

SONOREX • SONOPULS

Ultrasound in laboratories and for process engineering

- Degassing of samples and solvents
- Homogenizing
- Slurry suspending
- Cleaning of glassware
- Cleaning of sieves
- Cleaning of pipettes



NEW



SONOREX DIGITEC DT 510 F
with flat ultrasonic tank
for sample preparation in laboratory



SONOPULS mini20
for fast hand operation

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 approx. 20 kHz which are applicable in cell disruption, produce bubbles with larger diameters and stronger pressure waves than the higher frequencies of approx. 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 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 a very fine emulsion of oil and water can be produced by ultrasonic application. Compared to other manufacturing processes this emulsion is more stable.

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 scratching either the parts to be cleaned or the tank bottom. Beakers are placed into positioning lids and are used for 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.

Where do I find what?

News



Flat ultrasonic baths SONOREX DIGITEC DT ... F
page 7



Ultrasonic homogenizer SONOPULS mini20
page 18



SONOREX ultrasonic baths
page 4–10



SONOREX
acesories
page 10–11

SONOREX special accessories
page 12–13



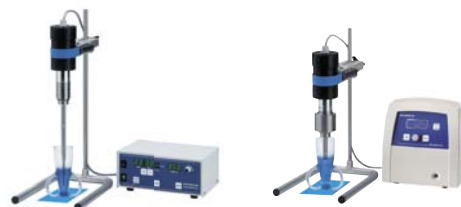
SONOREX TECHNIK
industrial ultrasound
page 14



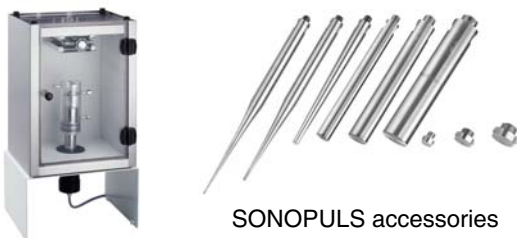
TICKOPUR / STAMMOPUR
cleaning and disinfecting agents
page 15



SONOPULS ultrasonic homogenizers
applications / features
page 16–17



SONOPULS ultrasonic homogenizers
page 18–19







SONOPULS accessories
page 20–22



SONOREX TECHNIK
SONOREAKTOR / SONOBLOC
page 23

Overview on ultrasonic baths

Features				
	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	0.8 mm. AISI 314	0.8 mm. AISI 304	0.8 mm. AISI 304	-
version "C"	2 mm. AISI 316 Ti	-	2 mm. AISI 316 Ti	2 mm. AISI 316 Ti
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
Degree of protection	IP 33	IP 32	IP 32	IP 32
Ultrasonic frequency (kHz)	35	35	35	35
Sweep	yes	no	yes	yes
PZT-transducers (PZT= lead circonate titanate)	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 bei Typ H-RC	10 programs	no	no
Interface	RS 232, bei Typ H-RC	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 14.

Digital high-power ultrasonic baths with fast degassing



- ❑ 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

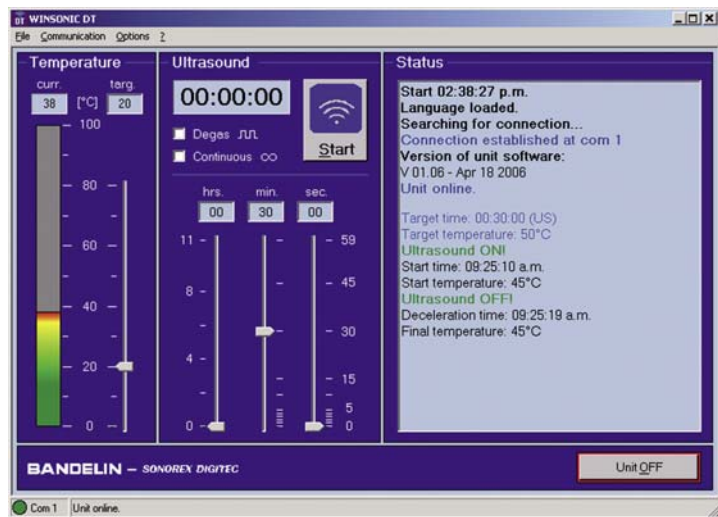
Internal tank dimensions (l x w x d) mm	Capacity litres	Type	Code No.	External dimensions (l x w x h) mm	Drain ball cock	Ultrasonic peak output * W	HF-output W _{eff}	Heater power W	Current consumption A	Weight net kg
190 x 85 x 60	0.9	DT 31	3200	205 x 100 x 170	-	240	30	-	0.2	1.8
		DT 31 H	3220			240	30	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			240	60	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 102 H	3235		G ¼	480	120	140	1.2	4.3
240 x 140 x 150	4.0	DT 103 H	3201	260 x 160 x 310	G ¼	560	140	200	1.5	4.6
Ø 240 x 130	5.6	DT 106	3270	Ø 265 x 270	G ¼	480	120	-	0.6	5.5
500 x 140 x 100	6.0	DT 156	3275	530 x 165 x 245	G ¼	640	160	-	0.7	6.1
500 x 140 x 150	9.0	DT 156 BH	3221	530 x 165 x 300	G ¼	860	215	600	3.6	7.3
300 x 150 x 150	5.5	DT 255	3215	325 x 175 x 295	G ¼	640	160	-	0.7	5.2
		DT 255 H	3240		G ¼	640	160	280	2.0	5.3
300 x 240 x 150	9.7	DT 510	3245	325 x 265 x 305	G ½	640	160	-	0.7	7.0
		DT 510 H	3206		G ½	640	160	400	2.5	7.6
300 x 240 x 200	13.0	DT 512 H	3226	325 x 265 x 350	G ½	860	215	400	2.7	8.0
325 x 300 x 150	13.5	DT 514	3250	355 x 325 x 305	G ½	860	215	-	1.0	8.2
		DT 514 H	3211		G ½	860	215	600	3.6	8.8
325 x 300 x 200	18.7	DT 514 BH	3216	355 x 325 x 385	G ½	860	215	600	3.6	9.8
500 x 300 x 200	28.0	DT 1028	3255	535 x 325 x 400	G ½	1,200	300	-	1.4	14.3
		DT 1028 H	3231		G ½	1,200	300	1,300	7.0	14.7
500 x 300 x 300	45.0	DT 1028 CH	3266	540 x 340 x 500	G ½	1,200	300	1,450	7.7	23.7
600 x 500 x 200	58.0	DT 1050	3265	655 x 535 x 425	G ½	2,400	600	-	2.7	31.0
600 x 500 x 300	90.0	DT 1050 CH	3271	640 x 540 x 530	G ½	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.

SONOREX DIGITEC DT ... -RC

High-power ultrasonic baths with infrared interface for process documentation

- Degassing of liquids
- Acceleration of slurring
- Emulsifying
- Sample preparation for analysis



starting screen



DT 102 H-RC with IR 1

WINSONIC® DT remote control

- The PC program is designed for operating systems MICROSOFT® WINDOWS®2000 and MICROSOFT® WINDOWS® XP in connection with the infrared adapter IR 1 allowing a comfortable operation and monitoring of DIGITEC DT ... RC ultrasonic baths.
- 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

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 necessary for connection.

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 _{eff}	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	G 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	G 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	G 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	G 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.

Flat ultrasonic baths with fast degassing for sample preparation

- Uniform sonication of samples irrespective of size and arrangement of the flasks
- Homogenizing
- Fast degassing of samples at the push of the button
- Sample preparation in laboratory flasks



SONOREX DIGITEC DT 1028 F
with 2 flask holders GL 510 F





Basic set:

- Ultrasonic bath SONOREX DIGITEC DT 100 F, flask holder GL100 F, 250 ml TICKOPUR R 33
- Ultrasonic bath SONOREX DIGITEC DT 510 F, flask holder GL 510 F, 250 ml TICKOPUR R 33
- Ultrasonic bath SONOREX DIGITEC DT 1028 F, 2 flask holders GL 510 F, 250 ml TICKOPUR R 33

TICKOPUR R 33, concentrate for producing the contact liquid.

Spring clamps EK are necessary to fix the laboratory flasks fast and easy to the flask holder GL. They prevent floating or canting of flasks.



Flask size Type	10 ml EK 10 	25 ml EK 25 	50 ml EK 50 	100 ml EK 100 
Code No.	051	053	055	057
for GL 100 F are suitable	8 ×	5 ×	4 ×	2 ×
for GL 100 F are suitable	18 ×	18 ×	9 ×	6 ×



DT 100 F



Flask holder GL 100 F
stainless steel, for DT 100 F
Code No. 3261

Lid for covering the ultrasonic tank without flask holder



Lid D 3 P
plastic, for DT 100 F
Code No. 3214



DT 510 F



Flask holder GL 510 F
stainless steel, for DT 510 and
DT 1028 F (2 pcs)
Code No. 3262



Lid D 10 P
plastic, for DT 510 F
Code No. 3246



Lid D 28 P
plastic, for DT 1028 F
Code No. 3258

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 _{eff}	Current consumption A	Weight net kg
240 × 140 × 65	1.85	DT 100 F	3241	260 × 160 × 195	-	240	60	0.4	3.0
300 × 240 × 65	4.3	DT 510 F	3242	325 × 265 × 195	G ½	560	140	0.7	5.15
500 × 300 × 65	9.5	DT 1028 F	3243	535 × 325 × 205	G ½	1,280	320	1.4	9.65

*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

High-power ultrasonic baths with power adjustment, fast degassing and 10 program data memory

- 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 ultrasonic baths.

Exact setting of all parameters guarantees reproducible results. When switching off the unit, the data are 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 _{eff}	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	G ¼	720	180	600	3.4	7.6
300 x 150 x 150	5.5	DK 255 P	782	325 x 175 x 305	G ¼	640	160	280	2.0	6.0
300 x 240 x 200	13.0	DK 512 P	783	325 x 265 x 350	G ½	820	205	400	2.7	8.8
325 x 300 x 200	18.7	DK 514 BP	784	355 x 325 x 385	G ½	860	215	600	3.6	10.2
500 x 300 x 200	28.0	DK 1028 P	786	535 x 325 x 400	G 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

Robust 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 _{eff}	Heater power W	Current consumption A	Weight net kg
190 x 85 x 60	0.9	RK 31	329	205 x 100 x 170	-	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 225	-	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		G ¼	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	39.5	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 baths with 2 mm s/s AISI 316Ti

- ❑ Removal of stubborn dirt in 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 _{eff}	Heater power W	Current consumption A	Weight net kg
220 x 135 x 100	3.0	RK 102 CH	3031	260 x 175 x 275	G ¼	480	120	200	1.4	5.6
220 x 135 x 150	4.5	RK 103 CH	3032	260 x 175 x 325	G ¼	560	140	200	1.6	6.4
280 x 150 x 150	6.3	RK 255 CH	3033	320 x 190 x 325	G ¼	720	180	280	2.0	7.9
280 x 234 x 200	13.1	RK 512 CH	3034	320 x 275 x 380	G 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	G 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	G ½	1,200	300	1450	7.7	23.7
600 x 500 x 300	90.0	RK 1050 CH	184	640 x 540 x 530	G ½	2,400	600	1950	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.

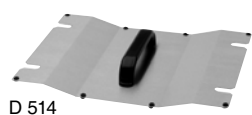
SONOREX accessories

Type	RK 31 / H DT 31 / H	RK 52 / H DT 52 / H	RK 100 / H / SH RK 102 H, DK 102 P DT 100 / H DT 102 H / H-RC	RK 102 CH	RK 103 H DT 103 H
Accessories					
Lids, s/s	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 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

Gerätetyp	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
Zubehör					
Lids, s/s	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
Insert baskets, plastic l x w x h (mm)	-	-	K 14 P 230 x 250 x 45	-	-
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



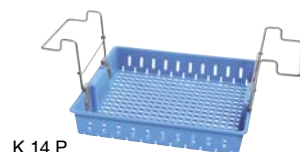
D 514

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



K 14

Insert baskets K
stainless steel



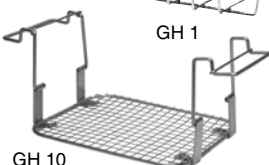
K 14 P

Insert baskets PK...C/K...P
plastic, with perforations, for gentle cleaning of sensitive surfaces.



GH 1

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.



GH 10

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.



KW 3



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 04, glass, 400 ml
SD 05, glass, 600 ml
KB 04, plastic, 400 ml mit 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

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

RK 1028 / H DT 1028 / H DK 1028 P	RK 1028 C RK 1028 CH DT 1028 CH	RK 1040	RK 1050 DT 1050	RK 1050 CH DT 1050 CH
D 1028	D 1028 C	D 40	D 1050 C	D 1050 C
K 28 455 x 245 x 50	K 28 C 455 x 245 x 50	K 40 Ø 480 x 50	K 50 545 x 450 x 50	K 50 C 545 x 450 x 50
K 28 P 420 x 200 x 45	-	-	-	-
GH 28 455 x 250	GH 28 C 455 x 250	-	-	GH 50 C 550 x 455
KW 28-0 437 x 230 x 155	KW 28-0 437 x 230 x 155	-	KW 50-0 517 x 445 x 184	KW 50 B-0 520 x 445 x 284
ES 4	ES 4	-	ES 4	ES 4

Special accessories for laboratories see page 12

Specific Applications in Laboratories

Spring clamps for laboratory flasks



K 10 with 2 EK 100

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.

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



GV 10

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

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

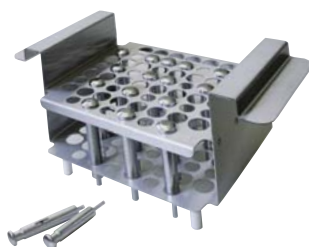


RG 2

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.

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 for RK/DT 514 BH
holes with dia. 22 mm for 30 punches EU B
holes with dia. 28 mm for 30 punches EU D

TH 14 B-S 22 for RK/DT 514 BH
holes with dia. 22 mm for 60 punches EU B

TH 14 B-S 28 for RK/DT 514 BH
holes with dia. 28 mm for 52 punches EU D

TH 28 C for RK 1028 CH
holes with dia. 22 mm for 30 punches EU B
holes with dia. 28 mm for 30 punches EU D

TH 28-S 22 for RK/DT 1028 H
holes with dia. 22 mm for 44 punches EU B

TH 28-S 28 for RK/DT 1028 H
holes with dia. 28 mm for 31 punches EU D

Careful cleaning of analysis sieves



DT 106 with SH 7

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

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 RK 106, 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 SUPER RK 1028 C

Ultrasonic baths for single-cleaning of analysis sieves up to dia. 400 mm:

SONOREX SUPER RK 1040

Recommended cleaning concentrate: TICKOPUR R 33 (see page 15).

Detailed documentation on request.

Special Applications

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



SONOREX PR 140 C with K 140 B

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

SONOREX PR 140 C

Code No. 2083

Ready to operate:

SONOREX PR 140 C

with basket K 140 B, lid D 140, cleaning concentrate TICKOPUR R 33 - 5 litres

Three-way cock

to change from tap water to DI-water (for final rinsing)

AR 140 C

metal

AR 140 CP-1

plastic

PG 140 B

Pipette container

plastic, for soaking or for final rinsing

K 140 B

Pipette basket

plastic

Detailed documentation on request.

Cleaning and disinfecting of breathing 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

EXAM-expertise concerning compatibility for use on surfaces:

Cleaning and disinfecting concentrate **STAMMOPUR 24**

Universal cleaning concentrate **TICKOPUR R 33** - see page 15

Detailed documentation on request.

SONOREX TECHNIK industrial ultrasonic units



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 unit with ultrasound and heater
RM ... U	cleaning unit with ultrasound
RM ... H	rinsing unit with heater
RM ...	rinsing unit without ultrasound and heater

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	HF-output W _{eff}	Heater power W	Current consumption A**	Weight net kg
325 x 275 x 200	13.0	RM 16 UH	8200	365 x 340 x 390	G ½	1 x 300	800	4.8	16.0
480 x 300 x 300	30.0	RM 40 UH	8210	540 x 340 x 500	G ¾	1 x 500	1,250	7.7	26.0
580 x 500 x 300	60.0	RM 75 UH	8220	640 x 540 x 530	G ¾	1 x 1,000	1,950	12.9	42.0
600 x 450 x 450	110.0	RM 110 UH	8230	780 x 550 x 800	G 1	1 x 1,000	4,800	10.5	72.0
1,000 x 500 x 400	160.0	RM 180 UH	8250	1,180 x 600 x 800	G 1	2 x 1,000	7,200	14.8	135.0
750 x 650 x 500	210.0	RM 210 UH	8270	930 x 750 x 800	G 1	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.

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

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.



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 2002 T patent DE 196 49 975

Detailed documentation on request.

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.	TICKOPUR R 33 - EXAM-expertise universal cleaner 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.	TICKOPUR R 30 neutral cleaner - 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. Not for light and non-ferrous metals, tin and zinc!	TICKOPUR R 27 special cleaner - 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.	TICKOPUR RW 77 special cleaner 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. Not for light metals, tin and zinc!	TICKOPUR R 60 intensive cleaner 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.	TICKOPUR R 36 special cleaner - 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.	TICKOPUR R 32 special cleaner - 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.	STAMMOPUR 24* - VAH certified, EXAM-expertise, simultaneous intensive cleaning and disinfection. 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 (Vaccinia, BVDV, H5N1, HbV, HIV). Mildly alkaline, pH 9.4 (1 %), dosage 1 to 2 %,	2 5 25

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

EC-Safety Data Sheets are available as PDF-data via internet at: www.bandelin.com

All TICKOPUR agents are also suitable for immersing and wiping.

SONOPULS Applications

Ultrasonic homogenizers are used in laboratories, hospitals and in industry for scientific experiments and analysis as well as in pilot or small lot production. Here are some examples showing the vast variety of applications for ultrasonic homogenizers:

Typical areas of application:

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

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**.
- Homogenizing of cheese samples for determination of nitrates:
HD 3200 or **HD 2200** with **MS 73**



Biochemistry - Biology - Medicine

- Sonication of small high-quality samples for analysis like EIA or 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 sample in cup booster **BR 30** or in cup horns **BB 2 G** or **BB 6** is recommended to avoid cross-contamination.
- Detection of prions by cyclic amplification of protein misfolding:
HD 2070 with **MS 73**
- Simultaneous sonication of 12 samples in microplates:
HD 3100 with MR 12-2



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.



Pharmacy - Cosmetic

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



SONOPULS Features

AMPLICHRON®-system

guarantees a constant amplitude independently from changing conditions within the sample. It ensures reproducible results for process validation. Settings within a range of 10 to 100 %. Verification of actual value at the display. Permanent control of ultrasound irradiation as well as indication of wear of the probe.

Pulsation

limits the temperature increase of heat sensitive samples. The adjustable pulsation allows cooling during ultrasound intervals.

Continuous operation

constant sound radiation - extremely effective

Integrated timer

Process duration storable. Indication of elapsed time in continuous operation or of remaining time in countdown mode.

Switching ON/OFF either at the generator or directly at the ultrasonic converter via button or remote control.

Accessories

A wide range of probes and special accessories for a vast variety of applications

Foil keypad

Easy to care and user-friendly.

Fail-safe during continuous operation and idling.

RFI-proofed and CE-marked, also as medical device compliant to the directive for in-vitro diagnostics 98/79/EG

Features	mini20 NEW	HD 2xxx	HD 3xxx
Amplitude control	10–100 %	10–100 %	10–100 %
Power control	yes (HF power)	no	yes (HF power)
Automatic amplitude limiting	yes	no	yes, after preselection of probe
Pulsation	ON cycles 0,1–60 s OFF cycles 0,2–60 s	10–100 % – storable (Pulsdauerhältnis, Basis 1 sec)	ON cycles 0,2–600 s OFF cycles 0,3–600 s
Time modes	50 min: 59 s	99 min: 59 s continuous or timed	9 h: 59 min: 59 s continuous or timed
Safety shut-down	50 min: 59 s	no	9 h: 59 min: 59 s
Display	grafic / alphanumeric liquid crystal display of amplitude, pulsation mode, time, energy and optionally temperature	numerical seven-segment LED display of amplitude, pulsation mode and time	grafic / alphanumeric liquid crystal display of amplitude, pulsation mode, time, energy and optionally temperature
Menu guided	comfortable setting of all values through „push & turn“	no	comfortable setting of all values through „push & turn“
Energy monitoring	in kJ	no	in kJ
Temperature monitoring and measuring	no	no	optional, 0–120 °C – temperature sensor necessary , warning signal or alternatively cut-off
User programs	9	1	9, with software WINPULS®: 99
Remote control with PC	RS 232 (infrared)	no	RS 232 (infrared)
PC software, optionally available	no	no	WINPULS® for controlling and documentation
Error diagnosis	yes	no	yes
Processing frequency	30 kHz	20 kHz	20 kHz
Automatic storage of the last set parameters	yes	no	yes
Remote control	no	Foot switch	Foot switch

How to select the proper unit

Power output in watt is not the sole criterion for selecting an ultrasonic homogenizer. This value only indicates the power of the HF generator but not the energy delivered to the sample. The amplitude at the radiating surface of the probe is the determining factor for the evaluation of the irradiation result while taking into consideration the volume of the sample.

SONOPULS ultrasonic homogenizers produce with the same electric power higher amplitudes than other models in the market thanks to an ideal integration of all components.

SONOPULS Ultrasonic Homogenizers

SONOPULS mini20

for volumes up to 25 ml

Fast hand operation

Ready-to-operate for volumes from 0,5 ml to 25 ml, consisting of HF generator GM mini20, ultrasonic converter UW mini20 and microtip MS 2.5, diameter 2,5 mm.

Max. 20 W_{eff} HF output.

Code No. 3665



HF generator		GM mini20
Dimensions	mm	250 × 256 × 154
Weight	kg	2,0
Mains supply		230 V~, 50/60 Hz (optionally 115 V~, 50/60 Hz from 10/2008 available)
Converter		UW mini20
Dimensions	mm	dia. ca 50 × 160
Weight	g	270
Available titanium probes	dia. mm	1,5 or 2,5

SONOPULS HD 2070

for volumes up to 200 ml

Unit for the laboratory routine

Ready-to-operate for volumes from 2 ml to 50 ml, consisting of HF generator GM 2070, ultrasonic converter UW 2070, standard horn SH 70 G and microtip MS 73 diameter 3 mm.

Max. 70 W_{eff} HF output.

Code No. 2450



SONOPULS HD 2200

for volumes up to 1000 ml

Standard unit for the laboratory routine

Ready-to-operate for volumes from 20 ml to 900 ml, consisting of HF generator GM 2200, ultrasonic converter UW 2200, booster horn SH 213 G and flat tip TT 13, diameter 13 mm.

Max. 200 W_{eff} HF output.

Code No. 2530



HF generator		GM 2070	GM 2200
Dimensions	mm	257 × 180 × 115	257 × 180 × 115
Weight	kg	2,5	2,5
Mains supply		230 V~, 50/60 Hz, optionally with voltage selector for 115 V~, 50/60 Hz	
Converter		UW 2070	UW 2200
Dimensions	mm	dia. 70 × 120	dia. 70 × 120
Weight	kg	1,0	1,0
Available titanium probes	dia. mm	2, 3, 6, 13	2, 3, 6, 13, 19 or 25

SONOPULS Ultrasonic Homogenizers

SONOPULS HD 3100

for volumes up to 200 ml

High-Tech for research

Ready-to-operate for volumes from 2 ml to 50 ml, consisting of HF generator GM 3100, ultrasonic converter UW 3100, standard horn SH 70 G and microtip MS 73 diameter 3 mm. Max. 100 W_{eff} HF output.

Code No. 3680



SONOPULS HD 3200

for volumes up to 1000 ml

High-Tech for research

Ready-to-operate for volumes from 20 ml to 900 ml, consisting of HF generator GM 3200, ultrasonic converter UW 3200, booster horn SH 213 G and flat tip TT 13, diameter 13 mm. Max. 200 W_{eff} HF output.

Code No. 3660



HF generator		GM 3100	GM 3200
Dimensions	mm	250 × 256 × 154	250 × 256 × 170
Weight	kg	2,0	2,7
Mains supply		230 V~, 50/60 Hz, optionally 115 V~, 50/60 Hz	
Converter		UW 3100	UW 3200
Dimensions	mm	dia. 70 × 120	dia. 70 × 120
Weight	kg	1,0	1,0
Available titanium probes	dia. mm	2, 3, 6 or 13	2, 3, 6, 13, 19 or 25

SONOPULS HD 3400

for volumes up to 2500 ml

High-Tech for research and pilot plant stations

Ready-to-operate for volumes from 100 ml to 2500 ml, consisting of HF generator GM 3400, ultrasonic converter UW 3400, booster horn SH 3425 and extended probe VS 200 T, diameter 25 mm. Max. 400 W_{eff} HF output.

Code No. 3690



HF generator		GM 3400
Dimensions	mm	324 × 230 × 131
Weight	kg	3,1
Mains supply		230 V~, 50/60 Hz
Converter		UW 3400
Dimensions	mm	dia. 90 × 180
Weight	kg	2,2
Available titanium probes	dia. mm	19 or 25

SONOPULS Accessories



Probes made of titanium alloy

Probes (Ti-Al6-V4) transmit mechanical longitudinal waves into the sample. They are thermo-resistant, can be treated in autoclaves and are resistant to corrosive media.

Sample volume, diameter of the processing vessel and the required amplitude determine the selection of the unit and the type of probe. The higher the amplitude, the more intense the sonication.

For sonication of suspensions only long probes should be used. Safe application – no suspension particles in the thread.

Description		Microtips				Tapered tip	Extended probe		
		MS 1.5	MS 2.5	MS 72	MS 73	KE 76	VS 70 T	VS 190 T	VS 200 T
Type		MS 1.5	MS 2.5	MS 72	MS 73	KE 76	VS 70 T	VS 190 T	VS 200 T
Code No.		3639	3652	492	529	530	494	3638	478
Diameter	mm	1,5	2,5	2	3	6	13	19	25
Length approx	mm	57	53	191	175	135	130	130	130
Standard horn for HD 2070/3100		-	-	SH 70 G	SH 70 G	SH 70 G	SH 70 G	-	-
Booster horn for HD 2200/3200		-	-	SH 213 G	SH 213 G	SH 213 G	SH 213 G	SH 219 G	SH 225 G
Booster horn for HD 3400		-	-	-	-	-	-	SH 3419	SH 3425
Amplitude for HD 2070/3100	μm_{SS}	-	-	253 / 285	212 / 245	165 / 191	80 / 97	-	- / -
Amplitude for HD 2200/3200	(peak to peak)	-	-	282 / 286	302 / 308	249 / 255	153 / 170	-	46 / 51
Amplitude for HD 3400		-	-	-	-	-	-	116	82
Amplitude for mini20		70	95	-	-	-	-	-	-
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	25–900	30–1000
Volume HD 3400	ml	-	-	-	-	-	-	500–1500	500–2500
Volume mini20	ml	0,1–10	0,5–25	-	-	-	-	-	-
Vessel diameter min	mm	4	6	4	6	8	17	23	29

Standard and booster horns



SH 70 G SH 213 G SH 219 G SH 225 G SH 3419 SH 3425

Standard and booster horns (Ti-Al6-V4) are furnished with a thread for replaceable probes. With exterior thread to connect various vessels.

Typ	SH 70 G	SH 213 G	SH 219 G	SH 225 G	SH 3419	SH 3425
for HD	2070/3100	2200/3200	2200/3200	2200/3200	3400	3400
Code No.		486	5273647	3634	3679	3692



DH 13 G

Solid standard horn

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

Typ DH 13 G

for HD 2070/2200/3100/3200
Code No. 403

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*

Typ	FZ 5 G	FZ 7 G
for HD	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 70/213/219/225 G

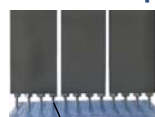
Typ	NA 29 G	NA 45 G
for HD	2070/2200/3100/3200	2070/2200/3100/3200
Code No.	540	487

Threaded adapter made of stainless steel with external thread M 40 x 1

GA 3 G for SH 70/213/219/225 G

Typ	GA 3 G
for HD	2070/2200/3100/3200
Code No.	473

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, MRS 3 or MRS 2-2C. For irradiation of samples in microplates and deep well plates. Simultaneous sonication of 12 samples. Multison tips individually replaceable.

Typ	MR 12-2	MR 12-3
MRS dia.	2 mm	3 mm
Code No.	3626	3633

SONOPULS Accessories

Silica glass probes



SH 70 GQ



GS 13 GS 6

GS for connection to HD 2070/3100 with **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.

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

Processing vessel for direct processing

Processing vessel, 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.

Type	Capacity	Internal diameter	Type	Code No.
KG 3	15 ml	20 mm	HD 2070/3100/2200/3200	536
KG 5	80 ml	35 mm	HD 2200/3200	481
DG 3	5,6 l/h	20 mm	HD 2070/3100/2200/3200	538
DG 5	30 l/h	35 mm	HD 2200/3200	482
RZ 1	25 ml	30 mm	HD 2070/3100/2200/3200	3606
RZ 2	50 ml	42 mm	HD 2070/3100/2200/3200	3607
RZ 3	120 ml	50 mm	HD 2070/3100/2200/3200	522
RZ 5	900 ml	90 mm	HD 2200/3200/3400	483
SZ 3	20 ml	20 mm	HD 2070//3100/2200/3200	534
SZ 5	130 ml	40 mm	HD 2200/3200	484



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

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.



EH 6



EH 3



BB 2 G



BR 30



BR 30

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

+ SH 70 G + TT 13

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 2070/2200/3100/3200
Code No. 459

HG 10 for HD 3400
Code No. 3646



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

KL 7 for HG 5/HG 10
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 oder 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.

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..) in LS 7.
To be clamped into the closure of the LS 7.

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.



LS 10
stainless steel with damping plates,
20 dB-AU damping.

LS 10

Typ
for HD

dB-AU damping
Code No.

LS 4
2070/2200
3100/3200
10
416

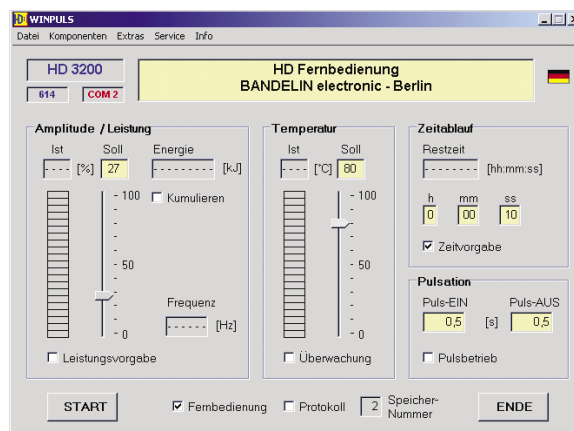
LS 7
2070/2200
3100/3200
20
3635

AH 6
LS 7
3619

UG 6
LS 7
3616

LS 10
3400
20
3637

WINPULS® remote control



For process control with PC for operation systems
MICROSOFT® WINDOWS® 2000 und
MICROSOFT® 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 3100/3200/3400
Code No. 3625

Temperature sensor



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

TM 100
for HD 3100/3200/3400
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 2070/2200/3100/3200/3400
Code No. 531

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

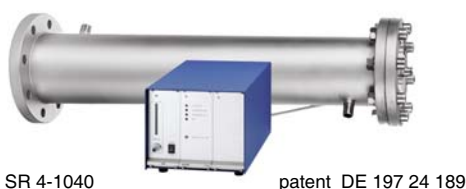
SONOREX TECHNIK SONOREACTOR

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

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



SR 4-1040 patent DE 197 24 189

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



SR 6-2040 patent DE 197 24 189

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 _{eff}	2000 W _{eff}
Frequency	40 kHz	40 kHz
Dimensions (l×w×h) incl. flange and cover	Ø 220 × 716 mm	285 × 338 × 827 mm
Material, stainless steel	1.4571 (V4A), 2,0 mm	1.4571 (V4A), 2,6 mm
Connections, flanges	2 × G ½	ND 16, DN 50 (DIN 2633)
Connection cable, EMC-protected	5 m	5 m
Pressure resistance	max. 10 bar	max. 10 bar
Weight	25 kg	63 kg
Protection class	IP 65	IP 65

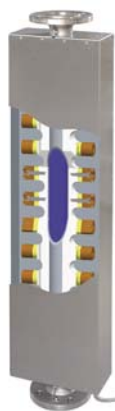
Reaktor options - on request

- 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 8-1002

Applications

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



SB 8-1002

Consisting of:
Reactor RB 8-1002
HF generator LG 1001 T
Code No. 8087

patent DE 196 499 75

Technical data	SB 8-1002
Filling volume	2,4 l
Sonicated volume	2,0 l
Flow rate	1–50 l/min
Reaction crevice	53 mm
Power density	max. 500 W/l
Power	1000 W _{eff}
Frequency	25 kHz
Dimensions (l×w×h) incl. flange and cover	255 × 165 × 1100 mm
Material, stainless steel	1.4571 (V4A), 3 mm
Connections, flanges	2 × pre-welded flange ND 16, DN 50 (DIN 2633)
Connection cable, EMC-protected	5 m
Pressure resistance	max. 10 bar
Weight	35 kg
Protection class	IP 30

Detailed documentation on request.

BANDELIN *electronic* Berlin



The family-owned mid-sized company specialized in manufacturing ultrasonic equipment, accessories and disinfectant and cleaning agents, maintain a Quality Management System complying with the requirements of EN ISO 9001:2000 and EN ISO 13485:2003.

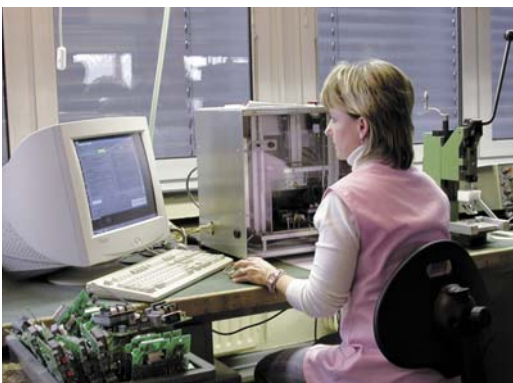


Your partner for quality and reliability

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.

5712 e/2008-03

A All units are RFI proof and (marked. Subject to technical alterations without notice. Our General Terms and Conditions are valid. Decoration products and accessories are not included in delivery. They are only for demonstration.

BANDELIN
www.bandelin.com
info@bandelin.com

**55 years
of experience
in ultrasound technology**