

SONOREX - SONOPULS

High-power ultrasound in laboratories

Cleaning of glassware and sieves

Degassing of samples and solvents

Homogenizing

Suspending

Emulsifying

SONOSHAKE



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.

Overview on **SONOREX** 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
Heating	optional, version "H"	yes	optional, H-Version	yes
Heating, 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 stainless steel tank material version "C"	0.8 mm. AISI 314 2 mm. AISI 316 Ti	0.8 mm. AISI 304 -	0.8 mm. AISI 304 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, welded	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
Power adjustment	no	yes	no	no
PZT-transducers (PZT= lead circonate titanate)	yes	yes	yes	yes
Fast degassing	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 (type H-RC)	10 programs	no	no
Interface	RS 232, type H-RC	no	no	no
PC software	yes	no	no	no
CE marked as medical device	yes, except for DT 1050 / CH	no	yes, except for RK 1050	yes, except for RK 1050 CH

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

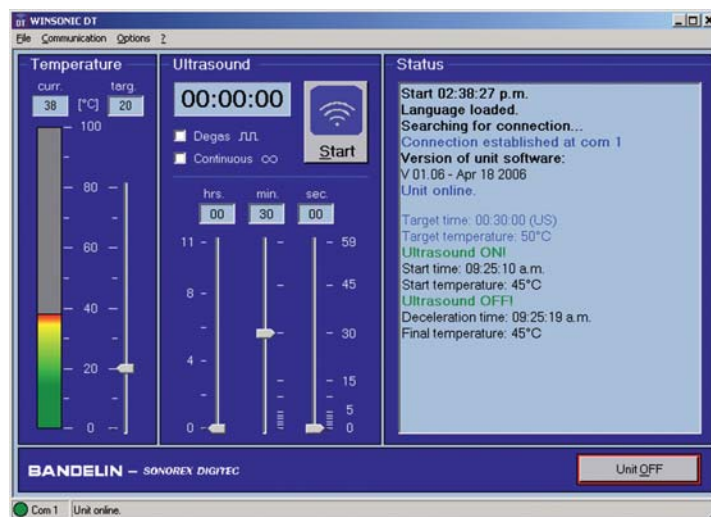


Internal tank dimensions (l x w x d) mm	Capacity litres	Type	Code No.	External dimensions (l x w x h) mm	Drain ball valve	Ultrasonic peak output * W	HF output W _{eff}	Heating power W	Current consumption A	Weight net kg
190 × 85 × 60	0,9	DT 31	3200	205 × 100 × 170	-	240	30	-	0,2	1,8
		DT 31 H	3220			240	30	0,5	1,9	
150 × 140 × 100	1,8	DT 52	3205	175 × 165 × 230	-	240	60	-	0,3	2,6
		DT 52 H	3225			240	60	140	0,9	2,9
240 × 140 × 100	3,0	DT 100	3210	260 × 160 × 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 × 140 × 150	4,0	DT 103 H	3201	260 × 160 × 310	G ¼	560	140	200	1,5	4,6
Ø 240 × 130	5,6	DT 106	3270	Ø 265 × 270	G ¼	480	120	-	0,6	5,5
500 × 140 × 100	6,0	DT 156	3275	530 × 165 × 245	G ¼	640	160	-	0,7	6,1
500 × 140 × 150	9,0	DT 156 BH	3221	530 × 165 × 300	G ¼	860	215	600	3,6	7,3
300 × 150 × 150	5,5	DT 255	3215	325 × 175 × 295	G ¼	640	160	-	0,7	5,2
		DT 255 H	3240		G ¼	640	160	280	2,0	5,3
300 × 240 × 150	9,7	DT 510	3245	325 × 265 × 305	G ½	640	160	-	0,7	7,0
		DT 510 H	3206		G ½	640	160	400	2,5	7,6
300 × 240 × 200	13,0	DT 512 H	3226	325 × 265 × 350	G ½	860	215	400	2,7	8,0
325 × 300 × 150	13,5	DT 514	3250	355 × 325 × 305	G ½	860	215	-	1,0	8,2
		DT 514 H	3211		G ½	860	215	600	3,6	8,8
325 × 300 × 200	18,7	DT 514 BH	3216	355 × 325 × 385	G ½	860	215	600	3,6	9,8
500 × 300 × 200	28,0	DT 1028	3255	535 × 325 × 400	G ½	1200	300	-	1,4	14,3
		DT 1028 H	3231		G ½	1200	300	1300	7,0	14,7
500 × 300 × 300	45,0	DT 1028 CH	3266	540 × 340 × 500	G ½	1200	300	1450	7,7	23,7
600 × 500 × 200	58,0	DT 1050	3265	655 × 535 × 425	G ½	2400	600	-	2,7	31,0
600 × 500 × 300	90,0	DT 1050 CH	3271	640 × 540 × 530	G ½	2400	600	1950	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 for process documentation

- ⇒ Degassing of liquids
- ⇒ Acceleration of suspending processes
- ⇒ 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 is possible for quality assurance.

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 valve	Ultrasonic peak output * W	HF output W _{eff}	Heating power W	Current consumption A	Weight net kg
240 × 140 × 100	3,0	DT 102 H-RC	3071	260 × 160 × 250	G ¼	480	120	140	1,2	4,3
300 × 150 × 150	5,5	DT 255 H-RC	3081	325 × 175 × 295	G ¼	640	160	280	2,0	5,3
300 × 240 × 150	9,7	DT 510 H-RC	3091	325 × 265 × 305	G ½	640	160	400	2,5	7,6
325 × 300 × 200	18,7	DT 514 BH-RC	3095	355 × 325 × 385	G ½	860	215	600	3,6	9,8

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SONOREX DIGITEC DT ... F

Flat ultrasonic baths with fast degassing for sample preparation

- ➔ Uniform sonication of samples irrespective of size and arrangement of the flasks
- ➔ same power densities in all 3 bath sizes are followed by same results in each one
- ➔ 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 TR 3
- Ultrasonic bath SONOREX DIGITEC DT 510 F, flask holder GL 510 F, 250 ml TICKOPUR TR 3
- Ultrasonic bath SONOREX DIGITEC DT 1028 F, 2 flask holders GL 510 F, 250 ml TICKOPUR TR 3

TICKOPUR TR 3, 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	250 ml EK 250
Code No.	051	053	055	057	3259
for GL 100 F are suitable	8 ×	5 ×	4 ×	2 ×	2 ×
for GL 100 F are suitable	18 ×	18 ×	9 ×	6 ×	5 ×



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 valve	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	1280	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.

The new generation: Ultrasonic bath SONOREX DIGITEC DT 1028 F combined with shaking device SA 1028



Ultrasonic bath DT 1028 F + shaking device SA 1028 = SONOSHAKE

Code No.: 3257

Shaking device SA 1028

- ➡ analogue setting of time (1 – 15 min or continuous) and shaking frequency
- ➡ reciprocating motion: settings in 4 steps possible of up to 200 rpm
- ➡ constant amplitude of 20 mm independently of loading
- ➡ rack easy to remove
- ➡ rack easy to remove – easy mounting of the laboratory clamps EK 10 –250 (separately to order)
- ➡ shaking platform approx. 410 x 280 mm (l x w)
- ➡ mounting of 36 x 10-ml-flasks or 36 x 25-ml-flasks or 18 x 50-ml-flasks or 12 x 100-ml-flasks or 10 x 250-ml-Kolben
- ➡ required floor space of SONOSHAKE approx. 850 x 360 mm (l x w)



The SONOSHAKE can be used either separately as an ultrasonic bath for sample preparation, a shaking device **SA 1028** only, or both combined!

Code No.: 3249

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 sera
- ⇒ 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 controlled. Power constancy guarantees exact reproducibility.

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 valve	Ultrasonic peak output * W	HF output W _{eff}	Heating 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	1200	300	1300	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.

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 suspending processes
- ⇒ Disinfecting and cleaning 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 valve	Ultrasonic peak output * W	HF output	Heating power	Current consumption A	Weight net kg
							W _{eff}	W		
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	1200	300	-	1,4	14,3
		RK 1028 H	324		G ½	1200	300	1300	7,0	14,7
500 x 300 x 300	45,0	RK 1028 C	661	540 x 340 x 500	G ½	2000	500	-	2,2	24,6
Ø 500 x 195	39,5	RK 1040	319	Ø 540 x 500	G ½	1200	300	-	1,4	20,5
600 x 500 x 200	58,0	RK 1050	323	655 x 535 x 425	G ½	2400	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.

Heavy-duty ultrasonic cleaning baths with 2 mm stainless steel, 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 valve	Ultrasonic peak output * W	HF output W _{eff}	Heating 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	1200	300	560	3,5	13,6
280 x 234 x 300	19,7	RK 515 CH	3035	320 x 275 x 485	G ½	1200	300	700	4,4	16,0
500 x 300 x 300	45,0	RK 1028 CH	143	540 x 340 x 500	G ½	1200	300	1450	7,7	23,7
600 x 500 x 300	90,0	RK 1050 CH	184	640 x 540 x 530	G ½	2400	600	1950	11,1	37,0

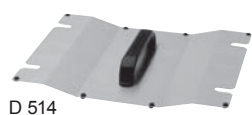
*To achieve an improved efficiency, the ultrasound is modulated whereby in combination with SweepTec a four times higher value of the HF output is obtained as ultrasonic peak output.

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 x d (mm)	-	GH 1 129 x 117	GH 1 129 x 117	GH 1 129 x 117	GH 1 129 x 117
Insert tubs l x w x d (mm)	-	-	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

Type	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
Accessories					
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 x d (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

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



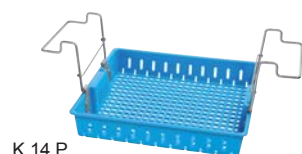
D 514

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



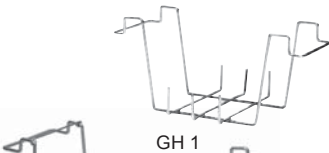
K 14

Insert baskets K
stainless steel



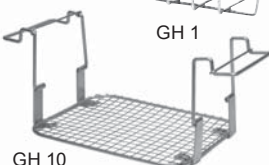
K 14 P

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 × 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 for **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 small parts.

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

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



DE 100



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 onto the tank bottom!

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 × 110 × 40	K 6 Ø 215 × 50	K 6 L 460 × 100 × 50	K 6 BL 460 × 100 × 50	K 5 C 260 × 110 × 40	K 5 C 260 × 110 × 40
PK 3 C 187 × 90 × 56	-	-	-	K 5 P 254 × 96 × 130	-
GH 1 129 × 117	-	-	-	GH 5 270 × 120	-
-	-	-	-	KW 5 254 × 96 × 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 × 245 × 50	K 28 C 455 × 245 × 50	K 40 Ø 480 × 50	K 50 545 × 450 × 50	K 50 C 545 × 450 × 50
K 28 P 420 × 200 × 45	-	-	-	-
GH 28 455 × 250	GH 28 C 455 × 250	-	-	GH 50 C 550 × 455
KW 28-0 437 × 230 × 155	KW 28-0 437 × 230 × 155	-	KW 50-0 517 × 445 × 184	KW 50 B-0 520 × 445 × 284
ES 4	ES 4	-	ES 4	ES 4

Special accessories for laboratories see page 12

Specific applications in laboratories



K 10 with 2 EK 100

Spring clamps for laboratory flasks

Neither floating nor canting of flasks. Fast and easy fixing to the bottom of insert baskets or utensil holders, with mesh sizes up to 12.5 x 12.5 mm.

EK 10, for 10-ml-Laboratory flask

EK 100, for 100-ml-Laboratory flask

EK 25, for 25-ml-Laboratory flask

EK 250, for 250-ml-Laboratory flask

EK 50, for 50-ml-Laboratory flask

Suitable for baskets K 3 C/CL, K 5 C, K 6, K 10/B, K 14/B, K 28/C, utensil holders GH 5, GH 10/B, GH 14/B, GH 28, and flask holders GL 100 F, 510 F and shaking device SA 1028



GV 10

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 3 - 2 pieces

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 - 2 pieces

suitable for baskets K 10/B, K 14/B, K 28/C and utensil holders GH 10/B, GH 14/B, GH 28



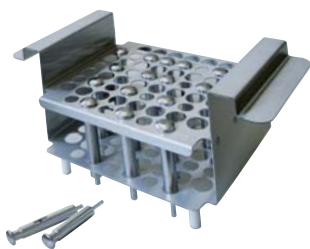
RG 2

Test tube holder

RG 2, stainless steel

For sonication 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 remain visible.

Suitable for ultrasonic units 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



Tableting punch holder

For tableting 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-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

TH 28 C-S 22 for RK/DT 1028 CH

holes with dia. 22 mm for 44 punches EU B

TH 28 C-S 28 for RK/DT 1028 CH

holes with dia. 28 mm for 31 punches EU D



DT 106
with SH 7

RK 1028 C
with SH 28 C

Careful cleaning of analysis sieves

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

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 bath SONOREX SUPER RK 1028 C

Ultrasonic bath 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.



PR 140 C with K 140 B

Pipette cleaning

Short cleaning time. 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 1,130 mm (Please note that 800 mm free space above the cylindrical vessel is necessary for loading.),
required floor space 335 × 255 mm,
Ultrasonic peak output 860 W, HF output 215_{eff} 35 kHz,
radiating surface diameter 150 mm,
timer 1 to 15 min or continuous,
mains connection 230 V~, 50/60 Hz, on request 115 V~.

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 with basket K 140 B, lid D 140,
cleaning concentrate: TICKOPUR R 33 – 5 litres and TICKOPUR R 27 – 1 litre.

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

AR 140 C, metal

AR 140 CP-1, plastic

Pipette container plastic, for soaking or for final rinsing

PG 140 B, plastic

Pipette basket

K 140 B, plastic



Prior to ultrasonic cleaning

After ultrasonic cleaning

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 by manual treatment

Economical

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

Ultrasonic bath SONOREX SUPER RK 514 BH

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

Ultrasonic bath 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 bath SONOREX LONGLIFE RK 1050 CH

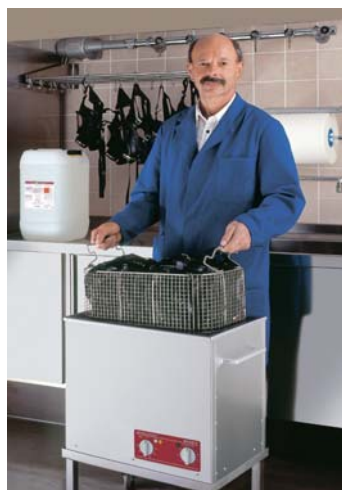
with insert basket K 50 CA for 9 breathing masks

with insert basket K 50 CV for 6 full masks

Ultrasonic bath SONOREX TECHNIK RM 180 UH

with insert basket MK 180 A for 15 breathing masks

Detailed documentation on request.



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

SONOREX TECHNIK industrial ultrasonic units



RM 110 UH

SONOREX TECHNIK modular programme RM is available in 6 standard sizes with 4 versions for cleaning as well as for 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. 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 valve	HF output W_{eff}	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	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	1250	7,7	26,0
580 x 500 x 300	60,0	RM 75 UH	8220	640 x 540 x 530	G ¾	1 x 1000	1950	12,9	42,0
600 x 450 x 450	110,0	RM 110 UH	8230	780 x 550 x 800	G 1	1 x 1000	4800	10,5	72,0
1000 x 500 x 400	160,0	RM 180 UH	8250	1180 x 600 x 800	G 1	2 x 1000	7200	14,8	135,0
750 x 650 x 500	210,0	RM 210 UH	8270	930 x 750 x 800	G 1	2 x 1000	7200	14,8	110,0

**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 HF generator, multiple-frequency ultrasound at the bottom and at the side, specification like RM 112.

Accessories

Type	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

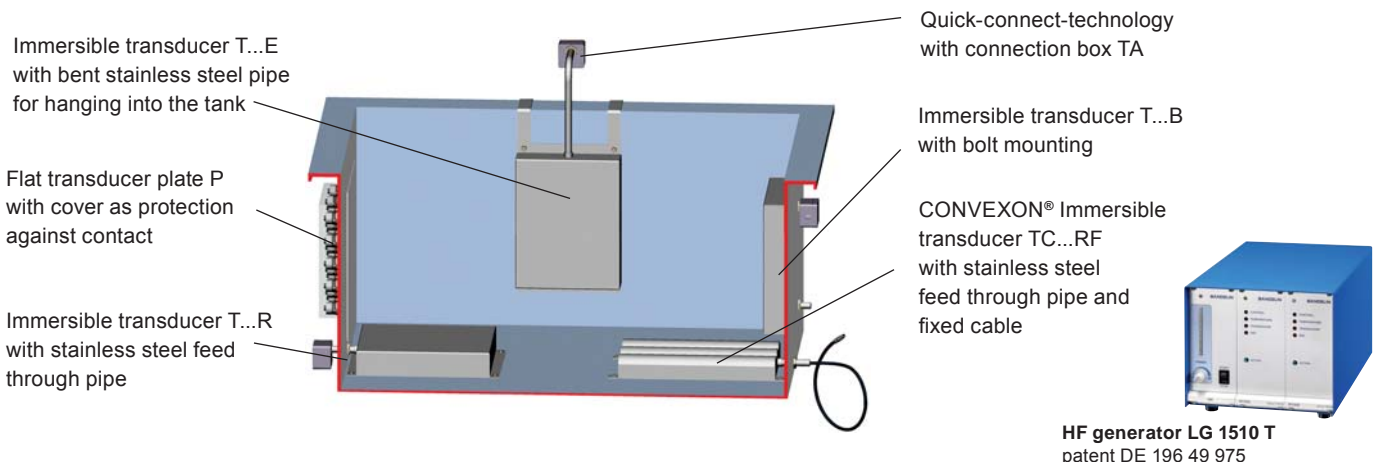
Existing tanks can be upgraded with high power immersible transducers or flat transducer plates in combination with suitable HF generators for ultrasonic cleaning and process acceleration. The immersible transducers are easy to install: they can be suspended by a hook over the tank rim or placed on the 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 are 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.

Separate documentation on request.



HF generator LG 1510 T
patent DE 196 49 975

Why do you need special agents for ultrasonic cleaning?

Water and ultrasound without any additives do not clean!

Besides ultrasonic power, temperature and relevant processing time, specially balanced cleaning agents are also necessary to achieve optimum cleaning results. With TICKOPUR cleaning concentrates, BANDELIN offers a wide range of adequate cleaning agents.

All of the TICKOPUR cleaning agents were specially developed for ultrasonic applications. With their cavitation-aiding properties, the cleaning concentrates support the cleaning process and are gentle to the material at the same time. Depending on the cleaning tasks, either alkaline, neutral or acidic cleaning agents are recommended. They are biologically degradable and easy to dispose of. 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, anti-corrosive, 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, also mixed tissue
e. g. for extraction of cell contents
- ⇒ Emulsifying of hardly mixable liquids, e.g. oil and water, particle size in μm range
- ⇒ Deagglomeration of nanoparticles in material research (nanostructured material) in medicine, biotechnology, automobile industry
- ⇒ 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**

For special customer requests: BANDELIN will supply booster horns and probes for special applications.

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 increase of temperature when processing sensitive samples. The adjustable pulsation allows cooling during rest intervals.

Continuous operation

Constant sound radiation- extremely effective

Built-in timer

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

Switching ON / OFF - easy to handle

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 clean and user-friendly

ROHS compliant

Devices are built lead free.

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	HD 2000 series	HD 3000 series
Samples volumina	0,1 – 25 ml	1 – 1000 ml	1 – 2500 ml
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 (duty cycle, base 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	numerical seven-segment 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 measurement	no	no	optional, 0–120 °C, temperature probe necessary, optional signal tone or switch - 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®
error diagnosis	yes	no	yes
Processing frequency	30 kHz	20 kHz	20 kHz
Automatic storage of the last adjusted values	yes	no	yes
Operating test	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

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 mini20, ultrasonic converter mini20 and microtip MS 2.5, diameter 2,5 mm. Max. 12 W_{eff} HF output.

Code No. 3665



Fast manual use – ideal for smallest volumes. Pulsation on pressing the bottom at the ultrasonic converter by thumb.



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)
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

Small unit for lab routine

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

Code No. 2450



SONOPULS HD 2200

for volumes up to 1000 ml

Standard unit for lab routine

Ready-to-operate basic equipment for volumes from 20 ml to 900 ml consisting of generator GM 2200, ultrasonic converter UW 2200, booster horn SH 213 G and titanium flat tip TT 13 of 13 mm diameter. HF-output max. 200 W_{eff}

Code No. 2530



HF generator		GM 2070	GM 2200
dimensions	mm	257 x 180 x 115	257 x 180 x 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	Ø 70 x 120	dia. 70 x 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 reserch

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 x 256 x 154	250 x 256 x 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 x 120	dia. 70 x 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 reserch 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 x 230 x 131
weight	kg	3,1
mains supply		230 V~, 50/60 Hz
converter		UW 3400
dimensions	mm	dia. 90 x 180
weight	kg	2,2
available titanium probes	dia. mm	19 or 25

Probes • Standard and booster horns • Adapters

Probes

made of titanium alloy (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.

Please note that probes are subject to wear and tear.
It is advisable to order spare probes with the first homogenizer.



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									
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		50	70	-	-	-	-	-	-
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 (minimum)	mm	4	6	4	6	8	17	23	29

Probe length may vary slightly due to the variations in the titanium material.

Standard and booster horns

(Ti-Al6-V4) are furnished with a thread for replaceable probes. With exterior (except SH 3419, SH 3425) thread to connect various vessels.

solid standard horn - DH 13 G -
with diamond coating on the radiating area;
lifetime is thirty times longer than usual.



Flow-through standard and booster horns

material: Ti-6Al-4V, 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.



	standard horn	booster horn					diamond standard horn	flow-through standard horn	flow-through booster horn
	SH 70 G	SH 213 G	SH 219 G	SH 225 G	SH 3419	SH 3425	DH 13 G	FZ 5 G	FZ 7 G
for HD	2070 / 3100	2200 / 3200			3400		2070 / 2200 3100 / 3200	2070 / 3100	2200 / 3200
Code No.	486	527	3647	3634	3679	3692	403	490	452

Adapters

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

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

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



	sleeve adapters		threaded adapter
	NA 29 G	NA 45 G	GA 3 G
for HD	2070 / 2200 / 3100 / 3200		
Code No.	540	487	473

Probe extensions

for enlarging the operating depth when using flat tips.

VS 70 between SH 70 G / 213 G and TT 13
VS 200 between SH 225 G and TT 25



	probe extensions	
Type	VS 70	VS 200
for HD	2070 / 2200 3100 / 3200	2200 / 3200
Code No.	500	415

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	

Silica glass probes

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.



MULTISON® ultrasonic probe

patent applied D 10 2004 024 214

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 .



	Multison probe composed of multison horn with per 1 multison tip			multison tips		
Type	MR 12-2	MR 12-2C	MR 12-3	MRS 2	MRS 3	MRS-2C
Diameter, mm	2	2	3	2	3	2
Length, mm					16	
Code No.	3626	3643	3633	3628	3629	3642

Processing vessel, made of stainless steel

DG 4 G for high-volume flow-through processing like emulsifying, dispersing or homogenizing, up to 30 l/h. The sample can be repeatedly sonicated in circulation. For connection to SH 70 G or SH 213 G with TT 13, DH 13 G.



DG 4 G

KG 4 G, closed vessel with cooling jacket. Processing volume about 65 ml.

	flow-through processing vessel	cooling vessel
Type	DG 4 G	KG 4 G
for HD	2070 / 2200 3100 / 3200	2070 / 2200
Code No.	3608	3608

Processing vessels made of glass

Cooling vessel KG

for sonication of temperature-sensitive samples. The cooling jacket allows circulation of cooling liquid during sonication.

Flow-through vessel DG

with cooling jacket for irradiation of larger volumes. The cooling jacket allows circulation of cooling liquid during sonication.

Rosett cell RZ

for homogenous and intense circulation of liquids caused by the shape of the vessel and its 3 sidearms

Suslick cell SZ

with 3 sidearms for introduction of gas or measuring probes.



KG 3



DG 3



RZ 3



SZ 3

Type	cooling vessel		flow-through vessel		rosett cell					suslick cell	
	KG 3	KG 5	DG 3	DG 5	RZ 1	RZ 2	RZ 3	RZ 4	RZ 5	SZ 3	SZ 5
for HD	2070 / 2200 3100 / 3200	2200 3200	2070 / 2200 3100 / 3200	2070 / 2200	2070 / 2200 / 3100 / 3200			2200 / 3200 3400		2070 3100	2200 3200
volume, ml	15	70	max. 5,6 l/H	max. 30 l/h	25	40	110	390	660	20	110
interior diameter, mm	20	35	20	53	30	42	50	75	90	20	40
height, mm	65	95	65	95	85	100	135	202	243	80	144
Code No.	536	481	538	482	3606	3607	522	3256	483	534	484

Processing vessels for indirect processing



EH 6

BB 6

BB 2 G

+ SH 70 G + TT 13

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

Microtube holder EH 6

For use in BB 6. Up to 6 samples can be treated simultaneously. Pressure plate holds tubes in place. No floating of cups. A mixing of samples is excluded due to markings at the holder.

Cup horn BB 6

for indirect intense sonication. The cup horn is equipped with inlet and outlet for circulation of cooling liquid. Also useable for direct sonication.

Cup horn BB 2 G

plastics, for indirect sonication of pathogenic material.

Microtube holder EH 3

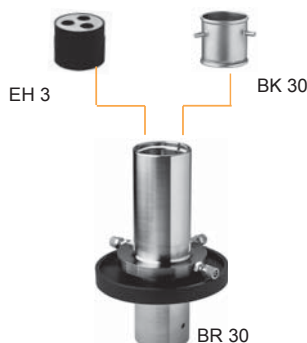
for use with BR 30. Up to 3 samples can be treated simultaneously. 2 exchangeable discs with diameters 8,5 or 11,5 mm.

Inset basket BK 30

For intensive cleaning of small parts, e. g. cleaning of radioactively contaminated seeds in BR 30.

Cup booster BR 30

For high-intensive irradiation of smallest and sensitive sample volumes, e. g. radioactive seeds or bacteria as well as for flow-through sonication of liquids like cell suspensions. During indirect processing of samples the ultrasound will be transferred by the contact liquid. The sonication will be carried out in reaction vessels or in the inset beaker BK 30. The cup booster is equipped with inlet, outlet and overflow. A cooling as well as a flow-through process is possible.



EH 3

BK 30

BR 30



Stand

Stainless steel stand

with lab clamp and non-slip mat to hold processing vessels securely in place

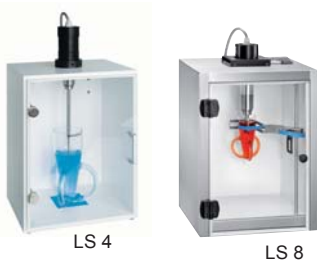
Clamping device KL 7 (DE 20 2006 005 654.98)

for HG 5 / HG 10 with rod and swivelling clamp for reaction vessels dia. 15 mm to dia. 100 mm

Supporting table AT 7

suitable for KL 7 or in LS 8 with non-slip mat to hold sample vessels securely in place

Type	HG 5	HG 10	KL 7	AT 7
for HD	2070 / 2200 3100 / 3200	3400	HG 5 HG 10	KL 7 LS 8
Code No.	459	3646	3636	3644



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 Plastic coated walls, 10 dB-AU damping.

LS 8 made of stainless steel, with damping material. 20 dB-AU damping. The damping material is water resistant for easy cleaning.

With rod, swivelling clamp and 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 during indirect sonication with horn BB 6 or cup booster BR 30. Ultrasonic converter is fixed safely through a special clamp.

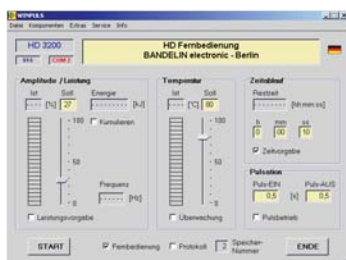
LS 11 stainless steel with damping material, 20 dB-AU damping, The damping material is water resistant, for easy cleaning. **Distance tube** for direct processing with long probes

AH 6: for MS 72/73, KE 76, VS 70 with TT 13, VS 200 mit TT 25 / VS 200 T, VS 70 T, GS ...

BD 8: damping material for sound proof boxes



Type	LS 4	LS 8	LS 11	UG 6	AH 6	BD 8
for HD	2070 / 2200 3100 / 3200	2070 / 2200 3100 / 3200	3400	2070 / 2200 3100 / 3200	LS 7	LS 8 LS 11
dB-AU damping	10	20	20	-	-	-
Code No.	416	3653	3663	3616	3619	3661



WINPULS® remote control

For process control with PC for operation systems MICROSOFT® WINDOWS® 2000 and 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

Type	WINPULS® software with infrared adapter IR 1
for HD	3100 / 3200 / 3400
Code No.	3625



TS 8

Foot switch remote control

for easy switching ON/OFF of the HF generator. With 3 m cable.

Type	TS 8
for HD	2070 / 2200 3100 / 3200 / 3400
Code No.	531



TM 100

Temperature sensor

for measuring the sample temperature from 0 up to 120 °C.

Diameter sensor: 4 mm

Type	TM 100
for HD	3100 / 3200 / 3400
Code No.	3622

Ultrasound in laboratories and pilot plant stations

SONOREX TECHNIK

Vortex reactor

Applications

- ⇒ Intensifying of industrial, biotechnological and chemical processes
- ⇒ Degassing
- ⇒ Disrupting of bacteria
- ⇒ Disinfection of liquids
- ⇒ Producing of finest polishing pastes for wafer industry
- ⇒ Homogenizing

Vortex reactor
consisting of:
Vortex reactorbloc WB and
HF generator LG 2002 T



SONOREX TECHNIK Tube reactor SONOBLOC®

Applications

- ⇒ intensive treatment of fibrous and bandshaped products
- ⇒ Support of industrial and biotechnological processes
- ⇒ Wire cleaning
- ⇒ Degassing
- ⇒ Disrupting of bacteria
- ⇒ Acceleration of disintegration
- ⇒ Dispersing of solid particles in liquids

**Tube reactor
SONOBLOC®**
consisting of:
Tube reactorbloc RB and
HF generator LG 1001 T



Technical Data	Vortex reactorbloc - WB			Tube reactorbloc - RB	
	WB 4-1402...	WB 4-1503...	WB 4-1604...	RB 8-1002...	RB 8-1004...
Flow-through rate	1 - 50 l/min			1 - 100 l/min	
Internal pressure, max.	10 bar			10 bar	
Solid particles	< 5 mm			-	
Power density, max.	480 W/l	520 W/l	550 W/l	500 W/l	
Power, max.	1400 W	1500 W	1600 W	1000 W	
Frequency	25 kHz	25 und 40 kHz	40 kHz	25 kHz	40 kHz
Tube material / dimensions	Stainless steel AISI 316 Ti / dia. 139.7 × 2.6 mm; dia. 104 × 2 mm			Stainless steel AISI 316 Ti / dia. 60.3 × 3.6 mm	
Housing dimensions (l × w × h)	290 × 290 × 642 mm			260 × 150 × 990 mm	
Weight, net	approx. 50 kg			approx. 35 kg	
HF generator (separate)	LG 1510 T	LG 2002 T		LG 1001 T	

Units are equipped with standard victaulic connection. Further connection versions on request.

Separate documentation on request.



BANDELIN *electronic*

specialized in manufacturing of ultrasonic units,
maintain a quality management system complying
with the requirements of EN ISO 9001 / 12.2000
and EN ISO 13485:2003 + AC:2007



5752 e/2009-08

All units are CE marked.
Illustrations exemplarily, not to scale

Subject to technical alterations without notice.
Decoration products are not included in delivery.

The general delivery terms apply.

BANDELIN

www.bandelin.com
info@bandelin.com

60 years of experience in ultrasound technology