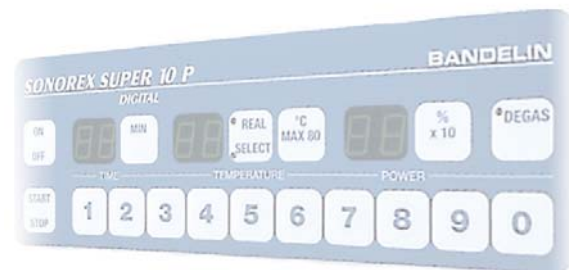
\*To achieve an improved efficiency, the ultrasound is modulated whereby in combination with SweepTec a four times higher value of the HF-output is obtained as ultrasonic peak output.

# SONOREX DIGITAL 10 P

## The only ultrasonic baths with 10-programme data memory - for precise and reproducible work

- ❑ Degassing of solvents for HPLC
- ❑ Accelerating of chemical reactions
- ❑ Mixing of plasma and serum
- ❑ Emulsifying
- ❑ Homogenizing of samples for residue analysis in vegetarian food
- ❑ Preparation for pollutant analysis of drinking or drain water
- ❑ Preparation of liposomes in cosmetics and pharmacy
- ❑ Preparation of samples for analysis of THC-content in cannabis

Working with SONOREX DIGITAL 10 P is more comfortable and precise through user-friendly high-power ultrasound, integrated in digital ultrasound baths. Exact setting of all parameters guarantees reproducible results. When switching off the unit, the data is stored automatically.



- You select**
- Time • Temperature • Power • DEGAS •
- and store up to 10 variations**

### Time

Setting between 1 to 99 min and continuous operation. Interruption is possible at any time. Display of remaining time.

### Temperature

Heating adjustable between 20 to 80 °C (68 to 176° F).  
 Display REAL: Bath temperature  
 Display SELECT: Required temperature  
 Integrated thermometer, accuracy ± 1,5° C.

### Power

Setting from 10 to 100 %. Microprocessor control. Power constancy guarantees exact reproduction.

### DEGAS

Rapid degassing of liquids. Higher degassing rates in HPLC-technique.

Internal tank dimensions (l x w x d) mm	Capacity litres	Type	Code No.	External dimensions (l x w x h) mm	Drain ball cock	Ultrasonic peak output * W	HF-output W <sub>eff</sub>	Heater power W	Current consumption A	Weight net kg
240 x 140 x 100	3.0	DK 102 P	780	260 x 160 x 250	-	480	120	140	1.2	4.5
500 x 140 x 150	9.0	DK 156 BP	781	530 x 165 x 300	¼"	720	180	600	3.4	7.6
300 x 150 x 150	5.5	DK 255 P	782	325 x 175 x 305	¼"	640	160	280	2.0	6.0
300 x 240 x 200	13.0	DK 512 P	783	325 x 265 x 350	½"	820	205	400	2.7	8.8
325 x 300 x 200	18.7	DK 514 BP	784	355 x 325 x 385	½"	860	215	600	3.6	10.2
500 x 300 x 200	28.0	DK 1028 P	786	535 x 325 x 400	½"	1,200	300	1,300	7.0	15.2

\*To achieve an improved efficiency, the ultrasound is modulated whereby in combination with SweepTec a four times higher value of the HF-output is obtained as ultrasonic peak output.

# SONOREX SUPER

## Compact ultrasonic baths - easy to operate

- ❑ Cleaning of
  - technical glassware like burettes, pipettes, petri dishes and laboratory flasks
  - analysis sieves up to 400 mm diameter
  - medical instruments
  - metal parts of all kinds
  - electronic components
- ❑ Degassing of liquids to determine concentration
- ❑ Acceleration of suspension processes
- ❑ Disinfects and cleans at the same time
- ❑ Production of emulsions
- ❑ Preparation of samples for analysis, e. g. analysis of hair



Internal tank dimensions (l x w x d) mm	Capacity litres	Type	Code No.	External dimensions (l x w x h) mm	Drain ball cock	Ultrasonic peak output * W	HF-output W <sub>eff</sub>	Heater power W	Current consumption A	Weight net kg
190 x 85 x 60	0.9	RK 31	329	205 x 100 x 155	-	240	30	-	0.2	1.8
		RK 31 H	044		-	240	30	70	0.5	1.9
150 x 140 x 100	1.8	RK 52	311	175 x 165 x 230	-	240	60	-	0.3	2.6
		RK 52 H	164		-	240	60	140	0.9	2.9
240 x 140 x 100	3.0	RK 100	301	260 x 160 x 250	-	320	80	-	0.4	3.4
		RK 100 H	312		-	320	80	140	1.0	3.6
		RK 100 SH	192		hose	320	80	140	1.0	4.0
		RK 102 H	303		G ¼	480	120	140	1.2	4.3
240 x 140 x 150	4.0	RK 103 H	326	260 x 160 x 310	G ¼	560	140	200	1.5	4.3
Ø 240 x 130	5.6	RK 106	306	Ø 265 x 270	G ¼	480	120	-	0.6	5.5
500 x 140 x 100	6.0	RK 156	305	530 x 165 x 245	G ¼	640	160	-	0.7	6.1
500 x 140 x 150	9.0	RK 156 BH	646	530 x 165 x 300	G ¼	860	215	600	3.6	7.3
300 x 150 x 150	5.5	RK 255	3066	325 x 175 x 305	G ¼	640	160	-	0.7	5.2
		RK 255 H	316		G ¼	640	160	280	2.0	5.3
300 x 240 x 150	9.7	RK 510	327	325 x 265 x 305	G ½	640	160	-	0.7	7.0
		RK 510 H	321		G ½	640	160	400	2.5	7.6
300 x 240 x 200	13.0	RK 512 H	795	325 x 265 x 350	G ½	860	215	400	2.7	8.0
325 x 300 x 150	13.5	RK 514	277	355 x 325 x 305	G ½	860	215	-	1.0	8.2
		RK 514 H	207		G ½	860	215	600	3.6	8.8
325 x 300 x 200	18.7	RK 514 BH	263	355 x 325 x 385	G ½	860	215	600	3.6	9.8
500 x 300 x 200	28.0	RK 1028	322	535 x 325 x 400	G ½	1,200	300	-	1.4	14.3
		RK 1028 H	324		G ½	1,200	300	1,300	7.0	14.7
500 x 300 x 300	45.0	RK 1028 C	661	540 x 340 x 500	G ½	2,000	500	-	2.2	24.6
Ø 500 x 195	38.0	RK 1040	319	Ø 540 x 500	G ½	1,200	300	-	1.4	20.5
600 x 500 x 200	58.0	RK 1050	323	655 x 535 x 425	G ½	2,400	600	-	2.7	31.0

\*To achieve an improved efficiency, the ultrasound is modulated whereby in combination with SweepTec and depending on the tank model four times or eight times higher values of the HF-output are obtained as ultrasonic peak output.

# SONOREX LONGLIFE

## Heavy-duty ultrasonic cleaning units

- ❑ Removal of stubborn dirt for service and maintenance
- ❑ Direct application of high purity water possible
- ❑ RK 1028 CH and RK 1050 CH for cleaning and disinfection of respiratory masks



Internal tank dimensions (l x w x d) mm	Capacity litres	Type	Code No.	External dimensions (l x w x h) mm	Drain ball cock	Ultrasonic peak output* W	HF-output W <sub>eff</sub>	Heating power W	Current consumption A	Weight net kg
140 x 135 x 100	1.9	RK 52 CH	3030	180 x 175 x 250	-	240	60	100	0.7	4.0
220 x 135 x 100	3.0	RK 102 CH	3031	260 x 175 x 275	¼"	480	120	200	1.4	5.6
220 x 135 x 150	4.5	RK 103 CH	3032	260 x 175 x 325	¼"	560	140	200	1.6	6.4
280 x 150 x 150	6.3	RK 255 CH	3033	320 x 190 x 325	¼"	720	180	280	2.0	7.9
280 x 234 x 200	13.1	RK 512 CH	3034	320 x 275 x 380	½"	1,200	300	560	3.5	13.6
280 x 234 x 300	19.7	RK 515 CH	3035	320 x 275 x 485	½"	1,200	300	700	4.4	16.0
500 x 300 x 300	45.0	RK 1028 CH	143	540 x 340 x 500	½"	1,200	300	1,450	7.7	23.7
600 x 500 x 300	90.0	RK 1050 CH	184	640 x 540 x 530	½"	2,400	600	1,950	11.1	37.0

\*To achieve an improved efficiency, the ultrasound is modulated whereby in combination with SweepTec a four times higher value of the HF-output is obtained as ultrasonic peak output.

## Accessories for all SONOREX units

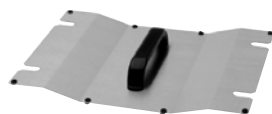
Model	RK 31 / H DT 31 / H	RK 52 / H / CH DT 52 / H	RK 100 / H / SH RK 102 H, DK 102 P DT 100 / H / SH DT 102 H / H-RC	RK 102 CH	RK 103 H DT 103 H
<b>Accessories</b>					
Lids	D 08	D 52	D 100	D 100	D 100
Insert baskets, s/s l x w x h (mm)	K 08 170 x 65 x 50	K 1 C 120 x 110 x 40	K 3 C 200 x 110 x 40	K 3 C 200 x 110 x 40	K 3 CL 200 x 110 x 40
Insert baskets, plastic l x w x h (mm)	-	PK 1 C 90 x 90 x 66	PK 2 C 187 x 90 x 56	-	PK 3 C 187 x 90 x 56
Utensil holders l x w (mm)	-	GH 1 129 x 117	GH 1 129 x 117	GH 1 129 x 117	GH 1 129 x 117
Insert tubs	-	-	KW 3 195 x 115 x 88	-	KW 3 195 x 115 x 88
Positioning lids	DE 08	DE 52	DE 100	DE 100	DE 100

Model	RK 510 / H DT 510 / H / H-RC	RK 512 H / CH DT 512 H DK 512 P	RK 514 / H DT 514 / H	RK 514 BH DT 514 BH / BH-RC DK 514 BP	RK 515 CH
<b>Accessories</b>					
Lids	D 510	D 510	D 514	D 514	D 510
Insert baskets, s/s l x w x h (mm)	K 10 250 x 195 x 50	K 10 B 250 x 195 x 50	K 14 275 x 245 x 50	K 14 B 275 x 245 x 50	K 15 C 250 x 190 x 50
Utensil holders l x w (mm)	GH 10 260 x 200	GH 10 B 260 x 200	-	GH 14 B 280 x 250	-
Insert tubs l x w x d (mm)	KW 10-0 242 x 182 x 136	-	KW 14 280 x 215 x 145	KW 14 B 275 x 210 x 195	-
Positioning lids Beaker holder	DE 510	DE 510	DE 514	DE 514	DE 510



# SONOREX Accessories

**Appropriate accessories facilitate ultrasonic application and simultaneously protect oscillating tank and parts to be cleaned**



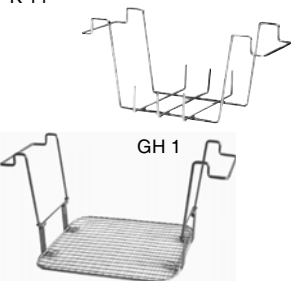
D 514

**Tank lids D,**  
stainless steel, to protect the liquid from outside dirt. Condensation water runs back into the tank.



K 14

**Insert baskets K,**  
stainless steel foil with perforations or mesh net starting from K 6 BL. Basket: holds up to max. 10 kg. Insert basket PK/K...P, plastic, with perforations, for gentle cleaning of sensitive surfaces.



GH 14 B

**Utensil holders GH,**  
stainless steel, mesh size 12.5 x 12.5 mm for larger objects. Utensil holder **GH 1,** suitable for flasks up to a diameter of 105 mm.



KW 3

**Insert tubs KW,**  
plastic, non-perforated and with lid. For working with chemicals that corrode the stainless steel oscillating tank. Insert tubs KW are made of PP, except **KW 3/5** made of PE. Stable up to a temperature of 80 °C (176° F) in water and up to 60 °C (140° F) in acids.



KD 0



PD 04

**Inset sieve baskets,**  
mesh net, suitable for inset beakers.

**KD 0**  
stainless steel, diameter 75 mm

**PD 04**  
plastic, diameter 60 mm



SD 06



DD 06

**Inset beakers**  
for indirect cleaning of hardware. Suitable for **DE/ES**

**SD 06,** glass 600 ml

**PD 06,** plastic 600 ml

**EB 05,** stainless steel 600 ml

diameter 85 mm, 100 mm deep,

with retaining ring and lid **DD 06.**

**SD 09,** glass with ring 1000 ml



EB 05



PD 06

Suitable for **DE 08**

**SD 05,** glass 600 ml

**KB 04,** plastic 400 ml

with ring



DE 100

**Positioning lids DE,**

stainless steel, for inset beakers

**SD 06, PD 06, EB 05 and SD 09:**

**DE 52** for 1 beaker

**DE 100/6/255** for 2 beakers

**DE 156/510/514** for 4 beakers



ES 4

**Beaker holder ES 4**

stainless steel, for 4 inset beakers

**SD 06, PD 06, EB 05, SD 09 -**

in ultrasonic baths of a larger size

for optimum ultrasonic power.

**Objects to be cleaned or vessels must not be placed on the bottom of the ultrasonic tank!**

<b>RK 103 CH</b>	<b>RK 106 DT 106</b>	<b>RK 156 DT 156</b>	<b>RK 156 BH DT 156 BH DK 156 BP</b>	<b>RK 255 / H DT 255 / H / H-RC DK 255 P</b>	<b>RK 255 CH</b>
<b>D 100</b>	<b>D 6</b>	<b>D 156</b>	<b>D 156</b>	<b>D 255</b>	<b>D 255</b>
<b>K 3 CL</b> 200 x 110 x 40	<b>K 6</b> Ø 215 x 50	<b>K 6 L</b> 460 x 100 x 50	<b>K 6 BL</b> 460 x 100 x 50	<b>K 5 C</b> 260 x 110 x 40	<b>K 5 C</b> 260 x 110 x 40
<b>PK 3 C</b> 187x 90 x 56	-	-	-	<b>K 5 P</b> 254 x 96 x 130	-
<b>GH 1</b> 129 x 117	<b>SH 7*</b>	-	-	<b>GH 5</b> 270 x 120	-
-	-	-	-	<b>KW 5</b> 254 x 96 x 130	-
<b>DE 100</b>	<b>DE 6</b>	<b>DE 156</b>	<b>DE 156</b>	<b>DE 255</b>	<b>DE 255</b>

<b>RK 1028 / H DT 1028 / H DK 1028 P</b>	<b>RK 1028 C RK 1028 CH DT 1028 C DT 1028 CH</b>	<b>RK 1040 DT 1040</b>	<b>RK 1050 DT 1050</b>	<b>RK 1050 CH DT 1050 CH</b>
<b>D 1028</b>	<b>D 1028 C</b>	<b>D 40</b>	<b>D 1050 C</b>	<b>D 1050 C</b>
<b>K 28</b> 455 x 245 x 50	<b>K 28 C</b> 455 x 245 x 50	<b>K 40</b> Ø 480 x 50	<b>K 50</b> 545 x 450 x 50	<b>K 50 C</b> 545 x 450 x 50
<b>GH 28</b> 455 x 250	<b>GH 28 C</b> 455 x 250 <b>SH 28 C*</b>	-	-	<b>GH 50 C</b> 550 x 455
<b>KW 28-0</b> 437 x 230 x 155	<b>KW 28-0</b> 437 x 230 x 155	-	<b>KW 50-0</b> 517 x 445 x 184	<b>KW 50 B-0</b> 520 x 445 x 284
<b>ES 4</b>	<b>ES 4</b>	-	<b>ES 4</b>	<b>ES 4</b>

**Special accessories for laboratories see page 10**

\* for analysis sieves dia 200 mm

# Specific Applications in Laboratories

## Spring clamps for laboratory flasks

No floating or canting of flasks.  
Fast and easy to fix to the bottom  
of insert baskets or utensil holders,  
with mesh sizes up to 12.5 x 12.5 mm.



K 10 with 2 EK 100

**Spring clamps EK**, stainless steel  
**EK 10** for 10 ml laboratory flask  
**EK 25** for 25 ml laboratory flask  
**EK 50** for 50 ml laboratory flask  
**EK 100** for 100 ml laboratory flask  
Suitable for basket: K 3 C/CL, K 5 C,  
K 6, K 10, K 14/B, K 28/C  
and utensil holders GH 5, GH 10/B,  
GH 14/B, GH 28

## Handle adjustment for insert baskets and utensil holders - registered pattern DE 200 017 14

Continuous adjustment of immersion  
depth, no floating, tipping over or  
flooding of laboratory flasks.  
Quick and easy to attach.



GV 10

**Handle adjustment GV**  
stainless steel

**GV 3** in pairs, suitable for baskets  
K 1 C, K 3 C/CL, K 5 C, K 6 L, K 6 BL  
and utensil holder GH 5  
**GV 10** in pairs, suitable for baskets  
K 10, K 10 B, K 14/B, K 28/C  
and utensil holders GH 10/B, GH 14/B,  
GH 28/C, GH 50 C

## Test tube holder

For ultrasonic radiation of 6 test tubes  
up to a diameter of 25 mm and 8 test  
tubes up to a diameter of 16 mm.  
Also applicable as a test tube rack.  
Contents of the test tubes remains  
visible.



RG 2

**Test tube holder RG 2**

stainless steel, suitable for  
SONOREX DIGITEC DT 52 / H,  
DT 100 / H / SH, DT 102 H / H-RC  
SONOREX SUPER RK 52/H,  
RK 100 / H / SH, RK 102 H,  
SONOREX DIGITAL DK 102 P

## Tabletting punch holder

For tabletting punches with different  
diameters.



TH 14 B

**TH 14 B**

suitable for RK/DT 514 BH

**TH 28 C**

suitable for RK/DT 1028 CH

## Careful cleaning of analysis sieves

Analysis sieves are test equipment  
and require careful cleaning.  
Clean sieves are prerequisite for safe  
results.

### Advantages

- high life span of the sieves by careful cleaning
- no damage to the sieves through manual cleaning
- gauze tension and accuracy of sieves remain intact, no alterations of mesh size
- easy and safe operation
- eco-friendly, economical



RK 106 with SH 7

**Sieve holder SH 7**

stainless steel, for single-cleaning  
of analysis sieves up to  
dia. 200 mm, max. height 50 mm.

suitable for ultrasonic baths  
SONOREX SUPER RK 106  
SONOREX DIGITEC DT 106

**Sieve holder SH 28 C**

stainless steel, allows simultaneous  
cleaning of up to 5 analysis sieves  
dia. 200 mm

suitable for ultrasonic baths  
SONOREX DIGITEC DT 1028 C  
SONOREX SUPER RK 1028 C

RK 1028 C with SH 28 C



**Sieve holder SH 210**

stainless steel, allows simultaneous  
cleaning of up to - 6 analysis sieves  
to dia. 305 mm and 400 mm

suitable for ultrasonic bath  
SONOREX TECHNIK RM 210 U

## Ultrasonic baths for single-cleaning of analysis sieves up to

dia. 400 mm:

SONOREX SUPER RK 1040

SONOREX DIGITEC DT 1040

**Recommended cleaning concen-  
trate: TICKOPUR R 33** (see page 13).

Detailed documentation on request.

# Special Applications

## Pipette washer - intense - gentle - time saving - environmentally friendly



SONOREX PR 140 C

Quick cleaning. No time-consuming washing. Rinsing process in the same vessel using the siphon principle - no shifting around. Accelerated circulation of pipettes. No glass breakage when used according to the operating instructions. Also suitable for burettes, other glassware and plastic pipettes. Max. length of objects to be cleaned: 765 mm.

### SONOREX PR 140 C

Operating capacity 13.9 l, operating depth 765 mm, height of the device 1130 mm, required floor space 335 x 255 mm, HF-power 2 x 450 W, 35 kHz, radiating surface diameter 150 mm, timer 1 to 60 min, mains connection 230 V~, 50/60 Hz, on request 115 V~. RFI-proof and CE marked.

### Quantity of pipettes to be cleaned

#### - suitable for K 140 B:

- diameter 9.0 mm - ca. 90 pieces
- diameter 10.7 mm - ca. 55 pieces
- diameter 14.0 mm - ca. 35 pieces
- diameter 20.0 mm - ca. 15 pieces
- diameter 29.0 mm - ca. 10 pieces

### Set PR 140 C

Code No. 2083

### Ready to operate:

**SONOREX PR 140 C with basket, lid, cleaning concentrate TICKOPUR R 33 - 5 litres**

### Accessories

**Pipette container PG 140 B**, plastic, for soaking or for final rinsing

**Pipette basket K 140 B**, plastic, (the set includes one basket)

**Three-way cock** to change from tap water to DI-water (for final rinsing)

**AR 140 C**, metal

**AR 140 CP**, plastic

Detailed documentation on request.

## Cleaning and disinfecting of breathing masks

SONOREX ultrasound cleans and disinfects breathings masks of each kind - full masks and half masks - in a single operation

### Thorough

- reliable removal of dirt from internals or even from angles and corners

### Gentle

- dirt residues will be removed by cavitation, also at difficult to access areas - electronic brushing  
- no scratching through manual treatment

**Economical** - simultaneous cleaning and disinfecting of up to 15 breathing masks in one process



SONOREX LONGLIFE RK 1028 CH with insert basket K 28 CA for 6 breathing masks

### Ultrasonic cleaner SONOREX SUPER RK 514 BH

with insert basket K 14 AZ for 2 breathing masks or 1 full mask

### Ultrasonic cleaner SONOREX LONGLIFE RK 1028 CH

with insert basket K 28 CA for 6 breathing masks  
with insert basket K 28 CV for 3 full masks

### Ultrasonic cleaner SONOREX LONGLIFE RK 1050 CH

with insert basket K 50 CA for 9 breathing masks  
with insert basket K 50 CV for 6 full masks

### Ultrasonic cleaner SONOREX TECHNIK RM 180 UH

with insert basket MK 180 A for 15 breathing masks

Cleaning and disinfecting concentrate **STAMMOPUR 24**

Universal cleaning concentrate **TICKOPUR R 33** - see page 13

Detailed documentation on request.

## SONOREX TECHNIK ultrasonic baths



RM 110 UH

SONOREX TECHNIK modular programme RM is available in 6 standard sizes with 4 versions for cleaning and rinsing. Once the cleaning process is defined, the units can be matched individually :

RM ... UH	cleaning bath with ultrasound and heating
RM ... U	cleaning bath with ultrasound
RM ... H	rinsing bath with heating
RM ...	rinsing bath without ultrasound and heating

### Features of SONOREX TECHNIK units:

Frequency 40 kHz, starting with RM 110 UH alternatively 25 kHz. RM 16 UH to 75 UH, 230 V~, 50/60 Hz, RM 110 UH to 210 UH, 380 to 415 V, 3-phase current-, N, PE, 50/60 Hz, 16 A. Heating 30 to 80 °C (86 to 176 °F). Welded tank 2 mm stainless steel AISI 316 Ti (V4A, 1.4571). Overflow, welded one-piece drain, drip-proof stainless steel housing and a sprinkle tube (from RM 110 UH upwards).

Internal tank dimensions (l x w x d) mm	Capacity litres	Type	Code No.	External dimensions (l x w x h) mm	Drain ball cock	Ultrasonic peak output* W	HF-output W <sub>eff</sub>	Heating power W	Current consumption A**	Weight net kg
325 x 275 x 200	13.0	RM 16 UH	8200	365 x 340 x 390	½"	1,200	1 x 300	800	4.8	16.0
480 x 300 x 300	35.0	RM 40 UH	8210	540 x 340 x 500	¾"	2,000	1 x 500	1,250	7.7	26.0
580 x 500 x 300	70.0	RM 75 UH	8220	640 x 540 x 530	¾"	4,000	1 x 1,000	1,950	12.9	42.0
600 x 450 x 450	115.0	RM 110 UH	8230	780 x 550 x 800	1"	4,000	1 x 1,000	4,800	10.5	72.0
1,000 x 500 x 400	180.0	RM 180 UH	8250	1,180 x 600 x 800	1"	4,000	2 x 1,000	7,200	14.8	135.0
750 x 650 x 500	235.0	RM 210 UH	8270	930 x 750 x 800	1"	4,000	2 x 1,000	7,200	14.8	110.0

\*To achieve an improved efficiency, the ultrasound is modulated whereby in combination with SweepTec a four times higher value of HF-output is obtained as ultrasonic peak output. \*\*from RM 110 pro phase

Models RM 112 to 212 with round tank corners and oblique bottom.

Models ZM 112 to 212 with a separate generator, multifrequency, ultrasound at the bottom and/or at the side, specification like RM 112. Information and prices on request.

### Accessories

Model	Insert baskets stainless steel	Code No.	Lids stainless steel	Code No.
RM 16 UH	MK 16 B	8408	MD 16	8440
RM 40 UH	MK 40 B	8409	MD 40	8442
RM 75 UH	MK 75 B	8416	MD 75	8444
RM 110 UH	MK 110	8423	MD 110	8446
RM 180 UH	MK 180	8424	MD 180	8447
RM 210 UH	MK 210	8425	MD 210	8448

### Devices for extension of bath life time:

- oil separator
- filtration

### Additional equipment:

- trough dryer
- lifting device with oscillation
- DI-water-treatment

Detailed documentation on request.

## SONOREX TECHNIK immersible transducers, flat transducer plates and generators

Existing tanks can be upgraded with high power immersible transducers or flat transducer plates in combination with suitable HF-generators for ultrasonic cleaning and process acceleration. The immersible transducers are easy to install: they can be suspended by a hook over the tank rim or placed on the tank bottom. No additional mechanical modifications are necessary.

The space-saving flat transducer plates can be built into the tank wall or bottom.

The ultrasonic power is supplied by a HF-generator, which is microprocessor-controlled and can be equipped with additional modules. The HF-generator is available up to 9,000 W, sps- or pc-connection is possible. Immersible transducers and flat transducer plates are available within a range from 200 W to 2,000 W as standard and a frequency from 25 kHz or alternatively 40 kHz. The correct selection of components ensures an optimal cleaning process.

Detailed documentation on request.



Immersible transducer T 25405 for insertion



CONVEXON® immersible transducer TC 40 30 6 P for insertion patent DE 100 13 120



CONCAVON® immersible transducer TN 40 10 6 P patent DE 100 13 120



Flat transducer plate P 25244 for space-saving assembly pattern DE 298 07 581



HF-generator LG 3002 T patent DE 196 49 975

# DR·H·STAMM Cleaning Agents

## Why do you need special agents for ultrasonic cleaning?

**Water and ultrasound without any additives do not clean!**

**Aqueous cleaning agents reducing the surface tension are necessary.**

**Tap water** has a high surface tension. Because of this, it cannot wet sufficiently the surface of the parts to be cleaned so that soil cannot be removed or absorbed completely.

**High-purity or deionized water** due to its very high surface tension leads to intensified cavitation erosion in the ultrasonic tank.

**Special cleaning or disinfection agents** reduce the surface tension, improve the cavitation effect, wet well the surface of the parts to be cleaned, remove or absorb the soiling and disinfect if required.

**Rinsing** after cleaning is necessary to remove remaining residues of cleaning agents and diluted soil particles from the parts to be cleaned.

**It is not allowed to use combustible liquids directly in the ultrasonic bath.**

**Household cleaners, acids and most of the customary acid cleaners are improper cleaning agents because they could destroy the tank by pitting corrosion resulting finally in breakdown of the ultrasonic bath.**



Optimum cleaning results with ultrasound require appropriate cleaning agents.

Contamination	Objects to be cleaned	Cleaning agents	Litres
General contamination, oily and greasy residues, soot, ink, drilling, grinding, polishing and lapping residues etc.	Glass, ceramics, plastics, rubber, steel, stainless steel, non-ferrous-, precious- and light metals, sieves, pipettes, respirators, PC-boards, glasses. Caution with tin and zinc.	<b>TICKOPUR R 33</b> <b>universal cleaner</b> anticorrosive, for laboratory, service and industry, gentle cleaning, mildly alkaline, pH 9.9 (1 %), dosage 1 to 5 %, 1 to 10 min.	2 5 25 200
Light drilling, grinding, polishing and lapping residues, dust, soot, oily and greasy residues etc.	Glass, ceramics, plastics, rubber, steel, stainless steel, non-ferrous-, precious- and light metals.	<b>TICKOPUR R 30</b> <b>neutral cleaner</b> - gentle cleaning, anticorrosive, neutral, pH 7 dosage 1 to 5 %, 1 to 10 min.	2 5 25 200
Heavy mineral residues like chalk, silicate, phosphate, rust, cement, temper colours, metal oxides, grease and oil films etc.	Glass, ceramics, plastics, rubber, steel, stainless steel, precious metals. <b>Not</b> for light and non-ferrous metals, tin and zinc!	<b>TICKOPUR R 27</b> <b>special cleaner</b> - based on phosphoric acid, anticorrosive, acid, pH 1.9 (1 %), dosage 5 %, 1 to 10 min.	2 5 25 200
Resinous residues, soot, grease, oils, waxes, pigments, coloured fog, silicon oils, flux media, oxides at copper, brass, bronze and precious metals.	Glass, ceramics, plastics, rubber, steel, stainless steel, non-ferrous- and precious metals, analysis sieves. Caution with light metals.	<b>TICKOPUR RW 77</b> <b>special cleaner</b> with ammonia, without phosphate, gentle to material, mildly alkaline, pH 9.9 (1 %), dosage 5 %, 1 to 10 min.	2 5 25 200
Coke residues, resinous residues, soot, pigments, grease, oils, waxes, silicon oils, coloured fog, drilling, grinding, polishing and lapping residues etc.	Glass, ceramics, plastics, rubber, steel, stainless steel. <b>Not</b> for light metals, tin and zinc!	<b>TICKOPUR R 60</b> <b>intensive cleaner</b> saponifying, without phosphate, strongly alkaline, pH 12.8 (1 %), dosage 2 to 20 %, 1 to 10 min.	2 5 25 200
General contamination, oil, grease, distillation residues, organic and inorganic residues.	Glass, optical glass, ceramics, plastics, rubber, steel, precious and light metals.	<b>TICKOPUR R 36</b> <b>special cleaner</b> - tenside-free non foaming, gentle to material, mildly alkaline, pH 9.9 (1 %), dosage 0.25 to 5 %, 1 to 10 min.	2 5 25 200
Distillation residues, organic and inorganic residues, oily and greasy residues etc.	Glass, optical glass, ceramics, plastics, rubber, steel, precious and light metals.	<b>TICKOPUR R 32</b> <b>special cleaner</b> - without complexing agents, anticorrosive, gentle to material. To prepare with DI water. Mildly alkaline, pH 9.9 (1 %), dosage 0.25 to 5 %, 1 to 10 min.	2 5 25 200
General contamination, biofilms, soot, pigments, oil- and fat-containing residues etc.	Glass, ceramics, plastics, rubber, steel, stainless steel, non-ferrous-, precious- and light metals, instruments, pipettes, respirators, protective goggles etc.	<b>STAMMOPUR 24* - DGHM** - certified, simultaneous intensive cleaning and disinfection.</b> Residue-free rinsing, neutral scent. Very gentle to material, anticorrosive. Free from aldehydes, chlorine and phenols. Extended endurance of the used solution: 3 days. Bactericidal (incl. Tb.-B.), fungicidal, virucidal (HBV/HIV). Mildly alkaline, pH 9.4 (1 %), dosage 1 %, 15 min (with ultrasound).	2 5 25

**\*Use disinfectants safely. Always read the label and product information before use!**

\*\* DGHM = Deutsche Gesellschaft für Hygiene und Mikrobiologie (German Society for Hygiene and Microbiology)

EC-Safety Data Sheets are available as PDF-data via internet at: [www.bandelin.com](http://www.bandelin.com)

All TICKOPUR agents are also suitable for immersing and wiping.

# SONOPULS Ultrasonic Homogenizers

Homogenizing — Suspending — Emulsifying — Sample preparation

## Features of SONOPULS series

- **Amplitude control 10 - 100 % with indication of actual value.** Permanent control of ultrasound irradiation into the sample and failure detection - wear of the probe is shown.
- **Pulsation** limits the temperature increase of heat sensitive samples. The adjustable pulsation allows cooling during ultrasound intervals.
- **Integrated timer**  
Processing time storable.
- **Indication of elapsed time** in continuous operation or remaining time in countdown mode.
- **Foil keypad**  
Easy care and user-friendly.
- **Switching ON/OFF** either at the generator or directly at the ultrasonic converter via button or remote control.
- **Fail-safe during continuous operation and against idling.**
- **CE marked, also as a medical device compliant to the directive for in-vitro-diagnostics.**

- **Amplitude control**
- **Pulsation** 10 to 100 % - storable
- **Timer** 1 s to 99 min - time storable
- **Automatic storage** of previous settings for pulsation and time
- **LED-Display** - monitoring of preselected values for amplitude, pulsation and time



SONOPULS HD 2070 (Stand and vessel to be ordered separately.)

### SONOPULS HD 2070 Small unit for the laboratory routine

For volumes from 2 ml to 50 ml, ready-to-operate standard set with generator GM 2070, ultrasonic converter UW 2070, standard horn SH 70 G and microtip MS 73 diameter 3 mm. max. 70 W HF-output.

Code No. 2450

Processing frequency 20 kHz.  
Mains connection 230 V~, 50/60 Hz.  
Optionally with voltage selector for 115 V~, 60 Hz (HD 2070-U)

For volumes from 1 ml to 200 ml  
5 titanium probes, dia 2 mm to 13 mm available.  
See table on page 16 - 17.

### SONOPULS HD 2200 Standard unit for the laboratory routine

For volumes from 20 ml to 900 ml, ready-to-operate standard set with generator GM 2200, ultrasonic converter UW 2200, booster horn SH 213 G and flat tip TT 13 diameter 13 mm. max. 200 W HF-output.

Code No. 2530

Processing frequency 20 kHz.  
Mains connection 230 V~, 50/60 Hz.  
Optionally with voltage selector for 115 V~, 60 Hz (HD 2200-U)

For volumes from 2 ml to 1000 ml  
8 titanium probes, dia 2 mm to 25 mm available.  
See table on page 16 - 17.

## Applications

Ultrasonic homogenizers are used in laboratories, hospitals and industry either for scientific experiments, analysis or also in pilot or small lot runs.

### Typical areas of application:

- Disruption of cells, bacteria, virus, tissue, e. g. for extraction of cell contents
- Homogenization of substances
- Producing of finest emulsions
- Acceleration of chemical reactions
- Production of dispersions and suspensions

### Analysis

Preparing samples for grain size determination or environmental analysis: **HD 3200** or **HD 2200** with tapered tip **KE 76** or with extended probe **VS 70 T**.

### Pharmacy - Cosmetics

Production of larger volumes of long lasting emulsions, e. g. lotions and production of antigens, vaccines or liposomes: **HD 3200** and **HD 2200** with flow-through cell **DG 4 G**, made of stainless steel

# SONOPULS Ultrasonic Homogenizers

Cell disruption — Sonochemistry — Degassing — Acceleration of reactions

Power indication in watts is not appropriate for evaluation of ultrasonic homogenizers.

The ultrasonic effect of a homogenizer depends on the amplitude on the sound irradiating surface of the probe (see pages 16 - 17) and on the sample size to be sonicated and not primarily on the electrical power.

Through an optimal adjustment of all components SONOPULS ultrasonic homogenizers provide higher amplitudes with the same electrical power than other models commercially available. Constancy of amplitude by means of AMPLICHRON-control ensures reproducible results for process validation.

- **Amplitude control** in % or alternatively power control in W
- **Pulsation:** operation intervals from 0,1 s up to 600 s  
rest intervals from 0,2 s up to 600 s
- **Timer** 9 h: 59 min: 59 s
- **Display of energy** in kJ delivered to the sample
- **9 user programs**
- **Monitoring of allowed probes**
- **Automatic amplitude limiting** after preselection of the probe
- **Temperature indication** from 0 up to 120 °C, 248°F) alternatively switching off or warning signal when exceeding the maximum temperature, temperature sensor optionally
- **WINPULS remote control** for process organisation with PC over RS-232 and IR interface
- **Lighted LCD display**



SONOPULS HD 3200 (Stand and vessel to be ordered separately.)

## SONOPULS HD 3100

High-Tech for research - for small volumes

For volumes from 2 ml to 50 ml, ready-to-operate standard set with generator GM 2070 ultrasonic converter UW 2070, standard horn SH 70 G and microtip MS 73 diameter 3 mm. max. 100 W HF-output.

Code No. 3650

Processing frequency 20 kHz.  
230 V~, 50/60 Hz or 115 V~, 50/60 Hz

For volumes from 1 ml to 200 ml  
5 titanium probes, dia 2 mm to 13 mm available.  
See table on page 16 - 17.

## SONOPULS HD 3200

High-Tech for research - for larger volumes

For volumes from 20 ml to 900 ml, ready-to-operate standard set with generator GM 2200, ultrasonic converter UW 2200, booster horn SH 213 G and flat titanium tip TT 13 diameter 13 mm. max. 200 W HF-output.

Code No. 3660

Processing frequency 20 kHz.  
230 V~, 50/60 Hz or 115 V~, 50/60 Hz

For volumes from 2 ml to 1000 ml  
8 titanium probes, dia 2 mm to 25 mm available.  
See table on page 16 - 17.

## Applications

### Biochemistry - Biology - Medicine

Sonication of small high-quality samples for analysis like EIA oder RIA: **HD 3100** and HD 2070 with microtip **MS 72** or **MS 73**.

Due to high amplitudes, disruption of high-resistant bacteria, cells or tissues is possible. Indirect processing of the sample in the cup booster **BR 30** or in the cup horns **BB 2 G** or **BB 6** is recommended to avoid cross-contamination.

The selection of the appropriate cooling vessel is crucial for the temperature equalization and the sonication of larger samples.

Detection of prions by cyclic amplification of protein misfolding - a new method for BSE and CJD test:  
**HD 2070** with **MS 73**

### Chemistry and Sonochemistry

Acceleration of chemical reactions or destroying of highly-molecular compounds: **HD 3200** or **HD 2200** with tapered tip **KE 76** and sleeve adapters **NA 29 G** or **NA 45 G** for tight fitting to a sonochemical reaction vessel.

# SONOPULS Accessories



## Probes

made of titanium alloy transmit the mechanical longitudinal waves into the sample. They are thermoresistant, can be treated in autoclaves and are resistant to corrosive media. The volume of the sample, the diameter of the processing vessel and the required amplitude determine the selection of unit and the type of probe. The higher the amplitude, the more intense is the sonication.

**Extended probes VS 70 T/200 T** especially used for sonication of ceramic suspensions or when preparing test portions for grain size analysis.

MS 72 MS 73 KE 76 VS 70T VS 200 T TT 13 TT 19 TT 25

Decription		Microtips		Tapered tip	Extended probes	
Model		MS 72	MS 73	KE 76	VS 70 T	VS 200 T
Code No.		492	529	530	494	478
Diameter	mm	2	3	6	13	25
Length ca.	mm	191	175	135	126	139
Standard horn for HD 2070/3100 Booster horn for HD 2200/3200		SH 70 G SH 213 G	SH 70 G SH 213 G	SH 70 G SH 213 G	SH 70 G SH 213 G	- SH 225 G
Amplitude HD 2070 / 3100 HD 2200 / 3200	$\mu\text{m}_{\text{ss}}^*$	253 / 285 282 / 286	212 / 245 302 / 308	165 / 191 249 / 255	80 / 97 153 / 170	- / - 46 / 51
Volume HD 2070 / 3100	ml	1 - 25	2 - 50	5 - 100	10 - 200	-
Volume HD 2200 / 3200	ml	2 - 30	5 - 90	10 - 350	20 - 900	30 - 1000
Vessel diameter minimum	mm	4	6	8	17	29

\*peak to peak

## Standard and booster horns



SH 70 G SH 213 G SH 219 G SH 225 G DH 13 G

Standard and booster horns (Ti-6Al-4V) are furnished with a thread for replaceable probes. With exterior thread to connect various vessels.

<b>Typ</b>	<b>SH 70 G</b>	<b>SH 213 G</b>	<b>SH 219 G</b>	<b>SH 225 G</b>	<b>DH 13 G</b>
für	2070/3100	2200/3200	2200/3200	2200/3200	2070/2200/3100/3200
Code No.	486	527	600	543	403

Solid booster horn  
DH 13 G with diamond coating on the radiating area; lifetime is thirty times longer than usually.

## Flow-through standard and booster horns



FZ 5 G

FZ 7 G

**FZ 5 G and FZ 7 G** to prepare stable mixtures of non-mixable or hardly mixable liquids (oil-in-water) by direct intrusion of pre-mixed samples into the cavitation field. In combination with flow-through cell DG 4 G the continuous treatment of 2 different media and parallel tempering is possible. Material: Ti-6Al-4V

<b>Typ</b>	<b>FZ 5 G</b>	<b>FZ 7 G</b>
für	2070/3100	2200/3200
Code No.	490	452

## Adapters



NA 29 G

NA 45 G

GA 3 G

Sleeve adapters made of PTFE for tight mounting on standard ground glass vessels.  
**NA 29 G** for NS 29/32 for SH 70/213 G  
**NA 45 G** for NS 45/40 for SH 70/213/219/225G

<b>Typ</b>	<b>NA 29 G</b>	<b>NA 45 G</b>	<b>GA 3 G</b>
für	2070/2200/3100/3200	2070/2200/3100/3200	2070/2200/3100/3200
Code No.	540	487	473

**GA 3 G** threaded adapter made of stainless steel with external thread M 40 x 1 for SH 70/213/219/225 G

## MULTISON®-ultrasonic probe Patent applied D 10 2004 024 214



Multison tips MRS  
- replaceable

**MR** for connection to HD 2070/3100 composed of Multison horn MRH 12 and 12 Multison tips MRS 2 (dia. 2 mm) or MRS 3 (dia. 3 mm). For irradiation of samples in microplates and deep well plates with 96 wells. Simultaneous sonication of 12 samples. MRS made of titanium alloy; individually replaceable.

<b>Typ</b>	<b>MR 12-2</b>	<b>MR 12-3</b>
MRS Ø	2 mm	3 mm
Code No.	3626	3633



# SONOPULS Accessories

## Silica glass probes



**GS** for connection to HD 2070 / 3100 with the special horn SH 70 GQ. For application in food analysis, pharmacy or environmental analysis.  
No intrusion of metal particles and boron compounds - ideal for trace analysis.  
High chemical and temperature shock resistance, no electric conductivity.

## Spiral probe



**WS 8**, dia. 8 mm, made of titanium alloy (Ti-6Al-4V), with special horn SH 200 W, for connection to HD 2200/3200.  
For gentle use in slim reaction vessels. Lateral irradiation. Long wearlife span through low erosion.

Titanium flat tips			Silica glass probes						Spiral probe
TT 13	TT 19	TT 25	GS 6	GS 6 L	GS 13	GS 13 L	GS 18	GS 18 L	WS 8
497	491	532	024	048	028	050	040	054	3617
13	19	25	6		13		18		8
5	5	6	145	290	145	290	145	290	215
SH 70 G SH 213 G	- SH 219 G	- SH 225 G	SH 70 GQ -		SH 70 GQ -		SH 70 GQ -		- SH 200 W
78 / 93 149 / 165	- / - 73 / 81	- / - 48 / 53	12,5 / 13 - / -		13 / 13 - / -		13 / 13 - / -		- / - 12 / 12
10 - 200	-	-	2 - 100		25 - 200		25 - 500		-
20 - 900	25 - 900	30 - 1000	-						8 - 15
17	23	29	10		17		22		10

## Direct processing

### Processing vessels made of glass



KG 3

DG 3

**Cooling vessel KG** for sonication of temperature-sensitive samples.

**Flow-through vessel DG** for processing larger volumes with simultaneous temperature equalization.



RZ 3

SZ 3

**Rosett cell RZ** for homogenous treatment of the sample through intense circulation.

**Suslick cell SZ** with three inlets for gas supply and measuring probes

Model	Capacity	Internal diameter	Model	Code No.
<b>KG 3</b>	15 ml	20 mm	HD 2070/3100/2200/3200	536
<b>KG 5</b>	80 ml	35 mm	HD 2200/3200	481
<b>DG 3</b>	15 ml	20 mm	HD 2070/3100/2200/3200	538
<b>DG 5</b>	80 ml	35 mm	HD 2200/3200	482
<b>RZ 1</b>	25 ml	30 mm	HD 2070/3100/2200/3200	3606
<b>RZ 2</b>	50 ml	42 mm	HD 2200/3200	3607
<b>RZ 3</b>	120 ml	50 mm	HD 2070/3100/2200/3200	522
<b>RZ 5</b>	900 ml	90 mm	HD 2200/3200	483
<b>SZ 3</b>	20 ml	20 mm	HD 2070//3100/2200/3200	534
<b>SZ 5</b>	130 ml	40 mm	HD 2200/3200	484

### Processing vessel made of stainless steel

**Processing vessel DG 4 G** for flow-through processing, e. g. emulsifying, dispersing or homogenizing, up to 30 l/h. For connection to SH 70 G or SH 213 G with TT 13..

**DG 4 G** Code No. 3608



DG 4 G

### Processing vessel for indirect processing

#### Cup horn BB and cup booster BR 30

for high-intensive sonication of smallest and sensitive sample volumes, e. g. cell disruption or treatment of pathogens and toxic material. No cross-contamination or sample loss.

No aerosoling with pathogenic or hazardous materials. Flow-through cooling liquid (BB 6 and BR 30) for temperature equalization.

**Microtube holder EH 6** for use in BB 6. Up to 6 samples can be treated simultaneously.

The pressure plate holds the cups in place, no floating.

**Microtube holder EH 3** for use with BR 30. Up to 3 samples can be treated simultaneously.

Two exchangeable discs with diameters 8.5 or 11.5 mm.

**Inset basket BK 30** for intensive cleaning of smallest parts in BR 30, e. g. radioactively contaminated seeds.



BK 30



EH 6



EH 3



BB 2 G  
+ SH 70 G + TT 13



BR 6



BR 30

Typ for HD	BB 2 G	BB 6	EH 6	BR 30	BK 30	EH 3
	2070	2200	2200	2070/2200	2070/2200	2070/2200
	3100	3200	3200	3100/3200	3100/3200	3100/3200
Code No.	552	3605	059	082	098	078

# SONOPULS Accessories

## Stand



**Stainless steel stand HG 5**  
with lab clamp and non-slip mat to hold processing vessels securely in place

**HG 5**  
for HD 2070/2200/HD 3100/3200  
Code no. 459



**Clamping device KL 7**  
with rod, swivelling clamp for reaction vessels dia. 15 mm to dia. 100 mm

**KL 7** for HG 5  
Code No. 3636

**Supporting table AT 7**  
suitable for KL 7 or in LS 7 with non-slip mat to hold sample vessels securely in place

**AT 7** for KL 7 or LS 7  
Code No. 3644

## Sound proof



**Sound proof boxes** reduce the noise level considerably. Precut holes at the backside allow connections for gas supply and flow-through processing. Acrylic door permits process monitoring.

**LS 4**  
Plastics coated walls, 10 dB-AU damping.



**LS 7**  
made of stainless steel, with damping plates. 20 dB-AU damping.  
**New: with rod, swivelling clamp and quick clamp for height adjustment of sample vessels.**

Clamping belt for safe fixing of sample vessels with different sizes. Also applicable for sonication of samples in glass vessels with round bottoms or with inlets from below.



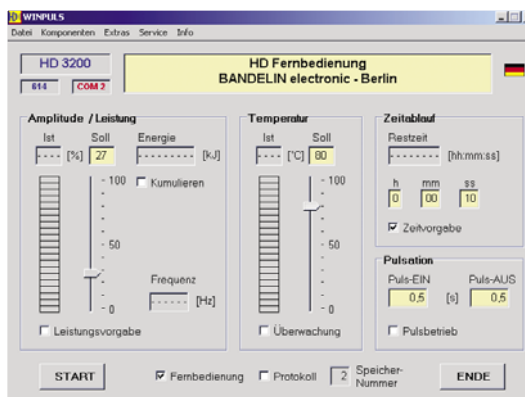
Special support **UG 6** is available for inverted position of the box with cup horn BB 6 or cup booster BR 30. Ultrasonic converter is fixed safely by a special clamp.

Typ for HD	LS 4	LS 7	UG 6
Noise reduction in dB-AU	10	20	
Code No.	416	3635	3616



**Distance tube AH 6**  
For direct processing with long probes (MS 72/73, KE 76, VS 70 with TT 13, VS 200 with TT 25, VS 70 T, VS 200 T and GS..). To be clamped into the closure of the LS 7.  
Code No. 3619

## WINPULS remote control



For process control with PC for operation systems WINDOWS® 2000 and WINDOWS® XP. With different additional functions like test logging and comfortable data storage (up to 99 storages). Set composed of WINPULS® software and infrared adapter IR 1 for interface RS 232.

**WINPULS remote control**  
for HD 3100/3200  
Code No. 3625

## Temperature sensor



**Temperature sensor TM 100**  
for measuring the sample temperature from 0 up to 120 °C

**TM 100**  
for HD 3100/3200  
Code No. 3622

## Remote control



**Foot switch remote control TS 8**  
For easy switching ON/OFF of the HF-generator. With 3 m cable.

**TS 8**  
for HD 2070/2200/3100/3200  
Code no. 531

**Detailed documentation for units and accessories on request.**

# SONOREX TECHNIK Reactors

## SONOREX TECHNIK SONOREACTOR

### Advantages

- Disinfection of organic substances in rinsing liquids for recycling
- Dispersion of nano-scaled polishing suspensions used in wafer industries
- Dispersion of nano-porous clay particles in inkjet paper manufacturing
- Degassing of dye solutions and photographic emulsions
- Intensifying of tanning and dyeing processes in leather industries
- Emulsifying of chemical substances in fertilizers such as condensate of urea and phosphoric acid
- Dispersing of ferrous oxide nanoparticles used in cancer therapy



SR 4-1040

**SR 4-1040**  
Consisting of:  
Cylindrical immersible transducer  
RT 4-1040  
Reactor housing RG 4-000  
Generator LG 1001 T, 1000 W  
Code No. 8067

patent DE 196 499 75



SR 6-2040

**SR 6-2040**  
Consisting of:  
Cylindrical immersible transducer  
RT 6-2040  
Reactor housing RG 6-0000  
Generator LG 2002 T, 2000 W  
Code No. 8090

patent DE 196 499 75

Technical data	SR 4-1040	SR 6-2040
Filling volume	3,9 l	11,3 l
Sonicated volume	2,8 l	8,0 l
Flow rate	1 - 50 l/min	5 - 100 l/min
Reaction crevice	15 mm	22,4 mm
Power density	350 W/l	250 W/l
Power	1000 W <sub>eff</sub>	2000 W <sub>eff</sub>
Frequency	40 kHz	40 kHz
Dimensions (l×w×h) incl. flange and cover	dia. 220 × 716 mm	285 × 338 × 827 mm
Material, stainless steel	1.4571 (V4A), 2 mm	1.4571 (V4A), 3 mm
Connections, flanges	DN 50, ND 16 (DIN 2633)	DN 50, ND 16 (DIN 2633)
Connection cable, EMC-protected	5 m	5 m
Pressure resistance	max. 10 bar	max. 10 bar
Weight	22,5 kg	24 kg
Protection class	IP 65	IP 65

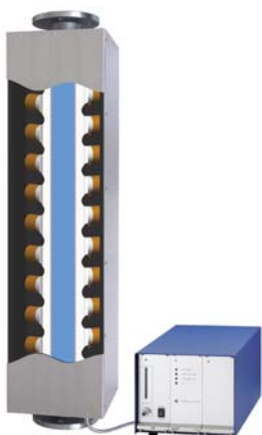
### Reaktor options - on request

- Power increase through featuring additional 1,000 W or 2,000 W, 25 kHz at the outside of the reactor housing
- Reactor cooling for temperature-sensitive media through reactor housing with cooling jacket (increase of power through external assembly not possible)

## SONOREX TECHNIK SONOBLOC SB 7-1025

### Applications

- Sewage sludge disintegration
- Producing of ceramics suspensions
- Dispersing of silicic acid used in wafer industries
- Producing of PTFE suspensions used for coatings



**SB 7-1025**  
Consisting of:  
Reactor RB 7-1025  
Generator LG 1001 T  
Code No. 8096

patent DE 196 499 75

Technical data	SB 7-1025
Filling volume	2,24 l
Sonicated volume	1,9 l
Flow rate	1 - 50 l/min
Reaction crevice	24 mm
Power density	ca. 520 W/l
Power	1000 W
Frequency	25 kHz
Dimensions (l×w×h) incl. flange and cover	1010 × 235 × 250 mm
Material, stainless steel	1.4571 (V4A), 3 mm
Connections, flanges	2 × Vorschweißflansch DN 50, ND 16 (DIN 2633)
Connection cable, EMC-protected	5 m
Pressure resistance	max. 10 bar
Weight	ca. 35 kg
Protection class	IP 30

Detailed documentation on request.

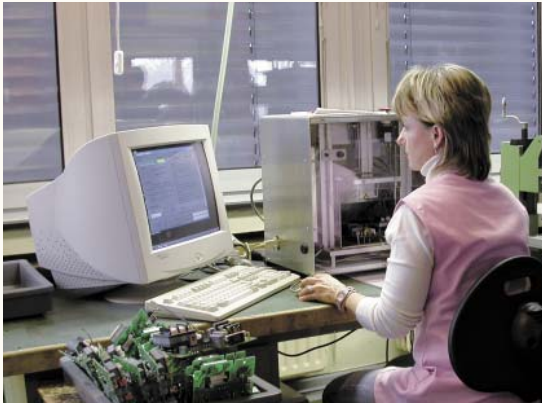
# BANDELIN *electronic* Berlin

## Your partner for quality and reliability

Quality and precision combined with 60 years experience in the precising mechanics and electronic apparatus engineering is reflected in the wide product range.

Our products with a vast variety of applications underline the growing importance of efficient ultrasonic technology.

The production is located in Berlin. Automated manufacturing lines ensure excellent quality and high productivity. Nevertheless, we have kept the flexibility and capability to manufacture equipment of special dimensions.



Test bench for electrical components



Modern laser technology in the sheet metal forming guarantees precise manufacturing

## Your advantages

- Free of charge test cleaning to clarify the process technology
- Speedy delivery from current series production



High voltage control and final inspection of all units.



**BANDELIN *electronic*** - specialize in manufacturing ultrasonic units and maintain a Quality Management System in compliance with the requirements of EN ISO 9001/12.2000 and EN ISO 13485/11.2000

5642 e/2006-03 All units are RFI proof and  $\text{C}\epsilon$  marked. Subject to technical alterations without notice. Our General Terms and Conditions are valid.

**BANDELIN**  
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**55 years  
of experience  
in ultrasound technology**