

# High-power ultrasound for industry – service – maintenance



Cleaning of parts and surfaces



# Content

FAQs on ultrasound .....	2–3
Ultrasonic cleaning .....	4
Influencing factors – The interaction of four factors .....	4
Typical areas of application for ultrasonic baths .....	5–6
<b>SONOREX TECHNIK</b> Available devices .....	7–8
Ultrasonic and rinsing baths RM 16.2 to RM 75.2 .....	9
Ultrasonic and rinsing baths RM 110 to RM 212 .....	10
Ultrasonic and rinsing baths ZM 112 to ZM 212 .....	11
Accessories .....	12
Ultrasonic baths for rent .....	12
Ultrasonic baths for special requirements.....	13
Additional equipment and peripherals .....	14
Examples of modular device installations.....	15
<b>SONOREX CNp 28-2</b> High-performance ultrasonic bath with pulsed vacuum.....	16
<b>SONOREX TECHNIK</b>	
High-power immersible transducers and flat transducer plates .....	17
Mounting examples .....	18
High-power ultrasound generators LG .....	19
Module concept for generators LG .....	20
High-power ultrasound generators TG and SG .....	21
Individual configurations with ultrasonic oscillating systems.....	22
Sonoreactors.....	23
<b>SONOBLOC</b> Tube reactors .....	23
<b>VORTEX</b> Vortex reactors.....	23
<b>SONOREX</b>	
Ultrasonic baths – analogue or digital .....	24
Ultrasonic baths in compact design .....	25
<b>TICKOPUR</b> cleaning concentrates.....	26–27
Company portrait.....	28

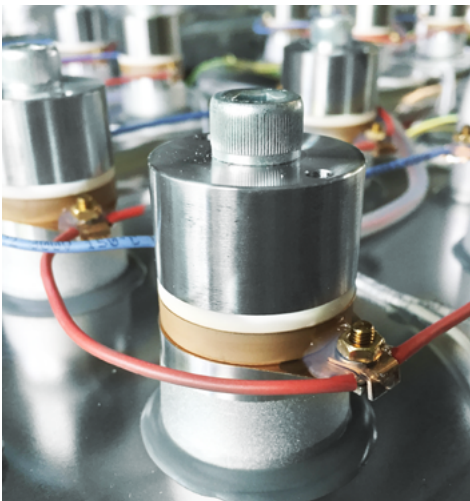
# FAQs

## What is ultrasound?

Oscillations at frequencies above 18 kHz (18,000 oscillations per second) are termed ultrasound. During the oscillating tension phase of a liquid, these oscillations cause millions of tiny vacuum bubbles to be generated, which then implode in the compaction phase, causing highly effective pressure surges. This process is called cavitation. Low frequencies of around 25 kHz create bubbles with larger diameters and more intensive pressure surges compared to higher frequencies of around 40 kHz, which are preferable for intensive and gentle cleaning.

## How does ultrasound work?

Cavitation blasts dirt particles from the parts immersed in the liquid, even from recesses and drill holes. Ultrasound completes cleaning in a few minutes with an efficiency in excess of any manual cleaning. At the same time it is gentle in action, as it causes no mechanical damage such as scratching.



Close-up of an ultrasound oscillator

## Which ultrasound bath size should I select?

The size of the cleaning objects will determine the size of the bath and thus the device type.

Basket dimensions must be taken into account when selecting a device. To allow the ultrasound to act on all sides, it is always better to choose a somewhat larger device. This also provides greater potential for other uses.

Other important selection criteria are the geometry of the cleaning objects and the nature of the soiling. For complex cleaning tasks, optional equipment such as rinsing baths and lifting devices are available, in order to meet the higher cleaning requirements.



Illustration of a cavitation bubble

## Does an ultrasound bath need a heating?

Heating the cleaning liquids shortens cleaning time. Soiling is removed more quickly. Devices with heating are usually used for cleaning in the industrial sector.

## How is the set temperature maintained?

The cavitation produced by the ultrasound heats up the liquid. Ultrasound baths with heating have a pre-set temperature selector. Once the target temperature is reached, the heating turns off, but the ultrasound will continue to increase the temperature in the bath as its mechanical energy is converted into heat energy.

## What accessories are necessary?

Cleaning objects must not lie on the bottom of the bath. Baskets and other inset beakers prevent scratching both to the cleaning objects and the bath floor.

When cleaning very small or sensitive parts, further accessories may be advisable, e.g. to provide a placement which is gentle on the parts.

A cover reduces the sound level and protects the liquid in the oscillating tank from external contamination.

The cover design ensures the return of condensate into the oscillating tank.

## What liquids should be used?

TICKOPUR preparations have been specially developed for use in ultrasound baths. The cleaning liquid should be carefully selected to take account of the materials of the parts and the specific contamination. Unsuitable cleaning agents may damage the parts. Water without a cleaner will not have a cleaning effect. Do not use household cleaners or pure DI water.

Never use inflammable or explosive liquids directly in the oscillating tank!



### How often does the bath liquid need to be changed?

The frequency of bath liquid changes will depend on the number of parts to be cleaned and the nature of the contamination.

If contamination levels in the bath liquid become too high, the cleaning effect will be impaired. This state can be deferred by use of filtration or oil separation, etc.

### What is degassing, and does degassing need to occur prior to the sonication process?

Yes, just for a few minutes, in order to expel dissolved gases.

This is important for effective cleaning, as hard cavitation will only occur once the gases have been removed. The degassing time will depend on the size of the bath and the hardness of the water. The process will end when the sound changes and becomes quieter and less shrill.

### How many parts can be cleaned simultaneously?

The parts should not overlap. There must be sufficient space between the parts. Bulk material must be loosely distributed.

### Can ultrasound damage the parts?

Thousands of cavitation bubble implosions occur every second and these are very powerful. Despite this, ultrasonic cleaning is a safe procedure, as the energy is at a microscopically small level. The cavitation bubbles have a diameter of only 1-3 nm!

### May I reach into the ultrasound bath while it is in operation?

This should be avoided. Ultrasound baths generally operate at a temperature between 50 - 60 °C. In addition, the cleaners used may be harmful to the skin. Dipping the hands into the ultrasound bath while ultrasound is being emitted should also be avoided as it could lead to damage to bone tissue.


### Is hearing protection necessary?

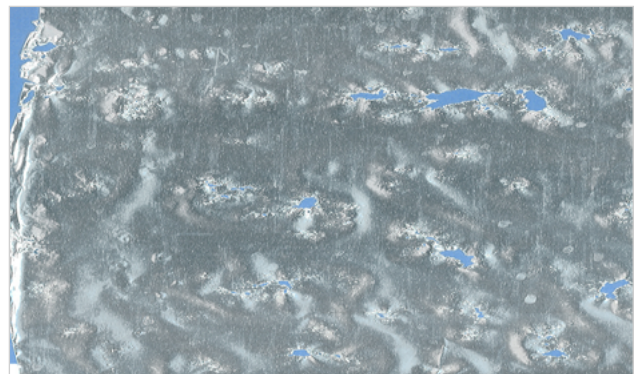
For continuous work in the vicinity of the device, hearing protection is recommended.

### How can I test the ultrasound bath's function?

We recommend a foil test pursuant to IEC/TR 60886: Aluminium foil is stretched over a wire frame and

sonicated for about 3 min. The foil must then show visible perforations.

See our instruction video: [Foil test](#) 



above: Performing the foil test.

below: Perforated foil after the test.

### If you want to know more...

... visit our website with integrated YouTube channel and many helpful instruction videos!

Or contact us directly ...

We are always pleased to provide advice, so call us at +49 (0)30 76880-0.



# Ultrasonic cleaning

## Advantages

### Economical

Regular ultrasonic cleaning saves money. The gentle effect of the ultrasound prolongs the lifespan of the cleaned utensils and lessens the need for replacement parts. Quick cleaning times shorten downtimes.

### Thorough

Ultrasonic cleaning processes are effective and have a very high cleaning efficiency. No brushes or cloths are necessary, thus avoiding damage to cleaned utensils and their surfaces. Even complex part shapes can be cleaned.

### Environmentally friendly

Use of biodegradable cleaning agents rather than environmentally damaging solvents. Oil separators and bath filtration extend the service life of cleaning liquids and thus reduce the consumption of chemicals and water.



### User-friendly

Ultrasonic cleaning devices are easy to install and operate. No special training is required.

## Influencing factors

### The interaction of four factors

#### Ultrasound

Very small vacuum bubbles are formed by the ultrasound in liquids, and immediately implode (cavitation). The forces generated cause the intensive but gentle removal of dirt particles from the item being cleaned.

#### Chemistry

The cleaning chemical encourages cavitation, reduces the surface tension of the water and frees and binds dirt particles. Depending on the type of contamination, different cleaning preparations will be used.



#### Temperature

Many cleaners only display their full effect at higher bath temperatures. The cleaning liquid can be heated by a heating facility in the device.

#### Time

Compared to other procedures, the joint use of chemicals and ultrasound reduces the cleaning time by up to 90 %. Depending on the contamination, cleaning will take from a few seconds to a few minutes.

# SONOREX TECHNIK

## Typical areas of application for ultrasonic baths

### Precision mechanics

Cleaning of parts in stainless steel, brass and aluminium

### Mechanical engineering

Cleaning and degreasing of bearings, crankshafts, turning plates, workpieces and electrostatic filters

### Grinding and polishing

Cleaning of lampshades, removal of lapping and polishing pastes.

### Mould cleaning

Cleaning of injection moulds

### Automotive industry/workshop/servicing

Cleaning of injection nozzles, carburettors, spray guns, nozzles, shock absorbers, engine parts, circuit boards, cutting tools, other tools, etc.

### Woodworking industry

Cleaning of woodworking tools and machine parts during maintenance

### Medical technology

Cleaning of prostheses, implants and joints

### Power stations

Cleaning of oil and welding fume filters, decontamination

### Catering

Cleaning and degreasing of e-filters and coffee machine parts

### Safety at work – fire protection

Cleaning of respirator masks and sooty parts

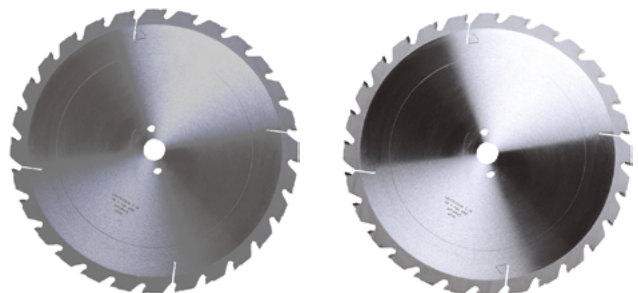
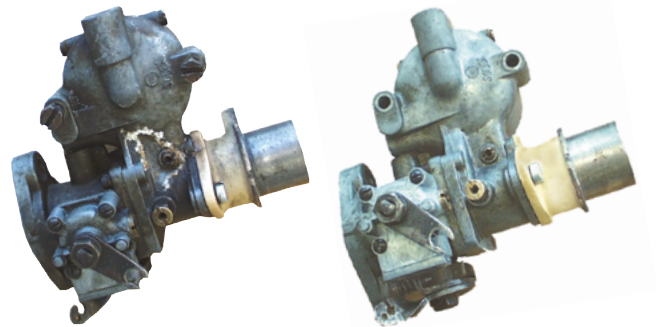
### Transport technology

Cleaning of relays, soldered frames, gearboxes and engine parts

### Pneumatic tools

Removal of grease, oil, abrasion dust and resinification during repairs

### Cleaning with ultrasound – examples



left dirty , right cleaned



# SONOREX TECHNIK

## Typical areas of application for ultrasonic baths

### Materials testing

Cleaning and degreasing of measuring tools

### Office technology

Cleaning of parts from copy machines, printers, franking machines, housings and keyboards

### Energy industry

Cleaning of valves and water meters

### Optical and glass industry

Preliminary and intermediate cleaning of optical glass and lenses

### Thin film technology

Cleaning of sensor parts

### Pharmaceutical industry

Cleaning of metal filters and tableting punches

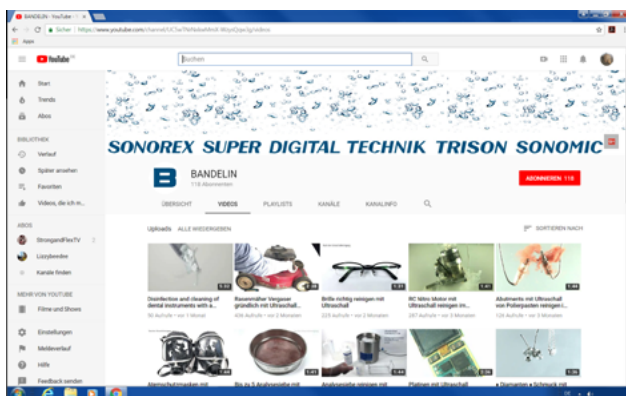
### Sports and leisure industry

Cleaning of climbing holds on climbing walls, golf clubs and balls, diving equipment, etc.

### Jewelry industry

Cleaning of metal wrist watch straps, chains, rings, etc.

### Cleaning with ultrasound – examples

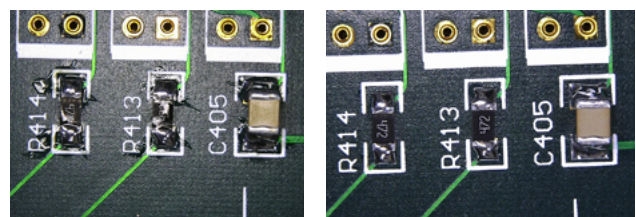


More information in videos:

[youtube.com/bandelin](https://www.youtube.com/bandelin) 

or here:

[Ultrasonic applications](#) 



left dirty, right cleaned



# SONOREX TECHNIK

## Available devices

Ever higher product quality requirements increasingly necessitate the use of high-value, flexible ultrasonic device technology.

In response, BANDELIN offers a wide selection of SONOREX TECHNIK devices for individual cleaning tasks, each meeting today's demands for quality, economy and environmental compatibility. The devices can be combined and, when extended with suitable peripherals, offer modular and flexible cleaning ranges with, e.g., integrated rinsing and drying.

### Four variants of ultrasonic bath in all bath sizes

**UH** Ultrasonic baths with heating – for cleaning. The heating supports the cleaning effect of the chemicals



**U** Ultrasonic baths without heating – for cleaning temperature-sensitive parts or for rinsing.



**H** Rinsing baths (without ultrasound) with heating



Rinsing baths without ultrasound or heating – for rinsing after ultrasonic cleaning.



# SONOREX TECHNIK

## Available devices – summary



Type	RM 16.2 to RM 75.2	RM 110 to RM 210	RM 112 to RM 212	ZM 112 to ZM 212
<b>Features</b>				
Operating volume [L]	13–62	110–210	115–230	115–230
Ultrasonic output	fixed	fixed	fixed	adjustable
Ultrasonic frequency (kHz)	40	25 or 40	25 or 40	25 or 40 or both
Ultrasonic transducers	bottom sonication	bottom sonication	bottom sonication	bottom sonication or bottom and side sonication
Ultrasound generator	integral	integral	integral	separate
Heating (optional)	On/off with control indicator, thermostatically adjustable from 30–80 °C.			
Operating elements	turning knob lower right	turning knob lower right	turning knob upper right	turning knob upper right
Time setting	1 - 15 min or continuous operation			variable via generator
Material, oscillating tank 2 mm stainless steel AISI 316L, welded	✓	✓	✓	✓
Tank bottom, inclined to drain	✓	–	✓	✓
Tank corners	right-angled	right-angled	rounded	rounded
Overflow gutter with drain	✓	✓	✓	✓
Welded drain with three-way ball valve	✓	✓	✓	✓
Filling level mark	✓	✓	✓	✓
Float switch as dry run protection	–	✓	✓	✓
Sprinkle tube (for separate oil separator)	–	✓	✓	✓
Housing material stainless steel AISI 304	✓	✓	✓	✓
Feet	fixed	fixed	height-adjustable	height-adjustable
Degree of protection	IP 32	IP 32	IP 32	IP 32

# SONOREX TECHNIK

## Ultrasonic and rinsing baths RM

### RM 16.2 to RM 75.2 (13–62 litres)

#### Equipment

- **Welded cleaning tank**  
in 2 mm stainless steel AISI 316L.
- **Inclined tank bottom**  
for better cleaning results from optimum sound propagation. Facilitates emptying of the tank, and accumulations of soiling and residual liquid on the tank bottom are largely avoided.
- **Overflow gutter**  
together with an oil separator is able to drain off floating contamination, oils and greases from the bath surface.
- **Filling level mark**  
clearly stamped on the side as working filling level for cleaning liquid. Facilitates dosage.
- **Welded drain**  
with three-way ball valve for emptying or refilling the tank and for connecting a filtration.
- **Additional drain** for connecting an oil separator or emptying the overflow gutter.
- **Heating**  
On/off with control indicator, thermostatically adjustable from 30–80 °C.
- **Drip-proof housing**  
in stainless steel AISI 304.
- **Ultrasound**  
On/off with control indicator, timer 1–15 min or continuous operation.
- **Ultrasound generator (integral)**  
Frequency 40 kHz.



RM 40.2 UH with transport cart TW 40

Type (selection)	Internal tank dimensions l × w × d [mm]	Operating volume (l)	External dimensions l × w × h [mm]	Ultrasonic peak output* [W]	Ultrasonic nominal output [W]	Heating power [W]	Current consumption [A]
RM 16.2 UH	325 × 275 × 200/210 <sup>+</sup>	13	365 × 340 × 390	1200	300	800	4.8
RM 40.2 UH	475 × 300 × 300/315 <sup>+</sup>	31	540 × 340 × 495	2000	500	1250	7.7
RM 75.2 UH	575 × 500 × 300/315 <sup>+</sup>	62	640 × 540 × 520	4000	1000	1950	12.9

<sup>+</sup>inclined tank bottom; \*corresponds to 4 times ultrasonic nominal power;  
Mains supply 230 V~ (±10 %) 50/60 Hz

# SONOREX TECHNIK

## Ultrasonic and rinsing baths RM



RM 180 UH



RM 112 UH

rounded tank corners

### RM 110 to RM 210 (110–210 litres)

#### Equipment

- as for RM 16.2 to RM 75.2,  
but with a flat tank bottom

#### additionally

- Sprinkle tube**  
together with an oil separator create a flow on the bath surface which drains floating contamination, oils and greases from the bath surface into the overflow gutter.
- Float switch**  
as dry run protection for heating and ultrasound. Height-adjustable feet for evening out uneven substrates.
- Ultrasound generator (integral)**  
Frequency either 40 or 25 kHz

### RM 112 to RM 212 (115–230 litres)

#### Equipment

- as for RM 110 to RM 210

#### additionally

- Rounded tank corners**  
at the sides and bottom facilitate tank cleaning. Adhering soiling is avoided.
- Controls fitted above**  
facilitate the operation of switches for ultrasound and heating.
- Inclined tank bottom**  
for better cleaning results from optimum sound propagation. Facilitates emptying of the tank, and accumulations of soiling and residual liquid on the tank bottom are largely avoided.

Type (selection)	Internal tank dimensions l × w × d [mm]	Operating volume (l)	External dimensions l × w × h [mm]	Ultrasonic peak output* [W]	Ultrasonic nominal output [W]	Heating power [W]	Current consump- tion ** [A]
RM 110 UH	600 × 450 × 450	110	780 × 550 × 800	4000	1000	4800	10.5
RM 180 UH	1000 × 500 × 400	160	1180 × 600 × 800	2 × 4000	2 × 1000	7200	14.8
RM 210 UH	750 × 650 × 500	210	930 × 750 × 800	2 × 4000	2 × 1000	7200	14.8
RM 112 UH	600 × 450 × 450/470+	115	780 × 610 × 800	4000	1000	4800	10.5
RM 182 UH	1000 × 500 × 400/420+	170	1180 × 660 × 800	2 × 4000	2 × 1000	7200	14.8
RM 212 UH	750 × 650 × 500/520+	230	930 × 810 × 800	2 × 4000	2 × 1000	7200	14.8

+inclined tank bottom; \*corresponds to 4 times ultrasonic nominal power; \*\* per phase  
Mains supply 400 V 3N~ (±10 %) 50/60 Hz



### ZM 112 to ZM 212 (115–230 Liter)

#### Equipment

- as for RM 112 to RM 212  
but external ultrasound generator
- Installation of generator in separate location from wet area is possible.
- Stepless power regulation.
- Serial interface and remote control connection for external control of the generator.
- Implementation of several cleaning baths, even with different frequencies, possible from a single generator.
- Model with bottom sonication (ZM ... U / UH) or with bottom and side sonication (ZM ... UL / UHL), also available in TwinSonic design.



#### TwinSonic design as multi-frequency device

Multi-frequency devices in TwinSonic design operate with ultrasound systems of different frequencies on the bottom and side. The benefits are an even sonication and power distribution for a better cleaning result in a shorter time.

Type (selection)	Internal tank dimensions l × w × d [mm]	Operating volume (l)	External dimensions l × w × h [mm]	Ultrasonic peak output* [W]	Ultrasonic nominal output [W]	Heating power [W]	Current consump- tion** [A]
ZM 112 UH	600 × 450 × 450/470 <sup>+</sup>	115	780 × 610 × 800	4000	1000	4800	4.3
ZM 112 UHL				2 × 4000	2 × 1000		8.6
ZM 182 UH	1000 × 500 × 400/420 <sup>+</sup>	170	1180 × 660 × 800	2 × 4000	2 × 1000	7200	8.6
ZM 182 UHL				2 × 6000	2 × 1500		13.0
ZM 212 UH	750 × 650 × 500/520 <sup>+</sup>	230	930 × 810 × 800	2 × 4000	2 × 1000	7200	8.6
ZM 212 UHL				2 × 6000	2 × 1500		13.0

<sup>+</sup>inclined tank bottom; \*corresponds to 4 times ultrasonic nominal power; \*\* per phase  
Mains supply 400 V 3N~ (±10 %) 50/60 Hz; ultrasound generator: 230 V~ (± 10 %) 50/60 Hz

# SONOREX TECHNIK

## Accessories

### Baskets

During ultrasonic cleaning, the cleaning objects should not be placed on the tank bottom, as the vibrations from the oscillating system can cause abrasion between the items and the tank. The use of a suitable cleaning basket is therefore necessary.







With the help of a basket, the cleaning objects can also be suitably placed in the device and later removed for rinsing without the user coming into contact with the cleaning or disinfection liquid.

### Lids

The correct lid for the ultrasound bath protects the cleaning liquid from contamination. The noise of ultrasound bath operation is also dampened. The lid is designed so that any condensate is led back into the ultrasound bath.

### Drop plates

These function as droplet and spray protection between the baths, when setting up several baths as a cleaning/rinsing line.

Accessories	RM 16.2	RM 40.2	RM 75.2	RM 110 RM 112 ZM 112	RM 180 RM 182 ZM 182	RM 210 RM212 ZM 212	Illustrations (examples)
Insert basket	MK 16 B	MK 40 B	MK 75 B	MK 110	MK 180	MK 210	 MK 40 B
Insert basket up to 40 kg	–	MK 40 S	MK 75 S	MK 110 S	MK 180 S	MK 210 S	 MK 210 S
Insert basket for lifting device	MK 16 MB	MK 40 MB	MK 75 MB	MK 110 B	MK 180 B	MK 210 B	 MK 110 B
Insert basket up to 40 kg for lifting device	–	MK 40 BS	MK 75 BS	MK 110 BS	MK 180 BS	MK 210 BS	 MK 75 BS
Lid	MD 16	MD 40	MD 75	MD 110	MD 180	MD 210	 MD 110
Drop plate between 2 devices	TB 16	TB 40	TB 75	TB 110	TB 180	TB 210	 TB 110

### Mietvereinbarung über ein Ultraschallbad SONOREX TECHNIK RM 110 UH

Frequenz: 25 kHz, Nennleistung: 1.000 W

1. BANDELIN electronic GmbH & Co. KG stellt dem Anwender für den vereinbarten Zeitraum das vorgenannte Ultraschallbad einschließlich Zubehör zur Verfügung. Für die erste Woche wird eine Grundgebühr

von € 724 – z. Miete berechnet. Für jede weitere Woche

4. Schäden durch unsachgemäßen Transport, Lagerung oder Fehlanwendung (z. B. Trockenlauf, Einsatz eines unzulässigen Beschallungsmediums), sofern diese durch den Anwender verursacht wurden, gehen zu Lasten des Benutzers. Gleiches gilt für Schäden, die durch einen

**BANDELIN**  
Ultraschall seit 1955

For more information:

<https://bandelin.com/service/#miete>

## Ultrasound baths for rent

Do you need an ultrasound bath for cleaning parts for a limited time period?

We hire out ultrasonic baths with operating volumes from 13 to 230 litres with basket and lid.

Interested? Request a rental contract with questionnaire.

Rentals are only available within Germany.

# SONOREX TECHNIK

## Ultrasonic baths for special requirements



### RL 70.2 UH

– Extra long and narrow oscillating tank with inclined tank bottom for easier tank emptying

Applications:

Cleaning of long parts, e.g. pipes, profiles, gang saw blades, long cutter blocks.



### L 220 / L 320

– Double tank for cleaning and rinsing in one device

Applications:

Cleaning of window blinds, lamp grids, reflectors, heddles, preforms or slats.



### W 65 und W 300

– Extra deep oscillating tank

especially for use on ships

Tank with high freeboard

Applications:

Cleaning of oil filters, fittings, cylinder heads.

Special bath	Internal tank dimensions l x w x d [mm]	Operating volume (l)	External dimensions l x w x h [mm]	Ultrasonic peak output* [W]	Ultrasonic nominal output [W]	Heating power [W]	Current consumption ** [A]
RL 70.2 UH	1700 x 250 x 250/280 <sup>+</sup>	76	1750 x 300 x 450	4000	1000	2000	13.0
L 220	2200 x 300 x 300/370 <sup>++</sup>	185/205 <sup>++</sup>	2320 x 750 x 850	2 x 4000	2 x 1000	–	8.6
L 320	3200 x 300 x 300/370 <sup>++</sup>	270/295 <sup>++</sup>	3320 x 750 x 850	4 x 4000	4 x 1000	–	13.0
W 65	500 x 300 x 450	30	560 x 360 x 650	1200	300	1450	7.0
W 300	1000 x 500 x 600	185	1180 x 600 x 1000	2 x 4000	2 x 1000	7200	14.8

<sup>+</sup> inclined tank bottom; <sup>++</sup> ultrasonic/rinsing chamber; \* corresponds to 4 times ultrasonic nominal power; \*\* in case of L 320 and W 300, per phase

W 65, RL 70.2 UH, L 220: Mains supply 230 V~ (±10 %) 50/60 Hz, Frequency 40 kHz

W 300, L 320: Mains supply 400 V 3N~ (±10 %) 50/60 Hz, Frequency W 300: either 40 or 25 kHz, Frequency L 320: 40 kHz

On request, W300 also with integral autotransformer for connection to existing ship's voltage.

**Accessories and additional equipment on request.**

# SONOREX TECHNIK

## Additional equipment and peripherals



### Oscillations MO

The oscillating motion of the objects to be cleaned in the bath makes the ultrasonic cleaning more effective and improves the rinsing off of corroded soiling.



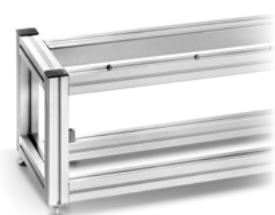
### Lifting devices MB with oscillation

The electrically-driven lifting device with oscillation facilitates the lifting and lowering of the basket. When a tank rack is used, the basket can be moved between different baths.



### Planing head holders HA

for efficient cleaning of planing heads.



### Tank racks WG

WG tank racks for moving the MB lifting device between two or more baths.



### Filtrations FA

Continuous filtering of the loosened particles extends the lifetime of the tank and maintains the cleaning power.



### Oil separators OX

Oil and grease rising to the surface of the tank are led via the overflow gutter into the oil separator, where they are separated by gravity.



### Air circulation dryer UT

The cleaning objects are dried after rinsing to quickly remove any residual moisture. Content from 19.5 to 90 litres.



### Trough dryers TO

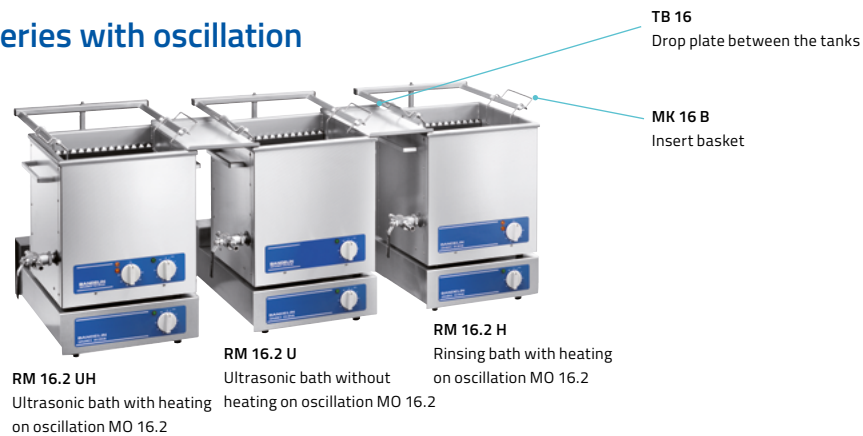
The cleaning objects are dried after rinsing to quickly remove any residual moisture. Content from 105 to 244 litres.



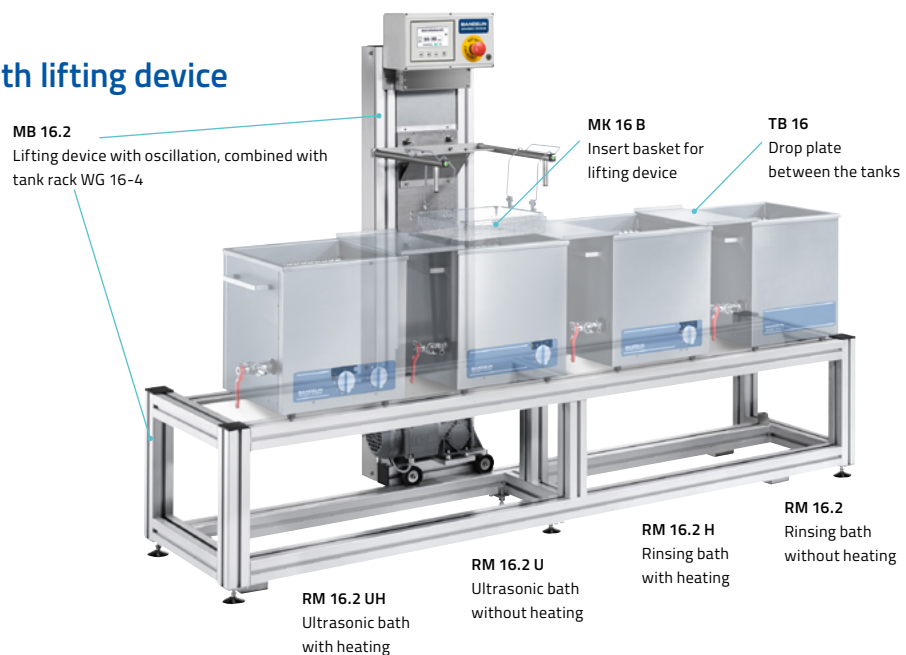
# SONOREX TECHNIK

## Examples of modular installations

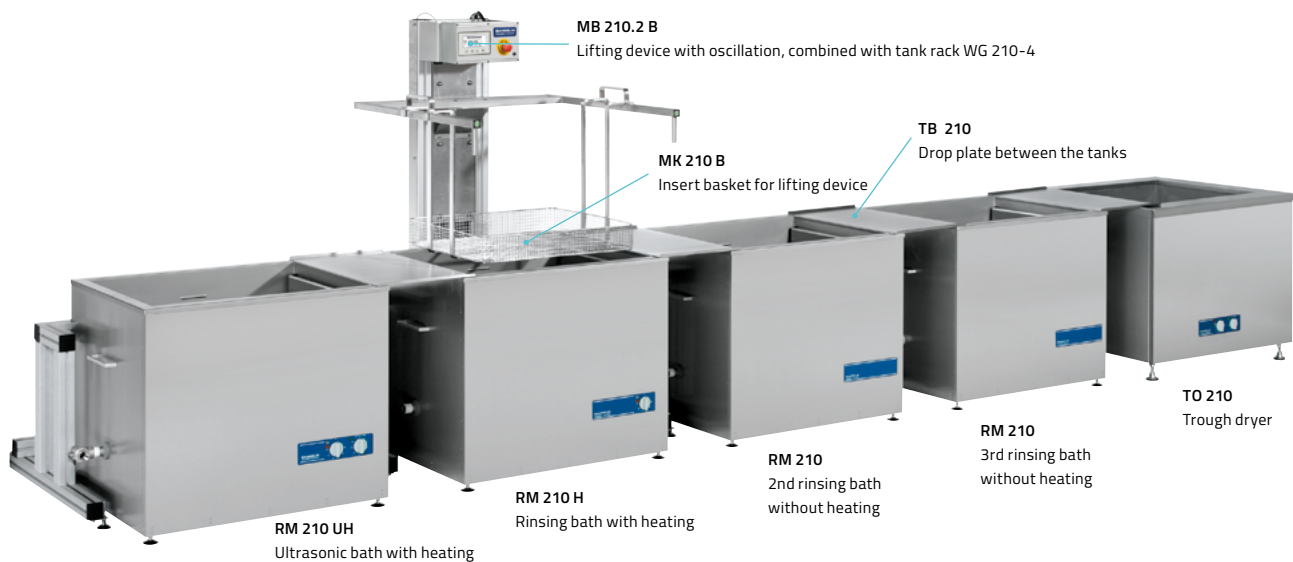
### RM 16 device series with oscillation



### RM 16 device series with lifting device



### RM 210 device series – with lifting device and peripherals





## SONOREX CNp 28-2

# High-performance ultrasonic bath with pulsed vacuum

### Compact CNp cleaning system

Effective cleaning using CNp (Cyclic Nucleation Process), a combination of ultrasonic and pulsed vacuum cleaning in one compact device.

**Applications:** Capillary, 3D printed parts, sintered parts, complex components, bulk materials.

#### Simple setup

Plug in the mains plug (three-phase current) and compressed air connection, attach the wastewater connection, device is ready for operation.

#### Double-tank design

Intensive cleaning and rinsing at the same time or 2 x cleaning cycles or 2 x rinsing cycles.

#### Safe and defined operation

Automatic temperature control, time program and fill level monitoring.

#### Low maintenance

Ultrasonic system and control unit are maintenance-free.

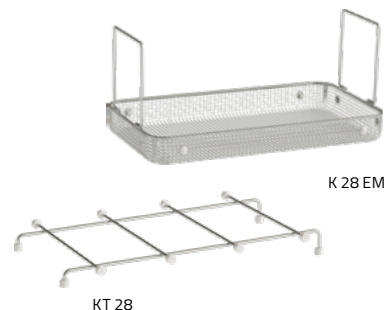
#### Economical

Even for small cleaning volumes, space-saving.



#### Ready-to-use set:

- SONOREX CNp 28-2
- Inset basket K 28 EM (2 pcs.)
- Basket holder KT 28 (2 pcs.)



For more information and video

Type	Internal tank dimensions l x w x d [mm]	Operating volume [l]	External dimensions L x B x H [mm]	Ultrasonic peak power* [W]	Ultrasonic nominal power [W]	Heizleistung [W]	Current consumption** [A]	Minimal chamber pressure [bar]
CNp 28-2	510 x 300 x 260/280 <sup>+</sup>	28	1,550 x 800 x 985	1200	300	3000	15.7	-0.8

All values (except external dimensions) per tank.

<sup>+</sup> inclined tank bottom; \* corresponds to 4 times ultrasonic nominal power; \*\* per phase

# SONOREX TECHNIK

## High-power immersible transducers and flat transducer plates

High-power oscillating systems such as immersible transducers and flat transducer plates are used for retrofitting tanks for industrial ultrasonic cleaning or the acceleration of chemical or physical processes.

They are efficient and fail-safe and their large oscillation areas provide even sonication distribution. The oscillation systems are energised with high-power ultrasound generators.

### Immersible transducer

for rapid integration into larger-sized tanks.

Features:

- 2 mm stainless steel AISI 316L, WIG welded
- Ultrasound frequencies 25 kHz or 40 kHz
- Different models accommodate the variety of uses



### Flat transducer plates

for space-saving installation where space is limited.

The inner tank dimensions are unchanged.

Features:

- 3 mm stainless steel plate AISI 316L
- Ultrasound frequencies 25 kHz or 40 kHz
- Integration in right-angled tank section
- No drill holes or templates for threaded bolts necessary



### Explosive plated compound ultrasound

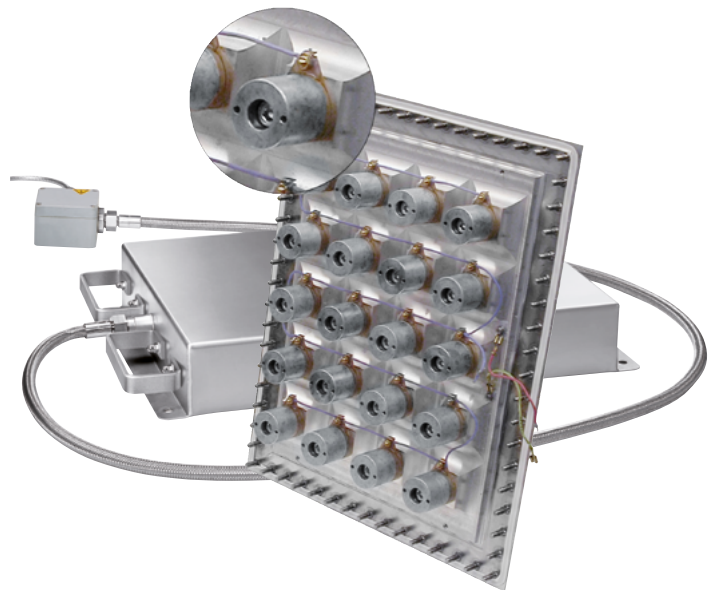
**Robust design gives enhanced mechanical stability.**

Solid aluminium and stainless steel plates are inseparably combined by explosion.

The oscillating components are screwed to this composite plate rather than glued.

Features:

- Long life-time due to low wear
- Stainless steel plating: 3 mm, AISI 316Ti
- High temperature stability up to max. 125 °C
- Suitable for pressure and vacuum loads
- New type of acceleration characteristics
- Ultrasound frequencies 25 kHz or 40 kHz
- Use as immersible transducers or flat transducer plates



### CONVEXON TC immersible transducer

Features:

- Convex radiation surface
- Even sonication distribution
- Homogeneous cleaning effectiveness
- Low surface erosion
- Enhanced lifespan
- 2 mm stainless steel AISI 316L, WIG welded
- Ultrasonic frequency 40 kHz



### CONCAVON TN immersible transducer

Features:

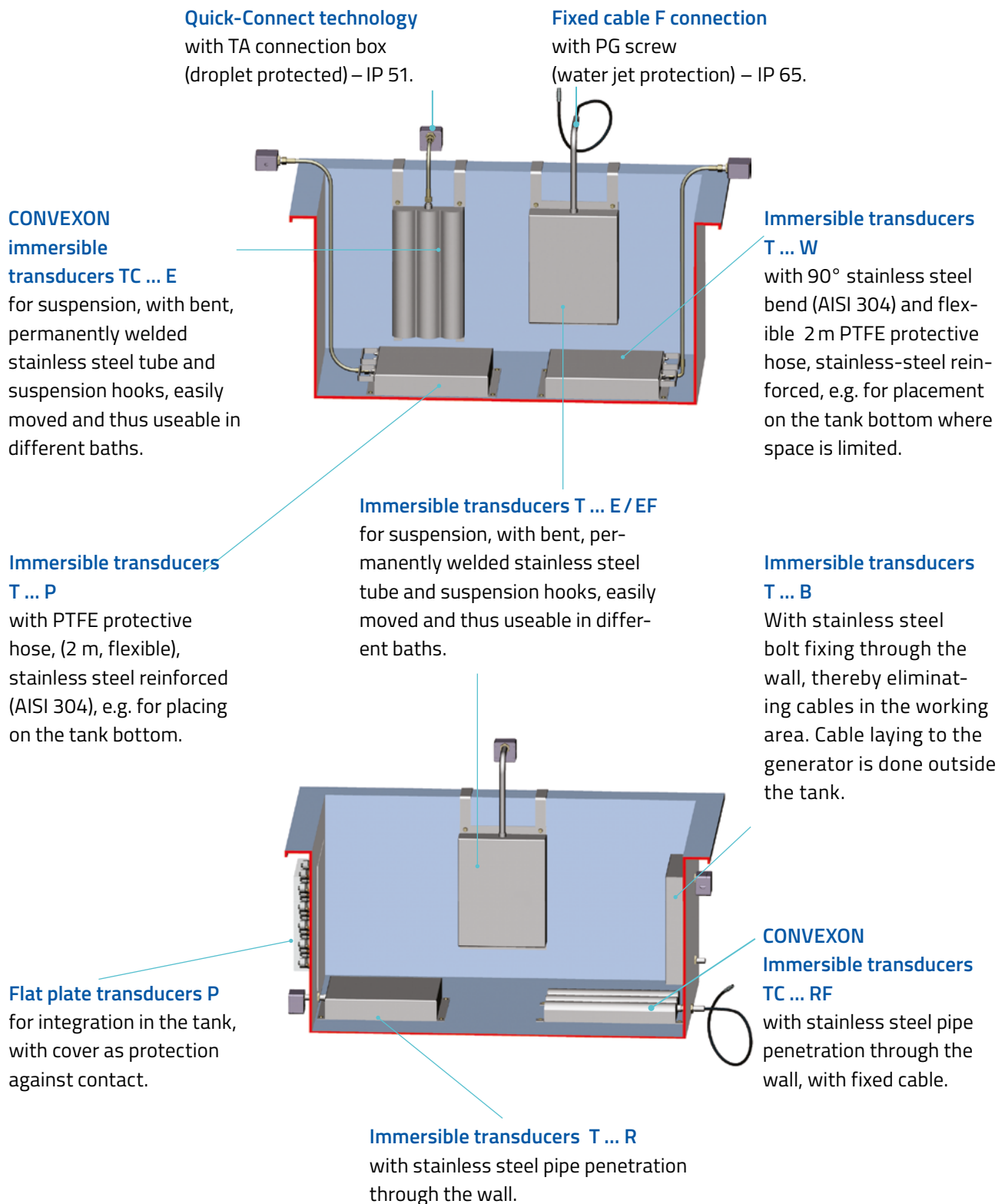
- Concave radiation surface
- Even sonication distribution
- Concentrated cleaning effectiveness
- 2 mm stainless steel AISI 316L, WIG welded
- Ultrasonic frequency 40 kHz



# SONOREX TECHNIK

## Mounting examples

For integration in existing tanks either with plug-in HF-cable Quick-Connect technology (IP 51) or with HF fixed cable connection (IP65)





# SONOREX TECHNIK

## High-power ultrasound generators LG

For operating high-power immersible transducers and flat transducer plates, high-power generators are used

### Module generators LG

The micro-processor controlled LG ultrasound generators provide HF power up to max. 9.0 kW at 25 kHz or 40 kHz.

The selection of generator with power and operating modules will depend on the total output of the ultrasonic oscillating systems being connected and the desired controllability of the application.

At the core of the ultrasound generators are power modules up to 1.5 kW, with regulation of all working parameters by the on-board micro-processor.



rear: LG 8008 D – 8.0 kW ,  
from left to right: LG 4004 F – 4.0 kW and LG 3020 T – 3.0 kW

### Operating and power modules of the generators LG

#### Control module SM 3

- Stepless adjustment of target output from 10–100 % via control dial
- START-STOP switch for HF delivery



#### Processor module PRO 3

- Individual programming for each power module
- Degassing function
- Error display



#### Power modules M 1003 and M 1503

- LEDs signal the operating mode
- Module switch for individual activation of each power module
- Power constant  $\pm 2\%$
- Protection from idle motion, short-circuiting and overload



# SONOREX TECHNIK

## Module concept for generators LG

**Tried and tested modular technology – reliable and high-performance, with exchangeable operating and power modules**

### Modular

All LG generator modules can be conveniently operated from the front and exchanged. Settings are performed through the SM 3 or PRO 3 operating modules. Power delivery is handled by power module M.

### Flexible

To increase generator power, additional power modules can be easily inserted in the free slots.

Mixed configurations with modules of different frequency (25 or 40 kHz) and power are also possible.

### Communication

The rear connections for remote control and the serial interface RS 232 allow the generators to be incorporated in higher-level monitoring and control devices.

### Ultrasound generators

### Operating modules

### Power modules

#### Desktop housing (T)

##### up to 3.0 kW

Dimensions (L × W × H) 218 × 405 × 198 mm

Mains connection: 230 V~ (±10 %) 50 / 60 Hz



#### Industrial housing (F)

##### up to 6.0 kW

Dimensions (L × W × H) 488 × 405 × 203 mm  
or 19" plug-in unit

for electrical cabinet integration

Mains connection: 400 V 3N~ (±10 %) 50 / 60 Hz



#### Industrial housing (D)

##### up to 9.0 kW

Dimensions (L × W × H) 488 × 405 × 425 mm  
or 19" plug-in unit

for electrical cabinet integration

Mains connection: 400 V 3N~ (±10 %) 50 / 60 Hz



# SONOREX TECHNIK

## High-power ultrasound generators TG and SG



TG 1503 – 1.5 kW

TG 3003 – 3.0 kW



SG 1510 – 1.5 kW

### Compact generators TG 1503 and TG 3003 especially for use in plant engineering

Micro-processor-controlled ultrasound generators TG 1503 and TG 3003 deliver HF power up to max. 3.0 kW at 25 kHz or 40 kHz, and in the case of TG 3003 a mixed configuration is also possible. The compact shape permits installation in a standard electrical cabinet, but holding brackets (optional) also allow for wall installation.

#### Compact generators TG 1503

Dimensions (L x W x H) 250 x 460 x 110 mm

Mains supply: 230 V~ (± 10 %) 50/60 Hz

#### Compact generators TG 3003

Dimensions (L x W x H) 250 x 460 x 160 mm

Mains supply: 230 V~ (± 10 %) 50/60 Hz

### Generator with protective housing SG 1510

The micro-processor-controlled ultrasound generators provide HF power up to max. 1.5 kW at 25 kHz or 40 kHz. Their hermetic enclosure and external cooling ribs allow these generators to be operated in both wet rooms and outdoors.

Dimensions (L x W x H) 490 x 265 x 225 mm

Mains supply: 230 V~ (± 10 %) 50/60 Hz

## Remote operation/control

### Remote operation



Remote control FS 15 L

The rear connection socket allows the generators to be turned on and off with an external control switch.

FS 7: Remote control cable with 7 m cable length, one end with plug

FS 15 L: Remote control with time switch 1–15 min and continuous operation, cable with plug, 7 m long

### RS 232 interface connection for PLC or PC



Generator

PLC

The interface allows the generator to be incorporated in higher-level control and monitoring devices. The modules are directly controlled by the PLC.

# Individual configurations with ultrasonic oscillating systems

Tanks, basins, plates, flanges, pipes and other metal components are directly configured with ultrasonic oscillating systems for cleaning or other sonication purposes, where the use of immersible transducers or flat transducer plates is not possible. In this case the oscillating systems are glued to the external surfaces such that the sonication effect is directed into the liquid or onto an object in the liquid.

## Project engineering information

The intended configuration surfaces must be flat. The output of each ultrasonic oscillating system will be max. 50 Watt. The oscillating systems can be provided with a housing (degree of protection IP 20) in aluminium which protects against contact but not splashing.

## Configuration examples



Foulard ponds for sonication of dye baths



Probe flange of a refractometer



Polarimeter tube for the analysis

### Ultrasonic oscillating systems

	PD 40 12	PD 25 17
Frequency [kHz]	40	25
Diameter of adhesive surface per system [mm]	min. 55	min. 65
Construction height without housing [mm]	55	77
Construction height with housing [mm]	70	90

### Ultrasound generator TG 50 /Z to TG 500 /Z

Number of possible oscillating systems [qty]	1 to 10	1 to 10
HF output [W]	30–500	30–500

### Ultrasound generator LG 1001 T to LG 3020 T /PRO Ultrasound generator TG 1503 or TG 3003

Number of possible oscillating systems [qty]	6 to 60	6 to 60
HF output [W]	300–3000	300–3000

■ Other configuration variants – including for curved surfaces, e.g. pipes – on request.

## Small generators TG 50 –TG 500 / Z for connection to special configurations

### Generators TG

HF power to 500 W  
Ultrasound frequency:  
40 kHz or 25 kHz



TG 50



TG 100 Z

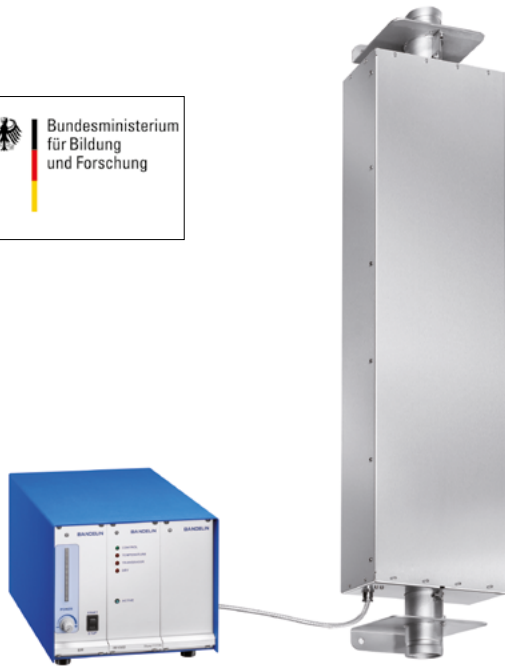
Mains supply:  
230 V~ (± 10 %) 50/60 Hz  
alternatively  
115 V ~ (± 10 %), 50/60 Hz

# SONOREX TECHNIK

## Sonoreactors

### SONOBLOC

Tube reactors for use in  
process technology and cleaning



SB 8-1002.01

#### Applications

- Ultrasonic intensive treatment of flexible filiform products and of wire or ribbon-shaped continuous profiles
- Acceleration of desintegration and/or breakdown of organic material for increasing biogas yields and for treatment of sewage sludge
- Supporting the disinfection of germ and parasite laden circulation water in pisciculture
- Dispersing of solids in liquids (pharmaceutical production)
- Supporting disinfection (killing of bacteria) in water and sewage treatment
- CO<sub>2</sub> degassing from aqueous reactants
- Efficient cleaning of grease, oil, emulsions and/or cracked residues in single and multiple wire cleaning
- Support of industrial and biotechnological processes in cleaning, disintegration, degassing and disagglomeration

### VORTEX

Vortex reactors  
for use in process technology



WR 4-1503.01

#### Applications

- Intensification of industrial, biotechnological and chemical processes (suspension, emulsion, disagglomeration, reaction acceleration, degassing)
- Intensive degassing of dye solutions and photographic casting solutions
- CO<sub>2</sub> degassing from aqueous reactants
- Supporting disinfection (killing of bacteria) in water and sewage treatment
- Sterilisation of organic contents in industrial rinsing liquids
- Supporting the disinfection of germ and parasite laden circulation water in pisciculture
- Production of ultra-fine polishing pastes for the wafer industry
- Homogenisation of colour pigments in oil (paint manufacture)

## Ultrasonic baths – analogue or digital

- SONOREX SUPER RK – Operation with turning knob
- SONOREX DIGITEC DT – Operation with foil keyboard



	SUPER RK ...	DIGITEC DT ...
Volume [l]	3.0–90.0	3.0–90.0
Ultrasonic frequency (kHz)	35	35
Sweep	✓	✓
DEGAS rapid degassing	–	✓
Operating elements	turning knobs	keypad
Time setting [min]	1–15, ∞	1, 2, 3, 4, 5, 10, 15, 30, ∞
Data memory	–	no, for type H-RC: WINSOINIC software
Safety shut-down	–	after 12 hours
Heating, thermostatically controlled [°C]	30–80	20–80
Heating	optional, H-version	optional, H-version
Setting accuracy of bath temperature [K]	± 5	± 2.5
Protection against boiling retardation	–	✓, optional switch-on
Excess temperature signal	–	✓
Tank thickness [mm] / Material C-version:	0.8 / AISI 304 2 / AISI 316L	0.8 / AISI 304 2 / AISI 316L
Hard chromium plating	RK 102 H	DT 102 H / H-RC
Filling level mark for safe dosing	✓	✓
One-piece drain, welded	✓, from RK 102 H	✓, from DT 102 H
Degree of protection	IP 32	IP 33
Mains supply 230 V~ [± 10 %] 50 / 60 Hz alternatively 115 V~ [± 10 %] 50 / 60 Hz	✓	✓
Interface/PC software	–	RS 232 in case of type H-RC / ✓



# SONOREX

## Ultrasonic baths in compact design

for use in servicing, workshop, laboratory and technical college



Cleaning of respirator masks at a fire station



Drill head cleaning in the ultrasonic bath RK 102 H

Type (selection)	Internal tank dimensions l x w x d [mm]	Capacity [l]	External dimensions l x w x h [mm]	Ultrasonic peak power* [W]	Ultrasonic nominal power [W]	Heating power [W]
RK 102 H DT 102 H	240 x 140 x 100	3.0	260 x 160 x 250	480	120	140
RK 156 BH DT 156 BH	500 x 140 x 150	9.0	530 x 165 x 300	860	215	600
RK 170 H	1000 x 200 x 200	39.0	1050 x 250 x 385	1520	380	1600
RK 255 H DT 255 H	300 x 150 x 150	5.5	325 x 175 x 295	640	160	280
RK 510 H DT 510 H	300 x 240 x 150	9.7	325 x 265 x 300	640	160	400
RK 514 H DT 514 H	325 x 300 x 150	13.5	355 x 325 x 305	860	215	600
RK 514 BH DT 514 BH	325 x 300 x 200	18.7	355 x 325 x 385	860	215	600
RK 1028 H DT 1028 H	500 x 300 x 200	28.0	535 x 325 x 400	1200	300	1300
RK 1028 CH DT 1028 CH	500 x 300 x 300	45.0	540 x 340 x 500	1200	300	1450
RK 1050 CH DT 1050 CH	600 x 500 x 300	90.0	640 x 540 x 530	2400	600	1950

\*corresponds to 4 times ultrasonic nominal power

# TICKOPUR

## Cleaning concentrates



### Dosing aids

	used with	Code no.
Dosing pump ①	5-l-jerrycan	268
Dosing pump ①	10-l-jerrycan	2660
Measuring beaker ②	100 ml	294



For optimum cleaning results in the ultrasound bath, specially formulated cleaning agents are necessary, in addition to the factors of ultrasound output, temperature and time.


Bandelin offers a comprehensive range of special cleaning agents from DR.H. STAMM GmbH. These have been specially developed for ultrasound applications. With their cavitation-conductive properties, these preparations support the cleaning process while protecting the materials. According to cleaning task, basic, neutral and acid cleaners are used.

The preparations are biologically degradable in accordance with the regulations of the Cleaners Directive. Rinsing is always necessary after cleaning.

### Caution:

**Do not use solvents directly in the ultrasound bath. Household cleaners, acids and many common acid cleaning agents are unsuitable and may lead to device failure as a result of pitting.**

All TICKOPUR preparations may also be used in submersion and wiping procedures.

Product information and EC safety data sheets as pdf files under:  
[Tickopur](#) 

# TICKOPUR

## Cleaning concentrates

Materials	Contamination	Cleaning concentrate	Litres*
Steel, stainless steel, non-ferrous, precious and light metals, glass, ceramics, plastics, rubber, windows, spectacles, e-filters, respirator masks.	General soiling, drilling, grinding, polishing and lapping residues, oil and grease-based residues, soot, ink, etc.	<b>TICKOPUR R 33</b> Universal cleaner with corrosion protection for servicing, industry, engineering, laboratory, gentle on materials, mildly alkaline, pH 9.9 (1%), dosage 3–5 %	5 10 200
Steel, stainless steel, non-ferrous, precious and light metals, glass, ceramics, plastics, rubber	Light contamination, grinding, polishing and lapping residue, dust	<b>TICKOPUR R 30</b> Neutral, tenside-based cleaner with corrosion protection, gentle on materials, emulsifying, neutral, pH 7.0, dosage 1–5 %	5 10
Steel, stainless steel, precious metals, glass, ceramics, plastic, rubber. Not for zinc, tin, light or non-ferrous metals.	Heavy mineral residue (limescale, silicates, phosphates, cements, etc.), rust, tempering colours, metal oxides, grease and oil films.	<b>TICKOPUR R 27</b> Special cleaner on phosphoric acid basis, for intensive decalcification and rust removal, acid, pH 1.9 (1 %), dosage 5 %	5 10
Steel, stainless steel, non-ferrous, precious and light metals, glass, ceramics, plastics, rubber	Mineral residue, flash rust, grease, oils, waxes, pigments, grinding, polishing and lapping residues	<b>TICKOPUR TR 3</b> Special cleaner on citric acid basis, gentle action, phosphate-free, with corrosion protection, weakly acid, pH 3.0 (1 %), dosage 5 %	5 10 200
Steel, stainless steel, non-ferrous, precious and light metals, glass, ceramics, plastics, rubber, soldered frames.	Grease, oils, waxes, pigments, fluxes, soldering pastes, drilling, grinding, polishing and lapping residues	<b>TICKOPUR TR 7</b> Universal cleaner, demulsifying, for fast separation of oil and grease, phosphate-free, mildly alkaline, pH 8.9 (1 %), dosage 0.1–5 %	5 10
Steel, stainless steel, glass, ceramics, plastics, rubber. Not for tin, zinc and light metals. Non-ferrous heavy metals may become corroded.	Coking residue, gumming, soot, pigments, greases, oils, waxes, pigments, fogging, drilling, grinding, polishing and lapping residues	<b>TICKOPUR TR 13</b> Intensive cleaner, demulsifying, for stubborn contamination, phosphate and silicate free, alkaline, pH 11.9 (1 %), dosage 0.1–10 %	5 10 200
Steel, stainless steel, glass, ceramics, plastics, rubber. Not for light metals. Caution with tin, zinc and non-ferrous metals.	Coking residue, gumming, soot, greases, oils, waxes, silicone oil, fogging, drilling, grinding, polishing and lapping residues.	<b>TICKOPUR R 60</b> Intensive cleaner, phosphate-free, strongly alkaline, pH 12.3 (1 %), dosage 2–20 %	5 10

\* Other container sizes on request. All TICKOPUR preparations may be used in submersion and wiping procedures

## Corrosion protection for ferrous metals

Materials	Properties	Concentrate	Litres
Suitable for all ferrous metals such as cast irons, unprotected steels in a large number of alloys.	Effective corrosion protection for indoor storage after cleaning with TICKOPUR agents and subsequent rinsing with water. No oil/grease film formation.	<b>TICKOPUR KS 1</b> Universal corrosion protection for all ferrous metals, solvent-free, neutral, pH 7.4 (1 %), dosage 0.5–2 %	2 5

■ Detailed documentation, advice and information on Tel. +49 30 76880–0

# BANDELIN – Ultraschall seit 1955

## Company portrait

We are a family-owned company located in Berlin and meanwhile run in the third generation, specialised in development, manufacturing and sales of ultrasonic devices, the corresponding accessories and application-specific cleaning agents and disinfectants.

A wide vertical range of manufacture, modern production lines and a motivated staff guarantee a high quality of the products. Our devices contribute to the success of our customers in the laboratory, medical, dental, pharmaceutical, industrial, craft as well as service.

As early as 1955, our company began developing and manufacturing high-performance ultrasonic devices. The constant expansion of the product range and a sharp rise in sales led to an expansion of the production area in 1985. In 1992, ultrasonic homogenisers and controllable, power-constant ultrasonic generators were introduced to the market.

The period from 1996 to 2004 was characterised by the development and production of innovative ultrasonic baths and immersible transducers as well as tube reactors for industrial applications.

In the following years, BANDELIN's product range was expanded by new laboratory ultrasonic devices. After the introduction of the ultrasonic bath for simultaneous cleaning and rinsing of MIC instruments, a further development was launched in 2016 for robotic instruments.

Today, the reputation of our brands SONOREX, SONOPULS, SONOMIC and TRISON stand for the high quality awareness of our employees and is equated in expert circles with ultrasound.

The most important product groups include:

- |           |  |
|-----------|--|
| SONOREX   | – ultrasonic baths and reactors  |
| SONOPULS  | – ultrasonic homogenisers  |
| SONOMIC   | – ultrasonic baths for rinsable MIC and standard instruments           |
| TRISON    | – ultrasonic baths for robotic-, rinsable MIS and standard instruments |
| TICKOPUR  | – cleaning agents  |
| STAMMOPUR | – cleaning agents and disinfectants                                    |

We are innovation leaders in the development of ultrasonic devices and new areas of application. In the past we have registered 79 patents / utility models as well as 68 trade brands. Our participation in various committees in the development of new standards and guidelines serve to ensure the highest standards for ultrasonic applications.

As the only complete supplier of ultrasonic devices, accessories, disinfectants and cleaning agents with approvals and certifications according to ISO 9001 and ISO 13485, BANDELIN is the market leader.

Over one million units have already been delivered to our customers.







Made in Germany

BANDELIN electronic  
GmbH & Co. KG  
Heinrichstraße 3–4  
12207 Berlin  
DEUTSCHLAND  
☎ +49 30 76880-0  
☎ +49 30 7734699  
info@bandelin.com

Certified in accordance with  
ISO 9001 and ISO 13485



We'll be happy to advise you in person!  
Ask our experts.

**+49 30 76880-0**  
**www.bandelin.com**

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