High-power ultrasound for industry – service – maintenance

Cleaning of parts and surfaces
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Typical applications

**Precision mechanics**  
Cleaning of stainless steel, brass and aluminium parts

**Mechanical engineering**  
Cleaning and degreasing of bearings, crankshafts, double-sided plates, work pieces, electrostatic filters

**Grinding and polishing shops**  
Cleaning of lamp shades

**Mould cleaning**  
Cleaning of plastic moulding tools

**Automobile industry**  
Cleaning of injection nozzles, carburettors, spray guns, nozzles, shock absorbers, engine parts, circuit boards and cutting tools

**Wood working industry**  
Cleaning of wood working tools and maintenance of machine parts

**Medicine technology**  
Cleaning of dentures, implants and joints

**Power stations**  
Cleaning of oil and smoke filters, decontamination

**Catering trade**  
Cleaning and degreasing of electrostatic filters and parts of coffee machines

**Industrial safety and fire protection**  
Cleaning of respirator masks and sooty parts

**Transport technology**  
Cleaning of relays, soldered frames, gear box and engine parts

**Pneumatic tools**  
Removal of grease, oil, abrasion and resinous residues during maintenance

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Cleaning with ultrasound – examples

**Material testing**  
Cleaning and degreasing of measuring tools

**Office technology**  
Component cleaning of copying machines, printers, postal franking machines, cases and keyboards

**Energy management**  
Cleaning of armatures and water meters

**Optical and glass industry**  
Preliminary and intermediate cleaning of optics and lenses

**Thin-layer technology**  
Cleaning of sensor parts

**Service**  
Cleaning of computer parts

**Pharmaceutical industry**  
Cleaning of metal filters and tableting tools
Knowledge of ultrasound

How does ultrasound work
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 higher frequencies of approx. 40 kHz which are used for intense but gentle cleaning.

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
Ultrasonic cavitation can be used for various purposes, such as producing fine emulsions of oil and water. Compared to other manufacturing processes this emulsion is more stable. In waste water treatment and biogas production disintegration and decomposition of organic material are increased.

How to select the proper device
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. Further decision criteria are especially the structure and the kind of dirt of the parts to be cleaned. The shape of the parts and the kind of residues are also important for the decision. For higher requirement is additional equipment available, like rinsing baths or lifting devices.

Should an ultrasonic unit have a heating
Warm cleaning solutions reduce the cleaning time; dirt is removed faster. Units with heaters are the preferred choice for industrial cleaning processes.

What kind of accessories should be used
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 bottom of the bath floor. When cleaning very small or sensitive parts, further accessories may be advisable to facilitate careful placement. For safety reasons, it is recommended that ultrasonic baths be kept covered (see TRBA 250).

What fluids should be used
TICKOPUR preparations have been specially developed for use in ultrasonic baths. Water without a detergent will not have a cleaning effect. Do not use household detergents or pure DI water. For work with acids, a plastic insert tub must be used. Never use inflammable or explosive fluids directly in the oscillating tank!

If you want to know more ...
... visit our website with its own YouTube channel and many helpful instruction videos! Or contact us directly at info@bandelin.com. We are always pleased to provide advice.

Further information about ultrasound ...
... can be found in the book "Low-Frequency Ultrasound" ISBN: 3-937889-26-4, available from your bookseller.
Ultrasonic cleaning

**Economical**
Regular ultrasonic cleaning saves money. Material to be cleaned will last longer due to the more gentle effect of ultrasound resulting in less needed spare parts. Faster cleaning times reduce standstill periods between productions.

**Efficient**
Ultrasonic cleaning processes are effective. Optimum cleaning results will be achieved. Brushing and wiping is no more necessary. The material to be cleaned – including its surfaces – will not be damaged. Even intricately shaped parts can be cleaned.

**Environmentally friendly**
Biologically degradable cleaning agents are used instead of ecologically harmful solvents. The consumption of chemicals and waste water can be further reduced by using an oil separator and a bath filtration.

**Easy to use**
Ultrasonic cleaning baths are easy to install, easy to operate and do not require special training.

What does ultrasound?
The interaction of four factors

**Ultrasound**
Ultrasound creates smallest vacuum bubbles in liquids. These bubbles implode immediately (cavitation). The forces resulting from cavitation cause an intensive and gentle removal of dirt particles from the object.

**Temperature**
Many cleaning agents become fully effective only at high bath temperatures. The cleaning solution can be heated by the cleaning units heating system.

**Chemistry**
The cleaning agent supports the cavitation process, reduces the surface tension, separates and binds dirt particles. Depending on the type of dirt accumulation, different cleaning agents are employed.

**Time**
Compared to other methods, the joint application of chemical agents and ultrasound reduces the time needed for cleaning up to 90%. Depending on the amount of dirt, that time varies from a few seconds up to a couple of minutes.
Three product lines with different configurations for application in industry, craft and service

Constantly increasing demands on product quality require also adequate ultrasonic equipment featuring sophisticated technology and high flexibility. BANDELIN offers a variety of SONOREX TECHNIK equipment for individual cleaning requirements that meet today’s demand for high quality, economic efficiency and environment associated factors.

- Ultrasonic baths with heating – for cleaning. The heating supports the cleaning effect of the chemistry.
- Ultrasonic baths without heating – for cleaning of temperature-sensitive parts or for rinsing.
- Units without ultrasound and heating – for the rinsing after ultrasonic cleaning.

The following summary gives an overview of the product range and is meant to help in pre-selecting suitable products:

<table>
<thead>
<tr>
<th>Features</th>
<th>RM 16 to RM 210</th>
<th>RM 112 to RM 212</th>
<th>ZM 112 to ZM 212</th>
</tr>
</thead>
<tbody>
<tr>
<td>internal tank</td>
<td>right-angled corners</td>
<td>round corners</td>
<td>round corners</td>
</tr>
<tr>
<td>operating volume</td>
<td>13 to 210 litres</td>
<td>115 to 230 litres</td>
<td>115 to 230 litres</td>
</tr>
<tr>
<td>ultrasonic power</td>
<td>fixed</td>
<td>fixed</td>
<td>adjustable</td>
</tr>
<tr>
<td>ultrasonic frequency</td>
<td>25 kHz* or 40 kHz</td>
<td>25 kHz or 40 kHz</td>
<td>25 or 40 kHz or both</td>
</tr>
<tr>
<td>ultrasonic transducers</td>
<td>at the bottom</td>
<td>at the bottom</td>
<td>at the bottom and at one side</td>
</tr>
<tr>
<td>operating elements</td>
<td>at bottom, right side</td>
<td>at upper right side</td>
<td>at upper right side</td>
</tr>
<tr>
<td>tank bottom</td>
<td>straight</td>
<td>inclined toward tank drain</td>
<td>inclined toward tank drain</td>
</tr>
<tr>
<td>ultrasonic generator</td>
<td>built-in</td>
<td>built-in</td>
<td>separate</td>
</tr>
</tbody>
</table>

*from RM 110 on
SONOREX TECHNIK RM

Ultrasonic baths

The Established – RM 16 to RM 210 from 13 to 210 litres

in four versions combinable:
- RM ... UH – ultrasound and heating
- RM ... U – ultrasound
- RM ... H – heating
- RM ... without ultrasound / without heating

Basic equipment
- welded cleaning tank
  made of 2 mm stainless steel AISI 316 Ti
- weir
  Floating contamination like particles, oil and grease can be moved from the bath surface using an oil separator.
- filling level mark
  Well recognizable imprint for the minimum filling level of the cleaning fluid.
- drain for 3-way ball valve
  For emptying or refilling the tank or connecting to a filtration.
- additional outlet
  For connection of an oil separator or for emptying the fluid behind the weir.
- heating
  On / Off with pilot lamp, temperature thermostatically adjustable from 30 to 80 °C.

- drip-proof housing
  made of stainless steel AISI 304
- ultrasound
  On / Off with pilot lamp, timer 1 to 15 min. or continuous operation.
- ultrasonic generator (built-in)
  frequency 40 kHz, from RM 110 also 25 kHz

Additionally from RM 110
- spraying pipe
  Generates in connection with an oil separator a flow on the liquids surface that leads floating oil and grease from the bath surface into the weir.
- liquid level switch
  for dry run protection of heating and ultrasonic transducers
- height-adjustable feet
  to compensate uneven floor space

Suitable accessories please see page 6.
SONOREX TECHNIK RM

Ultrasonic baths

The Convenient
– RM 112 to RM 212 from 115 to 230 litres

Basic equipment analogue RM 110 – RM 210, additional comfort

• round tank corners
  at the bottom and at all sides facilitate the cleaning of the tank. Accumulation of residues is avoided.

• operating elements at the upper side of the tank
  facilitate the turning of the knobs for ultrasound and heating

• inclined tank bottom
  for improved cleaning results through ideal distribution of ultrasound. It also facilitates the draining of used cleaning liquid.

<table>
<thead>
<tr>
<th>type (selection)</th>
<th>internal tank dimensions l × w × d mm</th>
<th>operating volume l</th>
<th>external dimensions l × w × h mm</th>
<th>ultrasonic peak power W**</th>
<th>HF power W_{eff}</th>
<th>heating power W</th>
<th>current consumption A***</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM 112 UH</td>
<td>600 × 450 × 450/470*</td>
<td>115.0</td>
<td>780 × 610 × 800</td>
<td>4000</td>
<td>1000</td>
<td>4800</td>
<td>10.5</td>
</tr>
<tr>
<td>RM 182 UH</td>
<td>1000 × 500 × 400/420*</td>
<td>170.0</td>
<td>1180 × 660 × 800</td>
<td>2 × 4000</td>
<td>2 × 1000</td>
<td>7200</td>
<td>14.8</td>
</tr>
<tr>
<td>RM 212 UH</td>
<td>750 × 650 × 500/520*</td>
<td>230.0</td>
<td>930 × 810 × 800</td>
<td>2 × 4000</td>
<td>2 × 1000</td>
<td>7200</td>
<td>14.8</td>
</tr>
</tbody>
</table>

*inclined tank bottom  **corresponds to 4 times HF output  ***per phase mains connection: 400 V 3N– (±1.0 %) 50/60 Hz. CEKON-plug 16 A

<table>
<thead>
<tr>
<th>Accessories</th>
<th>RM 16</th>
<th>RM 40</th>
<th>RM 75</th>
<th>RM 110</th>
<th>RM 112</th>
<th>ZM 112</th>
<th>RM 180</th>
<th>RM 182</th>
<th>ZM 182</th>
<th>RM 210</th>
<th>RM 212</th>
<th>ZM 212</th>
</tr>
</thead>
<tbody>
<tr>
<td>insert basket</td>
<td>MK 16 B</td>
<td>MK 40 B</td>
<td>MK 75 B</td>
<td>MK 110</td>
<td>MK 180</td>
<td>MK 210</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>insert basket load up to 40 kg</td>
<td>–</td>
<td>MK 40 S</td>
<td>MK 75 S</td>
<td>MK 110 S</td>
<td>MK 180 S</td>
<td>MK 210 S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>insert basket for lifting device</td>
<td>MK 16 B</td>
<td>MK 40 B</td>
<td>MK 75 B</td>
<td>MK 110 B</td>
<td>MK 180 B</td>
<td>MK 210 B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>insert basket for lifting device load up to 40 kg</td>
<td>–</td>
<td>MK 40 BS</td>
<td>MK 75 BS</td>
<td>MK 110 BS</td>
<td>MK 180 BS</td>
<td>MK 210 BS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lid</td>
<td>MD 16</td>
<td>MD 40</td>
<td>MD 75</td>
<td>MD 110</td>
<td>MD 180</td>
<td>MD 210</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>drop plate between 2 units</td>
<td>TB 16</td>
<td>TB 40</td>
<td>TB 75</td>
<td>TB 110</td>
<td>TB 180</td>
<td>TB 210</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
**SONOREX TECHNIK ZM**

Ultrasonic baths

**The Two-Parts**  
– ZM 112 to ZM 212 from 115 to 230 litres

**Basic equipment analogue RM 112 – RM 212**
- Separate installation of generator apart from the wet area possible.
- The generator is equipped with a serial interface and a remote control connection for external control.
- Operation of several cleaning tanks fed by one generator is possible, even if each tank works with a different frequency.
- Version with transducers at the bottom (ZM ... U / UH) or with transducers at the bottom and at the side (ZM ... UL / UHL), also available in TwinSonic-version.

**TwinSonic-version as multi-frequency unit**  
– registered utility model DE 20 2004 006 380
Multi-frequency units in the TwinSonic-version work with ultrasonic systems of different frequencies at the bottom and at one side. Advantage is a more homogenous distribution of ultrasound and power, thus improving the cleaning efficiency and reducing the time needed for cleaning.

**Foil test in accordance with IEC / TR 60886**
The foil test is a simple procedure for demonstrating the intensity and distribution of cavitation in an ultrasonic bath. Foils of multi-frequency units with bottom and side sonication show an uniform spread perforation.

<table>
<thead>
<tr>
<th>type (selection)</th>
<th>internal tank dimensions l × w × d mm</th>
<th>operating volume l</th>
<th>external dimensions l × w × h mm</th>
<th>ultrasonic peak power W**</th>
<th>HF power W_{eff}</th>
<th>heating power W</th>
<th>current consumption A***</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZM 112 UH</td>
<td>600 × 450 × 450/470*</td>
<td>115.0</td>
<td>780 × 610 × 800</td>
<td>4000</td>
<td>2 × 1000</td>
<td>4800</td>
<td>4.3</td>
</tr>
<tr>
<td>ZM 112 UHL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZM 182 UH</td>
<td>1000 × 500 × 400/420*</td>
<td>170.0</td>
<td>1180 × 660 × 800</td>
<td>2 × 1000</td>
<td>2 × 1000</td>
<td>7200</td>
<td>8.6</td>
</tr>
<tr>
<td>ZM 182 UHL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZM 212 UH</td>
<td>750 × 650 × 500/520*</td>
<td>230.0</td>
<td>930 × 810 × 800</td>
<td>2 × 1000</td>
<td>2 × 1000</td>
<td>7200</td>
<td>8.6</td>
</tr>
<tr>
<td>ZM 212 UHL</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

*Inclined tank bottom  **Corresponds to 4 times HF output  ***Per phase mains connection oscillating tank: 400 V 3N~±10% 50/60 Hz, CEKON-plug 16 A, HF generator: 230 V~±10% 50/60 Hz

Suitable accessories please see page 6.
SONOREX TECHNIK

Ultrasonic baths for rent

You need an ultrasonic bath for the cleaning of parts for a specific period?

---

We rent ultrasonic baths from 13 to 210 litres operating volume: RM 16 UH, RM 40 UH, RM 75 UH, RM 110 UH, RM 180 UH, RM 210 UH, RM 212 UH and RL 70 UH with basket and lid.

Are you interested in further details of rental? Lease agreement with questionnaire on request.

**Rental only within Germany.**

<table>
<thead>
<tr>
<th>type</th>
<th>internal tank dimensions l × w × d mm</th>
<th>operating volume l</th>
<th>external dimensions l × w × h mm</th>
<th>ultrasonic peak power W**</th>
<th>HF power W_{eff}</th>
<th>HF frequency kHz</th>
<th>heating power W</th>
<th>current consumption A</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM 16 UH</td>
<td>325 × 275 × 200</td>
<td>13.0</td>
<td>365 × 340 × 390</td>
<td>1200</td>
<td>300</td>
<td>40</td>
<td>800</td>
<td>4.8</td>
</tr>
<tr>
<td>RM 40 UH</td>
<td>480 × 300 × 300</td>
<td>30.0</td>
<td>540 × 340 × 500</td>
<td>2000</td>
<td>500</td>
<td>40</td>
<td>1250</td>
<td>7.7</td>
</tr>
<tr>
<td>RM 75 UH</td>
<td>580 × 500 × 300</td>
<td>60.0</td>
<td>640 × 540 × 530</td>
<td>4000</td>
<td>1000</td>
<td>40</td>
<td>1950</td>
<td>12.9</td>
</tr>
<tr>
<td>RM 110 UH</td>
<td>600 × 450 × 450</td>
<td>110.0</td>
<td>780 × 550 × 800</td>
<td>4000</td>
<td>1000</td>
<td>25</td>
<td>4800</td>
<td>10.5***</td>
</tr>
<tr>
<td>RM 180 UH</td>
<td>1000 × 500 × 400</td>
<td>160.0</td>
<td>1180 × 600 × 800</td>
<td>2 × 4000</td>
<td>2 × 1000</td>
<td>40</td>
<td>7200</td>
<td>14.8***</td>
</tr>
<tr>
<td>RM 210 UH</td>
<td>750 × 650 × 500</td>
<td>210.0</td>
<td>930 × 750 × 800</td>
<td>2 × 4000</td>
<td>2 × 1000</td>
<td>40</td>
<td>7200</td>
<td>14.8***</td>
</tr>
<tr>
<td>RM 212 UH</td>
<td>750 × 650 × 500</td>
<td>230.0</td>
<td>930 × 810 × 800</td>
<td>2 × 4000</td>
<td>2 × 1000</td>
<td>40</td>
<td>7200</td>
<td>14.8***</td>
</tr>
<tr>
<td>RL 70 UH</td>
<td>1700 × 250 × 250</td>
<td>70.0</td>
<td>1750 × 300 × 450</td>
<td>4000</td>
<td>1000</td>
<td>40</td>
<td>2000</td>
<td>13.0</td>
</tr>
</tbody>
</table>

**corresponds to 4 times HF output; ***per phase

mains connection RM 16 UH – 75 UH + RL 70 UH: 230 V– (±10%) 50/60 Hz, RM 110 UH–212 UH: 400 V 3N– (±10%) 50/60 Hz, CEKON-plug 16 A
**SONOREX TECHNIK**

Examples of modular installations

### RM 16 range with oscillation

- **RM 16 UH** ultrasonic tank with heating on oscillation MO 16.2
- **RM 16 U** rinsing tank with ultrasound on oscillation MO 16.2
- **RM 16 H** rinsing tank with heating on oscillation MO 16.2

### RM 16 range with lifting device

- **MB 16** lifting device with oscillation combined with tank rack WG 16-4
- **MK 16 B** insert basket for lifting device
- **TB 16** drop plate between 2 tanks

### RM 210 range with lifting device and peripheral units

- **MB 210 B** lifting device with oscillation combined with tank rack WG 210-5
- **MK 210 B** insert basket for lifting device
- **TB 210** drop plate between 2 tanks
- **WA 210** di-water treatment
- **TO 210** trough dryer
- **RM 210 H** rinsing tank with heating
- **RM 210 U** rinsing tank with ultrasound
- **RM 210** 2. rinsing tank
- **RM 210** 3. rinsing tank
Supplementary equipment

Oscillation MO

The oscillating movement of the parts intensifies the cleaning efficiency of the ultrasonic sonication and helps to remove dirt particles more efficiently.

Lifting device MB with oscillation

The electrically driven lifting device with oscillation facilitates the lowering of the basket and its removal. In connection with a tank rack, the basket can be transported from one unit to the other.

Tank racks WG

Tank racks WG for moving the lifting device MB, available for 2 and more units.

<table>
<thead>
<tr>
<th>supplementary equipment (selection)</th>
<th>RM 16</th>
<th>RM 40</th>
<th>RM 75</th>
<th>RM 110</th>
<th>RM 110</th>
<th>RM 180</th>
<th>RM 180</th>
<th>RM 210</th>
<th>RM 210</th>
</tr>
</thead>
<tbody>
<tr>
<td>oscillation</td>
<td>MO 16.2</td>
<td>MO 40</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>lifting device with oscillation, fix for 1 unit</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>MB 110</td>
<td>MB 180</td>
<td>MB 210</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lifting device with oscillation, movable for tank rack</td>
<td>MB 16</td>
<td>MB 40</td>
<td>MB 75</td>
<td>MB 110 B</td>
<td>MB 180 B</td>
<td>MB 210 B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tank rack for 2 units</td>
<td>WG 16-2</td>
<td>WG 40-2</td>
<td>WG 75-2</td>
<td>WG 110-2</td>
<td>WG 180-2</td>
<td>WG 210-2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Supplementary equipment

Air agitation LU
for rinsing support by injection of air bubbles into the rinsing tank

- compressed air supply up to 6 bar
- material made of stainless steel AISI 304

LU 110 for RM 110/112 rinsing tanks
LU 180 for RM 180/182 rinsing tanks
LU 210 for RM 210/212 rinsing tanks

Saw blade holder SA
for cleaning saw blades and cutting tools

- simple placement on existing ultrasonic units
  SONOREX TECHNIK RM 16 and RM 40
- motorised axis drive
- suitable saw blades dia. 240 – 480 mm

Specification
- adaptable axes \( \frac{3}{4} \)”, other axes (dia. 20 – 50 mm) usable
- maximum load 8.0 kg
- rotation speed approx. 1 rpm
- timer 1 – 15 min and continuous operation
- mains connection 230 V~ (± 10 %) 50 / 60 Hz

Planing head holder HA
for efficient cleaning of planing heads

- simple retrofitting to existing ultrasonic units
  RM 40 UH, RM 110 UH, RM 112 UH, RM 210 UH
- motorised axis drive
- suitable planing heads dia.: 280 – 750 mm

Specification
- planing head holding axis \( \frac{3}{4} \)”, other axes (dia. 20 – 50 mm) usable
- maximum load 80.0 kg
- rotation speed of the driver roller approx. 1 rpm
- timer 1 – 15 min and continuous operation
- mains connection 230 V~ (± 10 %) 50 / 60 Hz

<table>
<thead>
<tr>
<th>supplementary equipment</th>
<th>RM 16</th>
<th>RM 40</th>
<th>RM 110</th>
<th>RM 110</th>
<th>RM 112</th>
<th>RM 180</th>
<th>RM 182</th>
<th>RM 210</th>
<th>RM 212</th>
</tr>
</thead>
<tbody>
<tr>
<td>air agitation</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>LU 110</td>
<td>-</td>
<td>LU 180</td>
<td>-</td>
<td>LU 210</td>
<td>-</td>
</tr>
<tr>
<td>saw blade holder</td>
<td>SA 16</td>
<td>SA 40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>plaining head holder</td>
<td>-</td>
<td>RM 40</td>
<td>RM 110</td>
<td>RM 112</td>
<td>RM 112</td>
<td>-</td>
<td>-</td>
<td>RM 210</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>HA 40</td>
<td>HA 110</td>
<td>HA 112</td>
<td>HA 112</td>
<td>-</td>
<td>-</td>
<td>HA 210</td>
<td>-</td>
</tr>
</tbody>
</table>
Peripheral units

**Filtration FA**
To be connected to the ultrasonic cleaning tank. Removed particles are retained by filter. This prolongs the use of the cleaning liquid while its cleaning capacity remains unchanged.

**Oil separator OX**
To be connected to the ultrasonic cleaning tank, if oil and grease has to be removed. Dirt accumulations floating on the bath’s surface are led via the weir into the oil separator and are separated by gravitation.

**DI-water treatment WA**
To be connected to a rinsing bath in order to remove stain making water residues on the cleaned parts.

**Trough dryer TO**
The cleaned parts are dried after rinsing in order to rapidly remove residual moisture.

<table>
<thead>
<tr>
<th>Peripheral unit</th>
<th>RM 16</th>
<th>RM 40</th>
<th>RM 75</th>
<th>RM 110</th>
<th>RM 112</th>
<th>ZM 112</th>
<th>RM 180</th>
<th>RM 182</th>
<th>ZM 182</th>
<th>RM 210</th>
<th>RM 212</th>
<th>ZM 212</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtration FA</td>
<td>FA 16</td>
<td>FA 40</td>
<td>FA 75</td>
<td>FA 110</td>
<td></td>
<td></td>
<td>FA 180</td>
<td></td>
<td></td>
<td></td>
<td>FA 210</td>
<td></td>
</tr>
<tr>
<td>Oil separator OX</td>
<td>OX 16</td>
<td>OX 40</td>
<td>OX 75</td>
<td>OX 110</td>
<td></td>
<td></td>
<td>OX 180</td>
<td></td>
<td></td>
<td></td>
<td>OX 210</td>
<td></td>
</tr>
<tr>
<td>DI-water treatment</td>
<td>WA 16</td>
<td>WA 40</td>
<td>WA 75</td>
<td>WA 110</td>
<td></td>
<td></td>
<td>WA 180</td>
<td></td>
<td></td>
<td></td>
<td>WA 210</td>
<td></td>
</tr>
<tr>
<td>Trough dryer TO</td>
<td>TO 16</td>
<td>TO 40</td>
<td>TO 75</td>
<td>TO 110</td>
<td></td>
<td></td>
<td>TO 180</td>
<td></td>
<td></td>
<td></td>
<td>TO 210</td>
<td></td>
</tr>
</tbody>
</table>
Special units

**RL 70 UH**
**extra long and narrow tank**

- Applications
  - perfectly suitable for cleaning of long parts such as tubes, profiles, mill saw blades, long cutting blades

**L 220 / L 320**
**two-chamber configuration for cleaning and rinsing in a single unit**

- Applications
  - cleaning of blinds, lamp grids, reflectors, weaving healds, preforms and slat blinds

**W 65 und W 300**
**extra deep tank**

- specially designed for use on ships
- tank made of 2 mm stainless steel AISI 316 Ti, with high freeboard
- W 65: frequency 35 kHz,
  - W 300: frequency 40 kHz or 25 kHz

- Applications
  - cleaning of oil filters, valves and cylinder heads

### Parameters

<table>
<thead>
<tr>
<th>special unit</th>
<th>internal tank dimensions L × W × D mm</th>
<th>operating volume l</th>
<th>external dimensions L × W × H mm</th>
<th>ultrasonic peak power W**</th>
<th>HF power W_{eff}</th>
<th>heating power W</th>
<th>current consumption A</th>
</tr>
</thead>
<tbody>
<tr>
<td>RL 70 UH</td>
<td>1700 × 250 × 450</td>
<td>70</td>
<td>1750 × 300 × 450</td>
<td>4000</td>
<td>1000</td>
<td>2000</td>
<td>13.1</td>
</tr>
<tr>
<td>L 220</td>
<td>2200 × 300 × 300/370* per chamber</td>
<td>185</td>
<td>2320 × 750 × 850</td>
<td>2 × 4000</td>
<td>2 × 1000</td>
<td>–</td>
<td>8.6</td>
</tr>
<tr>
<td>L 320</td>
<td>3200 × 300 × 300/370* per chamber</td>
<td>270</td>
<td>3320 × 750 × 850</td>
<td>4 × 4000</td>
<td>4 × 1000</td>
<td>–</td>
<td>13.0***</td>
</tr>
<tr>
<td>W 65</td>
<td>500 × 300 × 450</td>
<td>30</td>
<td>560 × 360 × 650</td>
<td>1200</td>
<td>300</td>
<td>1450</td>
<td>7.0</td>
</tr>
<tr>
<td>W 300</td>
<td>1000 × 500 × 600</td>
<td>185</td>
<td>1180 × 600 × 1000</td>
<td>2 × 4000</td>
<td>2 × 1000</td>
<td>7200</td>
<td>14.8***</td>
</tr>
</tbody>
</table>

*ultrasonic-/rinsing chamber  **corresponds to 4 times HF output  ***per phase
W 65 and RL 70 UH, L 220: mains connection 230 V~ (±10 %), 50/60 Hz;
W 300 and L 320: mains connection 400 V 3N~ (±10 %) 50/60 Hz
W 300 on request additional with integrated autotransformer for connection to the existing voltage of the ship

- Accessories and additional equipment on request.

---

**SONOREX TECHNIK**

L 220 with lifting device LB 220

W 65 and W 300 (behind)
SONOREX TECHNIK
High-power transducers

Immersible transducers and flat transducer plates from 200 W to 2000 W

Immersible transducers
for quick installation in large tanks.

Features
- stainless steel housing of 2 mm AISI 316 Ti, TIG welded
- ultrasonic frequencies 25 kHz or 40 kHz
- different versions support a variety of applications

SONOREX TECHNIK high-power transducers, such as immersible transducers and flat transducer plates, are used, to convert tanks to ultrasonic cleaning tanks or to accelerate chemical or physical processes. They are efficient and functional stable and offer an uniform sonication by PZT-large area oscillating systems. High-power generators supply these transducers with energy.

Flat transducer plates
for space-saving installation, if space is limited.
The nominal tank dimensions remain unchanged.

Features
- stainless steel plate of 3 mm, AISI 316 Ti
- ultrasonic frequencies 25 kHz or 40 kHz
- installation in rectangular outcut in tank.
- no drilling jigs and bores for mounting bolts are required.

Separate project advices on request.
**SONOREX TECHNIK**

High-power transducers

Versions made of special materials and in special designs

Explosive plated compound ultrasound
– patent EP 0 552 696

Robust design for an increased stability.
Solid plates of aluminium and stainless steel are inseparably connected by explosive force. PZT elements are screwed onto this compound plate without using any adhesives.

**Features**
- long life span caused by low erosion
- stainless steel 3 mm, AISI 316 Ti
- high temperature stability up to 125 °C max.
- suitable for pressure and vacuum applications
- new radiating characteristics
- ultrasonic frequencies: 25 kHz or 40 kHz
- immersible transducers and flat transducers plates are available in this technology

**CONVEXON Immersible transducers TC**
– patent D 100 13 120

Features
- convex radiating surface
- uniform distribution of ultrasound
- homogeneous cleaning effect
- little surface erosion
- extended life span
- stainless steel material of 2 mm, AISI 316 Ti, TIG-welded
- ultrasonic frequency 40 kHz

**CONCAVON Immersible transducers TN**
– patent D 100 13 120

Features
- concave radiating surface
- uniform distribution of ultrasound
- focused cleaning effect
- stainless steel material of 2 mm, AISI 316 Ti, TIG-welded
- ultrasonic frequency 40 kHz

**HF connection technology**

Quick-connect-technology

Immersible transducers are normally equipped with connection boxes with HF sockets for plug-in of HF cables. When operating the equipment in wet surroundings, we recommend a fixed cable connection (F) with high-strength cable gland (hose-proof). Flat transducer plates are equipped with HF sockets only, without connection boxes.

Separate project advices on request.
**SONOREX TECHNIK**
High-power transducers

**Examples for mounting of ultrasonic transducers**
For mounting in existing tanks alternative with pluggable HF cables in Quick-connect-technology (IP 51) or with fixed HF cable (IP 65).

**CONVEXON**
Immersible transducers TC ... E
for hanging into the tank, with welded bent stainless steel pipe and suspension hooks, easily displaceable and applicable in a number of different tanks.

Immersible transducers T ... E / EF
for hanging into the tank, with welded bent stainless steel pipe and suspension hooks, easily displaceable and applicable in a number of different tanks.

Immersible transducers T ... W
with stainless steel bend 90° (AISI 304) and flexible PTFE-protection hose of 2 m length, with armoured stainless steel braiding, for placing directly on the tank bottom when only little space is available.

Immersible transducers T ... B
with bolt mounting through the tank wall, resulting in a working area being free of disturbing cables. The cable routing to the generator is arranged outside the tank.

Quick-connect-technology
with connection boxes TA (drip-proof) – IP 51.

Fixed cable connection F
with high-strength cable gland (hose-proof) – IP 65.

Flat transducer plates P
for mounting in the tank, with cover as protection against contact.

Immersible transducers TC ... RF
with stainless steel feed trough pipe through the tank wall and fixed cable.
SONOREX TECHNIK
High-power ultrasonic generators LG and TG

Powerful generators are used for the operation of high-power transducers.

Module generators LG
The microprocessor controlled LG generators deliver the required HF power up to 9.0 kW at ultrasonic frequencies of 25 kHz or 40 kHz. The selection of the generators and the installation of power and operating modules depend on the needed total power of the ultrasonic transducers and on the desired way of controlling. Keypart of every generator are uniform power modules up to 1.5 kW equipped with an on-board microprocessor for exact control of all working parameters.

Separate project advices on request.

Compact generators TG 1503 and TG 3003 – specifically for mechanical engineering
Compact design for installation in an electrical cabinet
The microprocessor controlled ultrasonic generators are factory-programmed with a power of 0.3 to 3.0 kW. The operating frequency is 25 kHz or 40 kHz; a combination is also possible for the TG 3003. Wall installation is possible using an angle bracket (optional).

Compact generator TG 1503
dimensions (l × w × h): 250 × 460 × 110 mm
mains connection: 230 V~ (± 10 %) 50/60 Hz

Compact generator TG 3003
dimensions (l × w × h): 250 × 460 × 160 mm
mains connection: 230 V~ (± 10 %) 50/60 Hz

Separate project advices on request.
**SONOREX TECHNIK**  
Module concept generators LG

Established modular technology – reliable and powerful, with changeable operating and power modules

**Modular structure**  
All modules of the LG generator can be easily inserted or exchanged from the front. The generator is set up by the operating modules SM 3 or PRO 3. Power is controlled via power modules M.

**Flexibility**  
In order to increase the generator’s power, additional power modules can be easily inserted into vacant slots.

**Mixed installation of modules with different frequencies (25 or 40 kHz) is possible.**

**Communication**  
The connections for remote control and serial interface at the rear side allow the integration of the generators into higher ranking monitoring and controlling equipment.

<table>
<thead>
<tr>
<th>HF generators</th>
<th>Operating modules</th>
<th>Power modules</th>
</tr>
</thead>
</table>
| **Desktop housing (T)**  
up to 3.0 kW  
dimensions (l × w × h): 218 × 405 × 198 mm  
mains connection: 230 V~ (±10 %) 50 / 60 Hz  | control module SM 3  
max. 2  
processor module PRO 3  | M 1003 or M 1503 |

| **Industrial housing (F)**  
up to 6.0 kW  
dimensions (l × w × h): 488 × 405 × 203 mm  
or 19”-plug-in unit  
for electrical cabinet  
mains connection: 400 V 3N~ (±10 %) 50 / 60 Hz  | control module SM 3  
max. 4  
processor module PRO 3  | M 1003 or M 1503 |

| **Industrial housing (D)**  
up to 9.0 kW  
dimensions (l × w × h): 488 × 405 × 425 mm  
or 19”-plug-in unit  
for electrical cabinet  
mains connection: 400 V 3N~ (±10 %) 50 / 60 Hz  | control module SM 3  
max. 8  
processor module PRO 3  | M 1003 or M 1503 |
**SONOREX TECHNIK**

Module concept generators LG

**Operating and power modules of generators LG**

**Control module SM 3**
- continuous setting of the nominal power range from 10 to 100% via rotary controller
- START-STOP switch for switching on/off of the HF power

**Processor module PRO 3**
- individual programming of each power module
- degassing
- error indication

**Power modules M 1003 and M 1503 – patent D 196 49 975**
- LEDs indicate the working condition
- module switch for individual activation of separate power modules
- power deviation ± 2%
- protected against idle motion, short circuits and over load

- Separate project advice on request.

**Remote control / controlling of generators LG and TG**

**Remote control**
- remote control FS 15 L

The generators can be switched on/off via an external control contact at the rear side.
- FS 7: cable for remote control, 7 m length, with plug at one side
- FS 15 L: remote control with timer 1 to 15 min and continuous operation, cable for remote control, 7 m length, with plug

**Interface RS 232 for PLC or PC**

The integration of the generator into higher ranking controlling and monitoring equipment is possible via its interface.
The power modules are controlled directly by the PLC equipment.

**Software for process controlling**

**Software WINSONIC LG**
The PC software WINSONIC LG allows comfortable operation and process planning under direct control via a PC.
Customised assemblies with ultrasonic oscillating systems

Tanks, sinks, plates, flanges and other elements made of metal or synthetics can be directly equipped in a customized fashion with PZT oscillating systems to be used for cleaning or for other sonication processes.

### Examples

- PVDF tank for sonication of aggressive media
- Foulard ponds for sonication of dye baths
- Probe flange of a refractometer
- Polarimeter tube for analysis

### Project advices

- The area for the assembling has to be in level.
- Power per ultrasonic oscillating system:
  - metal surfaces: max 50 W
  - synthetic surfaces: max. 30 W
- The PZT oscillating systems can be covered with an housing (degree of protection IP 20) made of aluminium. This housing is only a protection against contact but no protection against splash water.

### PZT oscillating systems

<table>
<thead>
<tr>
<th></th>
<th>PD 40 12</th>
<th>PD 25 17</th>
</tr>
</thead>
<tbody>
<tr>
<td>frequency</td>
<td>40 kHz</td>
<td>25 kHz</td>
</tr>
<tr>
<td>diameter of bonding surface per system</td>
<td>min. dia. 55 mm</td>
<td>min. dia. 65 mm</td>
</tr>
<tr>
<td>height without cover</td>
<td>55 mm</td>
<td>77 mm</td>
</tr>
<tr>
<td>height with cover</td>
<td>70 mm</td>
<td>90 mm</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>1 to 10 pieces</th>
<th>1 to 10 pieces</th>
</tr>
</thead>
<tbody>
<tr>
<td>number of possible oscillating systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HF output</td>
<td>30 to 500 W</td>
<td>30 to 500 W</td>
</tr>
</tbody>
</table>

### HF generator LG 1001 T to LG 3020 T / PRO

<table>
<thead>
<tr>
<th>number of possible oscillating systems</th>
<th>6 to 60 pieces</th>
<th>6 to 60 pieces</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF output</td>
<td>300 to 3000 W</td>
<td>300 to 3000 W</td>
</tr>
</tbody>
</table>

Further assembly variation – also for curved surfaces, such as tubes – on request.

### Ultrasonic generators TG 50 – TG 50 / Z for connection to special assemblies

**Generators TG**

- HF-power up to 500 W
- Ultrasonic frequency: 40 kHz or 25 kHz

<table>
<thead>
<tr>
<th></th>
<th>TG 50</th>
<th>TG 100 Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains connection</td>
<td>230 V (± 10 %), 50/60 Hz</td>
<td>115 V (± 10 %), 50/60 Hz</td>
</tr>
</tbody>
</table>
SONOREX TECHNIK

Sonoreactors

SONOBLOC

Tube reactors for use in process engineering and for cleaning

Applications
- ultrasonic intensive treatment of flexible fibrous products and wire or band-shaped endless profiles
- disintegration and decomposition of organic material to increase the biogas yield of anaerobic digestion
- support of disinfection of bacteria- and parasite-burdened fishbreeding circulating waters
- dispersion of solid particles in liquids (medicine production)
- support of disinfection (bacterial elimination) in water and wastewater treatment
- CO₂ degassing of aqueous reactants
- efficient cleaning by removing grease, oil, emulsions and/or crack residues with single- and multiple-wire cleaning
- support of industrial and biotechnological processes in cleaning, disintegrating, degassing and disagglomerating

Set-up of a tube reactor:
The special arrangement of transducers enables an optimal sonication of the medium.

Technical data regarding sonoreactors please see page 23.
Applications
• intensifying of industrial, biotechnological and chemical processes, disintegrating, degassing and disagglomerating
• intense degassing of dye solutions and photographic emulsions
• CO₂ degassing of aqueous reactants
• support of disinfection (bacterial elimination) in water and wastewater treatment
• disinfection of organic contaminant material in industrial rinsing liquids for recycling
• support of disinfection of bacteria- and parasite-burdened fishbreeding circulating waters
• producing of finest polishing pastes for wafer industry
• homogenizing of pigments in oil (producing of ink)

Applications
• elimination of germs and parasites in the circulation water of aquaculture systems (fish and ornamental fish farming, leech farming)
• disinfection (elimination of bacteria) during water and sewage treatment

Technical data regarding sonoreactors please see next page.
<table>
<thead>
<tr>
<th>SONOBLOC tube reactor bloc RB</th>
<th>VORTEX vortex reactor bloc WB</th>
<th>ultrasonic-UV reactor bloc AQ</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8-1002.01</strong></td>
<td><strong>8-1004.01</strong></td>
<td><strong>101-2002.01</strong></td>
</tr>
<tr>
<td><strong>flow-through rate (l/min)</strong></td>
<td>1 – 100</td>
<td>1 – 50</td>
</tr>
<tr>
<td><strong>internal pressure, max. (bar)</strong></td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td><strong>solid particles (mm)</strong></td>
<td>&lt; 50</td>
<td>&lt; 80</td>
</tr>
<tr>
<td><strong>power density, max. (W/l)</strong></td>
<td>500</td>
<td>444</td>
</tr>
<tr>
<td><strong>power max. (W)</strong></td>
<td>1000</td>
<td>2000</td>
</tr>
<tr>
<td><strong>frequency (kHz)</strong></td>
<td>25</td>
<td>40</td>
</tr>
<tr>
<td><strong>radiation power</strong></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>reaction tube</strong></td>
<td>tube 2”</td>
<td>tube 3”</td>
</tr>
<tr>
<td><strong>sonicated volume (l)</strong></td>
<td>2.0</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>tube material stainless steel AISI 316Ti dimensions (mm)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>dia. 60.3 × 3.6</strong></td>
<td><strong>dia. 88.9 × 3.6</strong></td>
<td><strong>dia. 139.7 × 2.6</strong></td>
</tr>
<tr>
<td><strong>dimensions of housing (l × w × h) (mm)</strong></td>
<td>260 × 150 × 990</td>
<td>dia. 370 × 1215</td>
</tr>
<tr>
<td><strong>built-in length (mm)</strong></td>
<td>1215</td>
<td>856</td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td>IP 22, optional IP 65</td>
<td>IP 65</td>
</tr>
<tr>
<td><strong>weight, net (kg)</strong></td>
<td>~ 35</td>
<td>~ 50</td>
</tr>
<tr>
<td><strong>HF generator (separate)</strong></td>
<td>LG 1001 T</td>
<td>LG 2002 T</td>
</tr>
</tbody>
</table>

**Accessories (optional)**

victaulic connection VAS
consisting of:
2 pcs. 2” or 3” victaulic stainless steel coupling, AISI 316Ti with EPDM gasket
2 pcs. stainless steel tube connection, AISI 316Ti, 2” or 3”, for welding into existing pipe system

Other connection variants and detailed documentation on request.
# Ultrasonic baths – analog or digital

<table>
<thead>
<tr>
<th>Feature</th>
<th>SUPER RK ...</th>
<th>DIGITEC DT ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity (l)</td>
<td>0.9 – 90.0</td>
<td>0.9 – 90.0</td>
</tr>
<tr>
<td>Ultrasonic frequency (kHz)</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Sweep – SweepTec</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Fast degassing Degas</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Operation</td>
<td>Turning knobs</td>
<td>Keypad</td>
</tr>
<tr>
<td>Time setting (min)</td>
<td>1–15, ∞</td>
<td>1, 2, 3, 4, 5, 10, 15, 30, ∞</td>
</tr>
<tr>
<td>Data memory</td>
<td>-</td>
<td>No, type H-RC: software WINSONIC</td>
</tr>
<tr>
<td>Safety shut-down</td>
<td>-</td>
<td>After 12 hours</td>
</tr>
<tr>
<td>Heating, thermostatically adjustable (°C)</td>
<td>30 – 80</td>
<td>20 – 80</td>
</tr>
<tr>
<td>Heating</td>
<td>Optional, version „H“</td>
<td>Optional, version „H“</td>
</tr>
<tr>
<td>Setting accuracy of bath temperature (K)</td>
<td>± 5</td>
<td>± 2.5</td>
</tr>
<tr>
<td>Protection against retardation of boiling</td>
<td>-</td>
<td>✓ Optional switch-on</td>
</tr>
<tr>
<td>Excess temperature signal</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Thickness tank material (mm) / material version „C“</td>
<td>0.8 / AISI 304 2 / AISI 316 Ti</td>
<td>0.8 / AISI 304 2 / AISI 316 Ti</td>
</tr>
<tr>
<td>Hard chromium-plated</td>
<td>RK 102 H</td>
<td>DT 102 H / H-RC</td>
</tr>
<tr>
<td>Filling mark for safe dosage</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>One-piece welded drain</td>
<td>✓, from RK 102 H</td>
<td>✓, from DT 102 H</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 32</td>
<td>IP 33</td>
</tr>
<tr>
<td>Mains connection: 230 V– (± 10 %) 50 / 60 Hz</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Alternative 115 V– (± 10 %) 50 / 60 Hz</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Interface / PC software</td>
<td>-</td>
<td>RS 232, type H-RC / ✓</td>
</tr>
<tr>
<td>CE marked as medical device</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
### Ultrasonicex baths in compact design

for the usage in service, repair, maintenance and industry

![Ultrasonicex baths](image)

<table>
<thead>
<tr>
<th>type (selection)</th>
<th>internal tank dimensions l × w × d mm</th>
<th>capacity l</th>
<th>external dimensions l × w × h mm</th>
<th>ultrasonic peak power W**</th>
<th>HF power Weff W</th>
</tr>
</thead>
<tbody>
<tr>
<td>RK 102 H DT 102 H</td>
<td>240 × 140 × 100</td>
<td>3.0</td>
<td>260 × 160 × 250</td>
<td>480</td>
<td>120</td>
</tr>
<tr>
<td>RK 156 BH DT 156 BH</td>
<td>500 × 140 × 150</td>
<td>9.0</td>
<td>530 × 165 × 300</td>
<td>860</td>
<td>215</td>
</tr>
<tr>
<td>RK 156 BH DT 156 BH</td>
<td>500 × 140 × 150</td>
<td>9.0</td>
<td>530 × 165 × 300</td>
<td>860</td>
<td>215</td>
</tr>
<tr>
<td>RK 170 H</td>
<td>1000 × 200 × 200</td>
<td>39.0</td>
<td>1050 × 250 × 385</td>
<td>1520</td>
<td>380</td>
</tr>
<tr>
<td>RK 255 H DT 255 H</td>
<td>300 × 150 × 150</td>
<td>5.5</td>
<td>325 × 175 × 295</td>
<td>640</td>
<td>160</td>
</tr>
<tr>
<td>RK 514 H DT 514 H</td>
<td>325 × 300 × 150</td>
<td>13.5</td>
<td>355 × 325 × 305</td>
<td>860</td>
<td>215</td>
</tr>
<tr>
<td>RK 514 BH DT 514 BH</td>
<td>325 × 300 × 150</td>
<td>13.5</td>
<td>355 × 325 × 305</td>
<td>860</td>
<td>215</td>
</tr>
<tr>
<td>RK 1028 H DT 1028 H</td>
<td>500 × 300 × 200</td>
<td>28.0</td>
<td>535 × 325 × 400</td>
<td>1200</td>
<td>300</td>
</tr>
<tr>
<td>RK 1028 CH DT 1028 CH</td>
<td>500 × 300 × 300</td>
<td>45.0</td>
<td>540 × 340 × 500</td>
<td>1200</td>
<td>300</td>
</tr>
<tr>
<td>RK 1050 CH DT 1050 CH</td>
<td>600 × 500 × 300</td>
<td>90.0</td>
<td>640 × 540 × 530</td>
<td>2400</td>
<td>600</td>
</tr>
</tbody>
</table>

**corresponds to 4 times HF output

**Accessories: Insert baskets**

made of stainless steel. Additional accessories on request.

<table>
<thead>
<tr>
<th>type (selection)</th>
<th>accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>RK 102 H DT 102 H</td>
<td>K 3 C K 6 BL K 7 K 5 C K 10 K 14</td>
</tr>
<tr>
<td>RK 156 BH DT 156 BH</td>
<td>K 14 B</td>
</tr>
<tr>
<td>RK 170 H</td>
<td>K 14</td>
</tr>
<tr>
<td>RK 255 H DT 255 H</td>
<td>K 28</td>
</tr>
<tr>
<td>RK 510 H DT 510 H</td>
<td>K 28 C</td>
</tr>
<tr>
<td>RK 514 H DT 514 H</td>
<td>K 50 C</td>
</tr>
<tr>
<td>RK 514 BH DT 514 BH</td>
<td>K 50 C</td>
</tr>
<tr>
<td>RK 1028 H DT 1028 H</td>
<td>K 28</td>
</tr>
<tr>
<td>RK 1028 CH DT 1028 CH</td>
<td>K 28 C</td>
</tr>
<tr>
<td>RK 1050 CH DT 1050 CH</td>
<td>K 50 C</td>
</tr>
</tbody>
</table>
Besides ultrasonic power, temperature and time, specially balanced cleaning agents are also necessary to achieve optimum cleaning results. With special agents from DR. H. STAMM GmbH BANDELIN offers a wide range of adequate cleaning agents. These cleaning agents were specially developed for ultrasonic applications. With their cavitation-aiding properties, the special agents 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.

All TICKOPUR agents are also suitable for immersing and wiping.

Brochure with more information on request. Product information, safety data sheets and dosing table as PDF file you will find at: www.bandelin.com
**TICKOPUR**

**Cleaning agents**

### Dosing aids

<table>
<thead>
<tr>
<th>type</th>
<th>code no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-l-jerrycan</td>
<td>pump 268</td>
</tr>
<tr>
<td>25-l-jellycan (optional use)</td>
<td>stop cock pump 252 266</td>
</tr>
</tbody>
</table>

### Materials features

<table>
<thead>
<tr>
<th>contamination</th>
<th>concentrate</th>
<th>litres*</th>
</tr>
</thead>
<tbody>
<tr>
<td>steel, stainless steel, non-ferrous, precious and light metals, glass, ceramics, plastics, rubber</td>
<td>TICKOPUR R 33 universal cleaner anticorrosive, for service, industry, technology and laboratory, gentle cleaning, mildly alkaline, pH 9.9 (1 %), dosage 3 to 5 %</td>
<td>5 25 200</td>
</tr>
<tr>
<td>steel, stainless steel, non-ferrous, precious and light metals, glass, ceramics, plastics, rubber</td>
<td>TICKOPUR R 30 neutral cleaner based on tensides, anticorrosive, gentle cleaning, emulsifying, neutral, pH 7.0 (1 %), dosage 1 to 5 %</td>
<td>5 25 200</td>
</tr>
<tr>
<td>steel, stainless steel, precious metals, glass, ceramics, plastics, rubber Not for tin, zinc and light non-ferrous metals!</td>
<td>TICKOPUR R 27 special cleaner based on phosphoric acid, for decalcification and rust removal, anticorrosive, acid, pH 1.9 (1 %), dosage 5 %</td>
<td>5 25 200</td>
</tr>
<tr>
<td>steel, stainless steel, non-ferrous, precious and light metals, glass, ceramics, plastics, rubber</td>
<td>TICKOPUR TR 3 special cleaner based on citric acid, gentle cleaning, without phosphate, anticorrosive, weakly acid, pH 3.0 (1 %), dosage 5 %</td>
<td>5 25 200</td>
</tr>
<tr>
<td>steel, stainless steel, non-ferrous, precious and light metals, glass, ceramics, plastics, rubber, soldering frame</td>
<td>TICKOPUR TR 7 universal cleaner, demulsifying, for rapid separation of oil and grease, without phosphate, mildly alkaline, pH 8.9 (1 %), dosage 0.1 to 5 %</td>
<td>5 25 200</td>
</tr>
<tr>
<td>steel, stainless steel, glass, ceramics, plastics, rubber Not for tin, zinc and light metals! Non-ferrous metals can be affected.</td>
<td>TICKOPUR TR 13 intensive cleaner, demulsifying, for stubborn contamination, without phosphate and silicate, alkaline, pH 11.9 (1 %), dosage 0.1 to 10 %</td>
<td>5 25 200</td>
</tr>
<tr>
<td>steel, stainless steel, glass, ceramics, plastics, rubber Not for light metals! Caution with tin, zinc and non-ferrous metal!</td>
<td>TICKOPUR R 60 intensive cleaner, without phosphate, saponifying, alkaline, pH 12.8 (1 %), dosage 2 to 20 %</td>
<td>5 25 200</td>
</tr>
</tbody>
</table>

*Other sizes on request.

### Anticorrosive for ferrous metals

<table>
<thead>
<tr>
<th>materials</th>
<th>features</th>
<th>concentrate</th>
<th>litres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable for all ferrous metal such as cast iron, unprotected steels of different alloys.</td>
<td>Efficient anticorrosive after cleaning with TICKOPUR agents and consecutive aqueous rinsing. No formation of oil or grease films.</td>
<td>TICKOPUR KS 1 all-purpose anticorrosive for all ferrous metals, without solvents, neutral, pH 7.4 (1 %), dosage 0.5 to 2 %</td>
<td>2 5</td>
</tr>
</tbody>
</table>

Dosing aids: left: pump, right: stop cock

Detailed advice and technical documentation: Phone +49 30 76880–258
BANDELIN

The Company profile

BANDELIN electronic, a family-owned mid-sized company, is located in the capital of Germany – Berlin. Development and manufacture of ultrasonic devices and disinfection and cleaning agents are carried out in Berlin. A wide vertical range of manufacture, modern production lines and a motivated staff guarantee a high quality of the products. The customers can buy everything from one-hand. Ultrasonic devices are in use in nearly all branches like industry, maintenance, service, medical, pharmaceutical and dental fields as well as laboratories.

Development and manufacture of high-power ultrasonic units began already in 1955. The product range was enlarged in the middle of the eighties caused by increased sales. Adjustable and power-constant HF-generators were launched in 1992.

The brand names SONOREX, SONOPULS and SONOMIC are equated with ultrasound from experts.

The most important product groups are:
- SONOREX – Ultrasonic baths and reactors
- SONOPULS – Ultrasonic homogenisers
- SONOMIC – Ultrasonic bath for rinsable keyhole surgery instruments and standard instruments
- TRISON – Ultrasonic bath for robotic instruments, rinsable keyhole surgery instruments and standard instruments
- TICKOPUR – Cleaning agents

BANDELIN electronic is the leader in development of new ultrasonic devices and opening up new application areas. In the past about 27 patterns / utility patents and 34 brand names were applied for. The company supports several committees in compiling of norms and guidelines. All products are CE marked.
Some impressions of our production
Tell us your requirements –
We will pleased to advice you at no obligation.

+49 30 76880-0

www.bandelin.com