SONOREX TECHNIK

High-power ultrasound
Intensive cleaning for
Industry – Service – Maintenance

BANDELIN

65 years of experience in ultrasound

Overview

Find out about our new ultrasonic cleaning units and see them in action. Comprehensive consultation is guaranteed by our experts. Generators, oscillating systems and reactors are for a hands-on experience. BANDELIN electronic is represented at many major trade fairs at home and abroad, for example at the AMB, parts2clean and METAV.

Contents

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.

FRIENDLY TO THE ENVIRONMENT

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.

OPERATION-FRIENDLY

Ultrasonic cleaning units are easy to install, easy to operate and do not require special training.

Four main factors for successful ultrasonic cleaning

Ultrasound

Ultrasound produces 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 cavitaion 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.

Applications

Typical industrial applications

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

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

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

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

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

Material testing
Cleaning and degreasing of measuring tools

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

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

Energy management
Cleaning of armatures and water meters

Precision mechanics
Cleaning of stainless steel, brass and aluminium parts

Mould cleaning
Cleaning of plastic moulding tools

Grinding and polishing shops
Cleaning of lamp shades

Power stations
Cleaning of oil and smoke filters, decontamination

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

Thin-layer technology
Cleaning of sensor parts

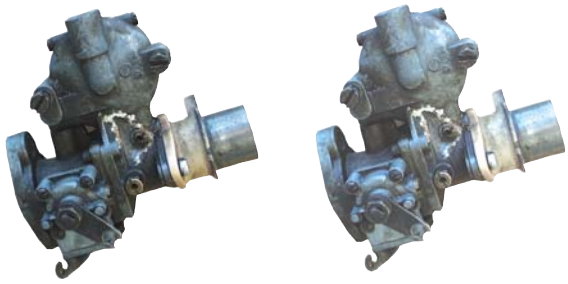
Service
Cleaning of computer parts

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

Medicine technology
Cleaning of dentures, implants and joints

Examples: ultrasonic cleaning

... of carburetors



dirty cleaned

... of oil filters

dirty cleaned

... of saw blades

dirty cleaned

... of respirators

dirty cleaned

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 todays demand for high quality, economic efficiency and environment associated factors.

- Units with ultrasound and heating (UH) – for cleaning. The heating supports the cleaning effect of the chemistry.
- Units with ultrasound (U) – for cleaning or rinsing with ultrasound support, without heating
- Units with heating (H) – for rinsing without ultrasound
- Units without ultrasound and without heating – for use with cascade rinsing in serveral tanks in a row

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

The established

The convenient

The two-parts

Characteristics	RM 16 to RM 210	RM 112 to RM 212	ZM 112 to ZM 212
Operating volume	13 to 210 litres	115 to 230 litres	115 to 230 litres
Internal tank	right-angled corners	round corners	round corners
Tank bottom	flat	inclined toward tank drain	inclined toward tank drain
Ultrasonic transducers	at the bottom	at the bottom	at the bottom and at one side
Ultrasonic power	fixed	fixed	adjustable
Ultrasonic generator	built-in	built-in	separate
Ultrasonic frequency	25 kHz* or 40 kHz	25 kHz or 40 kHz	25 or 40 kHz, or both
Operating elements	at bottom, right side	at upper right side	at upper right side

* from RM 110 on

The established – industrial units RM

RM 16 to RM 210 and RM 112 to RM 212 in 4 versions combinable:

RM ... UH with ultrasound and heating
RM ... U with ultrasound
RM ... H with heating
RM ... without ultrasound and without heating

RM 40 UH

The established industrial units RM 16 to 210
from 13 to 210 litres

- **Welded cleaning tank** − Made of 2 mm stainless steel AISI 316 Ti
- **Weir** − Floating contamination like particles, oil and grease can be removed from the bath surface using an oil separator.
- **Filling level mark** − Well recognizable imprint for the minimum filling level of the cleaning fluid.
- **Additional outlet** − For connection of an oil separator or for emptying the fluid behind the weir.
- **Drain for 3-way ball valve** − For emptying or refilling the tank or connecting to a filtration.
- **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.

Additionally from RM 110

- **Spraying pipe** − Generates in connection with an oil seperator a movement on the liquid's surface that leads floating oil and grease from the bath surface into the overflow weir.
- **Liquid level switch for dry run protection** of heating and ultrasonic transducers.
- **Height-adjustable feet**

Model (selection)	Internal tank dimensions (l × w × d) mm	Operating volume litres	External dimensions (l × w × h) mm	Ultrasonic peak power* W	HF power W_{eff}	Heating power W	Current consumption A**
RM 16 UH	325 × 275 × 200	13.0	365 × 340 × 390	1200	300	800	4.8
RM 40 UH	480 × 300 × 300	30.0	540 × 340 × 500	2000	500	1250	7.7
RM 75 UH	580 × 500 × 300	60.0	640 × 540 × 530	4000	1000	1950	12.9
RM 110 UH	600 × 450 × 450	110.0	780 × 550 × 800	4000	1000	4800	10.5
RM 180 UH	1000 × 500 × 400	160.0	1180 × 600 × 800	2 × 4000	2 × 1000	7200	14.8
RM 210 UH	750 × 650 × 500	210.0	930 × 750 × 800	2 × 4000	2 × 1000	7200	14.8

*Corresponds to 4 times HF output
**from RM/ZM 110 per phase
Mains connection:
RM 16 UH to RM 75 UH: 230 V~ (±10 %) 50/60 Hz, RM 110 UH to 210 UH: 400 V 3N~ (±10 %) 50/60 Hz. CEKON-plug 16 A.

The convenient – industrial units RM 112 UH to 212 UH
from 115 to 230 litres

Basic equipment analogue RM 110 – 210

welded cleaning tank made of 2 mm stainless steel AISI 316 Ti, ultrasound, heating, filling level mark, welded drain, overflow weir with drain, drip-proof housing made of stainless steel AISI 304

- **Spraying pipe**
  generates in connection with an oil seperator a movement on the liquid's surface that leads floating oil and grease from the bath surface into the overflow weir
- **Liquid level switch as dry run protection**
  for heating and ultrasonic transducers
- **Ultrasonic generator (built-in)**
  frequency of 40 kHz or 25 kHz
- **Height-adjustable feet**

RM 112 UH

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. Accumulation of particles and residual fluid on the tank bottom are considerably reduced.

Model (selection)	Internal tank dimensions (l × w × d) mm	Operating volume litres	External dimensions (l × w × h) mm	Ultrasonic peak power** W	HF power W_{eff}	Heating power W	Current consumption A***
RM 112 UH	600 × 450 × 450/470*	115.0	780 × 610 × 800	4000	1000	4800	10.5
RM 182 UH	1000 × 500 × 400/420*	170.0	1180 × 660 × 800	2 × 4000	2 × 1000	7200	14.8
RM 212 UH	750 × 650 × 500/520*	230.0	930 × 810 × 800	2 × 4000	2 × 1000	7200	14.8

*inclined tank bottom
**Corresponds to 4 times HF output
***per phase
Mains connection:
400 V 3N~ (± 10 %) 50/60 Hz, CEKON-plug 16 A.

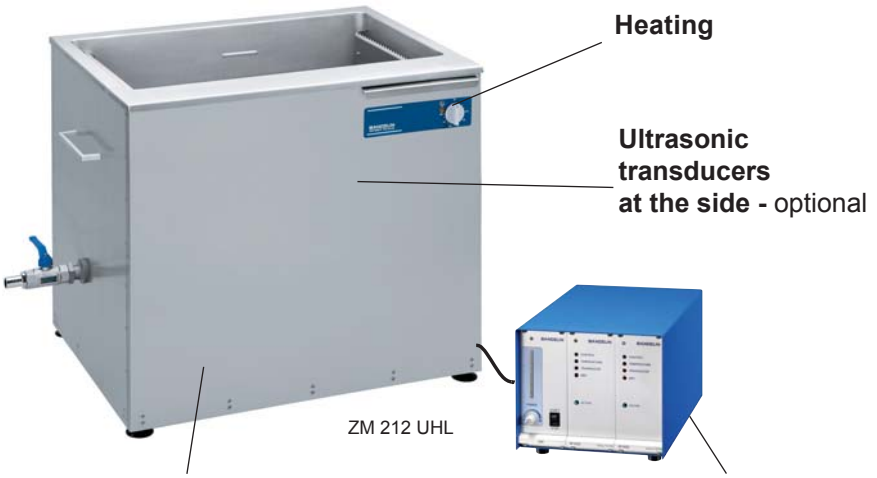
The two-parts – industrial units RM

Two-part industrial ultrasonic units from ZM 112 UH/L to 212 UH/L

- from 115 to 230 litres
- basic equipment analogue RM 112 – 212
- with ultrasonic transducers at the bottom and at one side (optional)
- also available in TwinSonic®-version as multi-frequency unit

Why two-parts?

- Separate installation of generator apart from the wet area
- 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
- Infinitely variable control of ultrasonic power

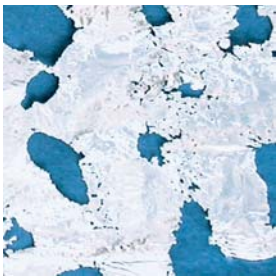


TwinSonic®-version as multi-frequency unit

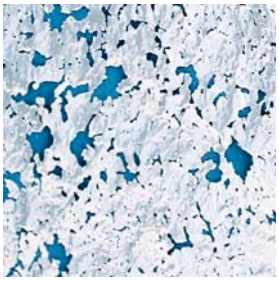
Registered utility model DE 20 2004 006 380

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 homogenious distribution of ultrasound and power, thus improving the cleaning efficiency and reducing the time needed for cleaning.

Illustration of the ultrasonic efficiency achieved with an aluminium foil according to IEC/TR 60886.



Single irradiation with 25 kHz



TwinSonic® irradiation with 25 kHz and 40 kHz

Model (selection)	Internal tank dimensions (l × w × d) mm	Operating volume litres	External dimensions (l × w × h) mm	Ultrasonic peak power** W	HF power W_{eff}	Heating power W	Current consumption A***
ZM 112 UH **ZM 112 UHL**	600 × 450 × 450/470*	115,0	780 × 610 × 800	4000 2 × 4000	1000 2 × 1000	4800	4.3 8.6
ZM 182 UH **ZM 182 UHL**	1000 × 500 × 400/420*	170,0	1180 × 660 × 800	2 × 4000 2 × 6000	2 × 1000 2 × 1500	7200	8.6 13.0
ZM 212 UH **ZM 212 UHL**	750 × 650 × 500/520*	230,0	930 × 810 × 800	2 × 4000 2 × 6000	2 × 1000 2 × 1500	7200	8.6 13.0

*inclined tank bottom
**Corresponds to 4 times HF output
***per phase
Mains connection:
400 V 3N~ (± 10 %) 50/60 Hz, CEKON-plug 16 A.

3 standard sizes in 4 versions each with infinitely variable control of ultrasonic power. Units equipped with ultrasonic transducers at the bottom or at the bottom and at one side for cleaning and rinsing.

ZM ... UH unit with ultrasonic transducers at the bottom and with heating
ZM ... UHL unit with ultrasonic transducers at the bottom and at one side and with heating
ZM ... U unit with ultrasonic transducers at the bottom
ZM ... UL unit with ultrasonic transducers at the bottom and at one side

Accessories

Insert baskets MK
protect the parts to be cleaned
and the unit against damage.

Lid MD
made of stainless steel,
to protect the liquid from contamination.

Model / Accessories	RM 16	RM 40	RM 75	RM 112 ZM 112 RM 110	RM 182 ZM 182 RM 180	RM 212 ZM 212 RM 210
Insert basket	MK 16 B	MK 40 B	MK 75 B	MK 110	MK 180	MK 210
Insert basket load up to 40 kg	-	MK 40 S	MK 75 S	MK 110 S	MK 180 S	MK 210 S
Insert basket for lifting device	MK 16 B	MK 40 B	MK 75 B	MK 110 B	MK 180 B	MK 210 B
Insert basket for lifting device, load up to 40 kg	-	MK 40 BS	MK 75 BS	MK 110 BS	MK 180 BS	MK 210 BS
Lid	MD 16	MD 40	MD 75	MD 110	MD 180	MD 210
Drop plate between 2 units	TB 16	TB 40	TB 75	TB 110	TB 180	TB 210

Additional equipment

MO 16.2

Oscillation MO

The electrically driven oscillation MO enables automatic movement of the basket in tanks of the production line RM 16 or RM 40.
The oscillating movement of the parts intensifies the cleaning efficiency of the ultrasonic irradiation and helps to remove dirt particles more efficiently.

Model / Additional equipment	RM 16	RM 40
Oscillation	**MO 16.2**	**MO 40**
Tank rack for 1 unit	**WO 16-1**	-

Further tank racks WO on request.

WO 16

Tank rack WO

The tank racks are designed for up to 4 units of the production line RM 16, in connection with oscillation MO 16.2.

MB 110 B

WG 110-2

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. The oscillating movement of the parts intensifies the cleaning efficiency of the ultrasonic irradiation and removes dirt particles more efficiently.

Tank rack WG

The tank racks WG are necessary for moving with the lifting device MB.

Model / Additional equipment	RM 16	RM 40	RM 75	RM 112 ZM 112 RM 110	RM 182 ZM 182 RM 180	RM 212 ZM 212 RM 210
Lifting device with oscillation, fixed, for one unit	-	-	-	**MB 110**	**MB 180**	**MB 210**
Lifting device with oscillation, movable, for tank rack WG	**MB 16**	**MB 40**	**MB 75**	**MB 110 B**	**MB 180 B**	**MB 210 B**
Tank rack for 2 units	**WG 16-2**	**WG 40-2**	**WG 75-2**	**WG 110-2**	**WG 180-2**	**WG 210-2**

Further tank racks WG on request.

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.

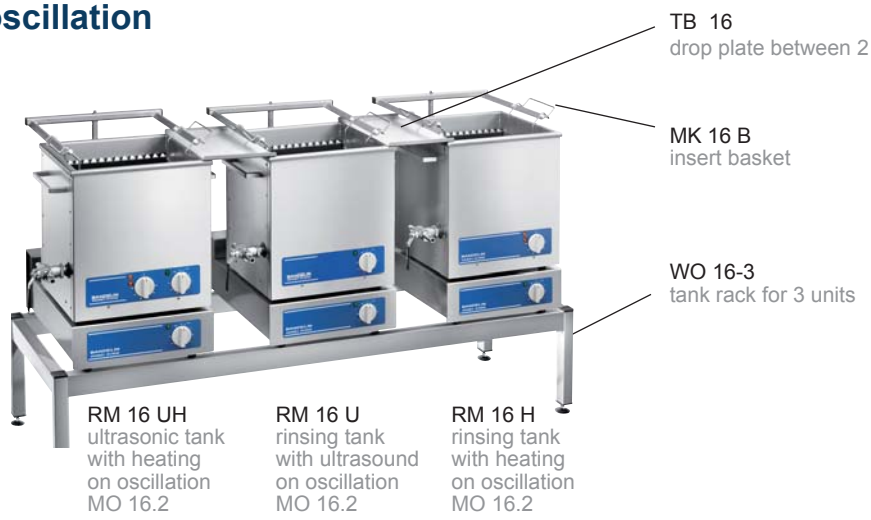
Trough dryer TO

The cleaned parts are dried after rinsing in order to rapidly remove residual moisture.

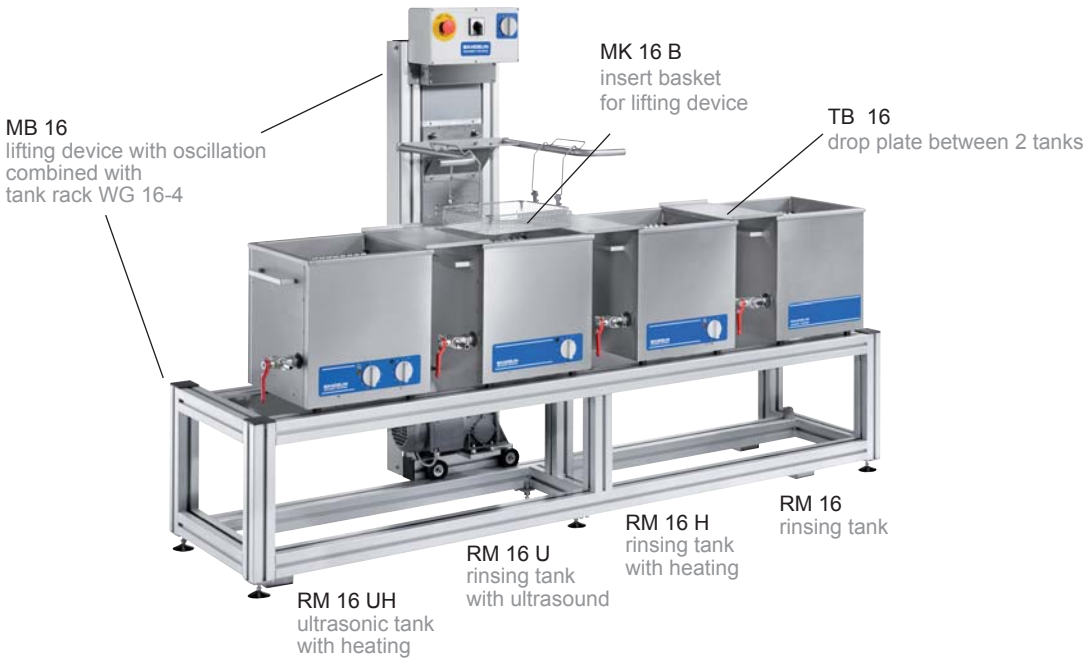
Model / Peripheral units	RM 16	RM 40	RM 75	RM 112 ZM 112 RM 110	RM 182 ZM 182 RM 180	RM 212 ZM 212 RM 210
Filtration	FA 16	FA 40	FA 75	FA 110	FA 180	FA 210
Oil separator	OX 16	OX 40	OX 75	OX 110	OX 180	OX 210
DI-water treament	WA 16	WA 40	WA 75	WA 110	WA 180	WA 210
Trough dryer	TO 16	TO 40	TO 75	TO 110	TO 180	TO 210

Examples of modular installations

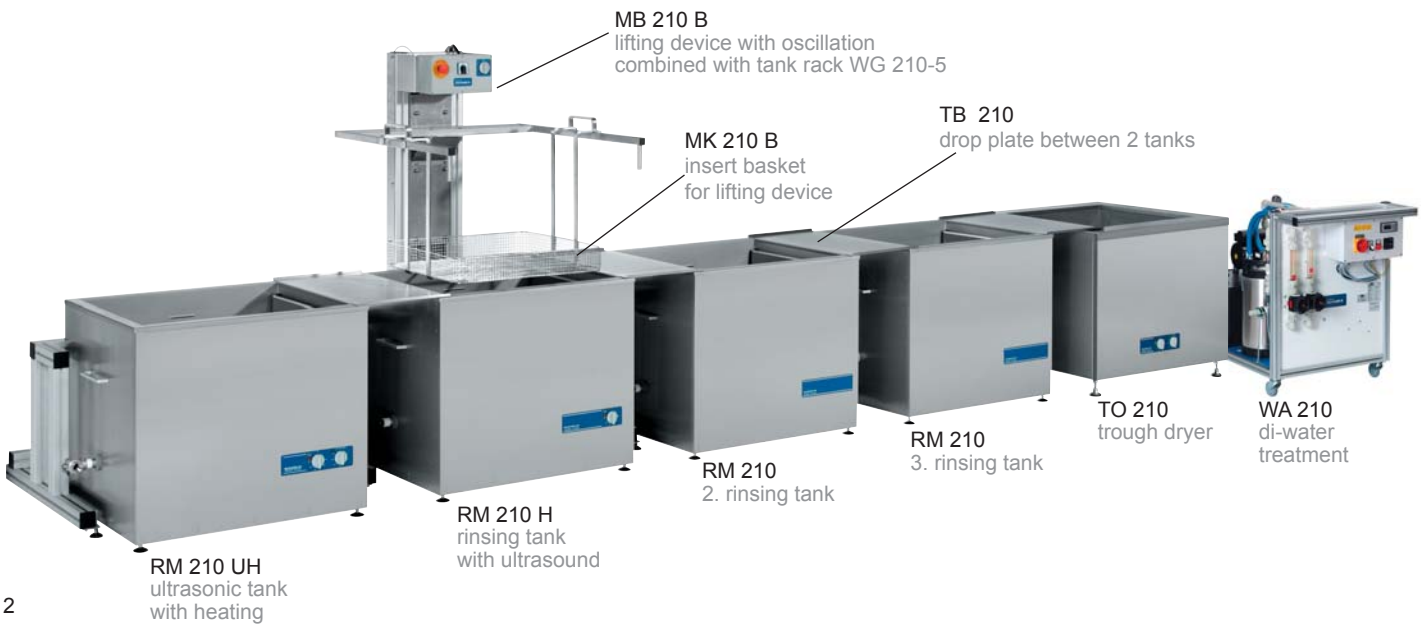
RM 16 range with oscillation



RM 16 range with lifting device



RM 210 range with lifting device and peripheral units



Saw blade holder SA 16 and SA 40
for cleaning saw blades and cutting tools, no additional cleaning necessary

SA 16 with RM 16 UH

Features

- Simple placement on existing ultrasonic units SONOREX TECHNIK RM 16 and RM 40
- Removal of persistent dirt, like resin residues
- Axis for different bore diameters

Specification

- Adaptable axis for different bore diameters: 20 to 50 mm
- Maximum load 8.0 kg
- Rotation speed approx. 1 rpm
- Timer 1 to 15 min and continuous operation
- Timer and motor inside an ABS-housing
- Mains connection 230 V~ (± 10 %) 50/60 Hz

Planing head holder HA 40, HA 110 and HA 112
for efficient cleaning of planing heads, no additional cleaning necessary

HA 40 with RM 40 UH

Features

- Simple retrofitting to existing ultrasonic units SONOREX TECHNIK RM 40 UH, RM 110 UH and RM 112 UH
- Motorised axle drive
- Useable planing heads diameter $_a$: 280 to 480 mm

Specification

- Planing head holding axle 3/4“, other holding axles (dia. 20 to 50 mm) usable
- Maximum load 80.0 kg
- Rotation speed of the drive roller approx. 1 rpm
- Timer 1 to 15 min and continuous operation
- Timer and motor inside stainless steel housing
- Mains connection 230 V~ (± 10 %) 50/60 Hz

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

LU 180

Compressed air supply up to 6 bar
Material made of stanless steel AISI 304

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

SONOREX TECHNIK W 65 and W 300 with extra high free board

Application

Cleaning of
– oil filters
– valves
– cylinder heads

Specially designed for use on ships.
The extra high tank freeboards avoid overflow of the cleaning liquid during cruising.

Specification

- 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
- Built-in heating, thermostatically adjustable from 30 to 80° C

W 65

W 300

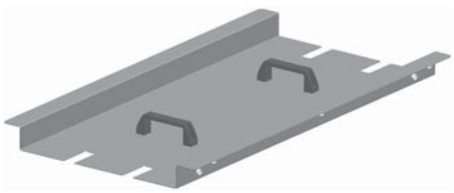
Accessories

Basket **WK 65**
Lid **WD 65**

WK 65

WD 65

Basket **WK 300** up to a load of 20 kg
Basket **WK 300 S** up to a load of 40 kg
Lid **WD 300**



WD 300

Model	Internal tank dimensions (l × w × d) mm	Operating volume litres	External dimensions (l × w × h) mm	Ultrasonic peak power* W	HF power W_{eff}	Heating power W	Current consumption A
W 65	500 × 300 × 450	30.0	560 × 360 × 650	1200	300	1450	7,0
W 300	1000 × 500 x 600	185.0	1180 × 600 × 1000	2 × 4000	2 × 1000	7200	14,8**

*Corresponds to 4 times HF output
**per phase
W 65 Mains connection 230 V~ (± 10 %), alternativ 115 V~ (± 10 %), 50/60 Hz, W 300 Mains connection 400 V 3N~ (± 10 %) 50/60 Hz
On request additional with integrated autotransformer for connection to the existing voltage of the ship.

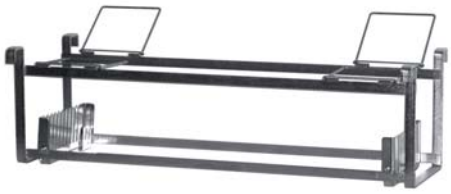
SONOREX TECHNIK RL 70 UH, long tank

Perfectly suitable for cleaning of long parts such as tubes, profiles, mill saw blades, long cutting blades

Accessories

Basket holder **KT 70 L**
Basket inset **RE 70 L**
Saw blade inset **SE 70 L**
Lid **MD 70**

Basket holder KT 70 L with basket inset RE 70 L



Basket inset KT 70 L with saw blade inset SE 70 L

Model	Internal tank dimensions (l × w × d) mm	Operating volume litres	External dimensions (l × w × h) mm	Ultrasonic peak power* W	HF power W_{eff}	Heating power W	Current consumption A
RL 70 UH	1700 × 250 × 250	70.0	1750 × 300 × 450	4000	1000	2000	13.1

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

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

L 220 with lifting device LB 220 for lowering and removal of the basket and for oscillating movement of parts in the cleaning or rinsing chamber.

Application

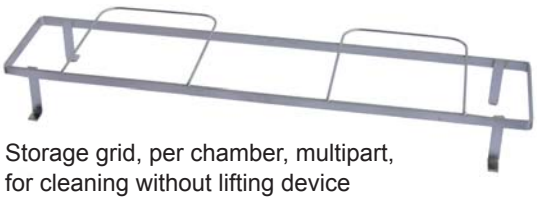
Cleaning of blinds, lamp grids, reflectors, weaving healds, preforms and slat blinds

SONOREX TECHNIK L 220

- Separate HF generator LG 2002 T
- Frequency 40 kHz
- Mains connection 230 V~ (± 10 %) 50/60 Hz
- Optional lifting device LB 220 with basket

SONOREX TECHNIK L 320

- Separate HF generator LG 4004 F
- Frequency 40 kHz
- Mains connection 400 V 3N~ (± 10 %) 50/60 Hz
- Optional lifting device LB 320 with basket



Storage grid, per chamber, multipart, for cleaning without lifting device
LR 220
LR 320

Lifting device with oscillation and with basket
LB 220
LB 320

Additional accessories such as a heating device can be supplied on request.

Model	Internal tank dimensions (l × w × d) mm	Operating volume per chamber litres	External dimensions (l × w × h) mm	Ultrasonic peak power* W	HF power W_{eff}	Current consumption A
L 220	2200 × 300 × 300/370❶	185.0	2320 × 750 × 850	2 × 4000	2 × 1000	8.6
L 320	3200 × 300 × 370/370❶	270.0	3320 × 750 × 850	4 × 4000	4 × 1000	8.6**

*Corresponds to 4 times HF output **per phase ❶ultrasonic-/rinsing chamber

High-power transducers

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

Immersible transducers for quick installation

Immersible transducers are used for sonication in large tanks or sinks without modifying the exisiting equipment to a large extent.

Features

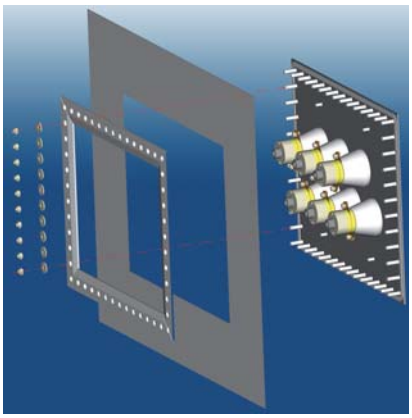
- Stainless steel housing of 2 mm, AISI 316 Ti, TIG welded
- Ultrasonic frequency 25 kHz or 40 kHz
- Drip-proof or hose-proof HF cable connections
- 10 different versions create a variety of application

Flat transducers plates P – for space-saving installation

Flat transducer plates are installed into the side wall or into the tank bottom, if space is limited. The nominal tank dimensions remain unchanged.

Features

- No drilling jigs and bores for mounting bolts are required!
- Installation in rectangular outcut in tank
- Stainless steel plate of 3 mm, AISI 316 Ti
- Ultrasonic frequency 25 kHz or 40 kHz
- Drip-proof HF cable connection



Exemples

HF power W_{eff}	Radiating surface* (l × w) mm	Immersible transducer 25 or 40 kHz External dimensions** (l × w) mm	Flat transducer plates 25 or 40 kHz External dimensions (l × w) mm
200	170 × 160	230 × 160	255 × 230
400	325 × 160	385 × 160	380 × 230
500	325 × 235	385 × 235	380 × 305
1000	415 × 325	475 × 325	480 × 380
1500	595 × 355	655 × 355	680 × 430
2000	565 × 355	625 × 355	630 × 430

* Radiating surface = external dimensions of installation type B
**external dimensions of installation types E, P, R and W.

Separate project advices on request.

CONVEXON®-Immersible transducer TC

patent D 100 13 120

TC 40 30 6 P

Features

- Convex radiating surface
- Consistent 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

Applications

- Super fine cleaning of sensitive parts
- Near field irradiation in process technology

HF power W_{eff}	Radiating surface * (l × w) mm	Immersible transducers TC external dimensions ** (l × w × h) mm
300	634 x 90	694 x 90 x 68
600	634 x 172	694 x 172 x 68
1000	634 x 260	694 x 260 x 68

* Radiating surface = external dimensions of installation type B
**external dimensions of installation types E, P, R and W.

CONCAVON®-Tauchschwinger TN

patent D 100 13 120

TN 40 10 6 RF

Features

- Concave radiating surface
- Uniform distribution of ultrasound
- Focussed cleanig effect
- Stainless steel material of 2 mm, AISI 316 Ti, TIG-welded
- Ultrasonic frequency 40 kHz

Applications

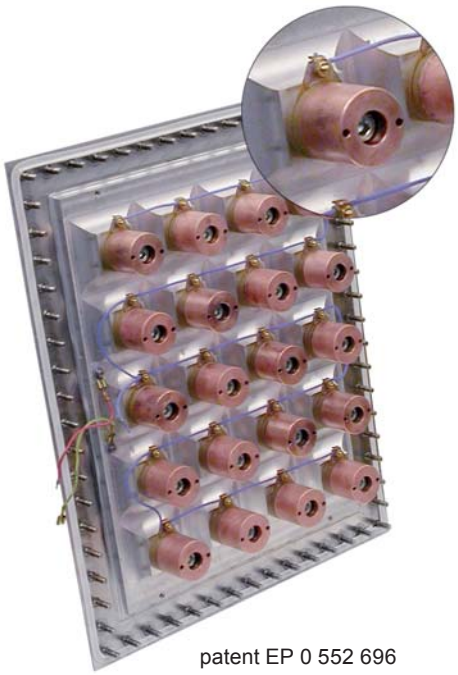
- Focused intensive cleaning of longish or fibrous parts
- Especially suitable for wire cleaning

HF power W_{eff}	Radiating surface * (l × w) mm	Immersible transducers TN external dimensions ** (l × w × h) mm
300	634 x 90	694 x 90 x 84

* Radiating surface = external dimensions of installation type B,
**external dimensions of installation types E, P, R and W.

Separate project advices on request.

Explosive plated compound ultrasound with extended life span



patent EP 0 552 696

Special design

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.

Mounting example

Explosive plated compound ultrasound mounted as flate transduser plate in a tank.

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
- Equal power along the entire surface
- Increased mechanical stability due to rugged design
- High reliability due to nonbonded transducers
- Ultrasonic frequencies: 25 kHz or 40 kHz
- Immersible transducers and flat transducers plates are available in this technology

Examples

Compound sound	25 kHz immersible transducers TQ and flat transducer plates PQ			40 kHz immersible transducers TQ and flat transducer plates PQ		
HF power W_{eff}	Radiating surface * (l × w) mm	TTQ external dimensions ** (l × w) mm	PQ external dimensions (l × w) mm	Radiating surface * (l × w) mm	TQ external dimensions ** (l × w) mm	PQ external dimensions (l × w) mm
500	558 × 198	622 × 198	605 × 255	384 × 134	448 × 134	430 × 205
750	414 × 342	478 × 342	455 × 405	284 × 234	348 × 234	330 × 305
1000	558 × 342	622 × 342	605 × 405	384 × 234	448 × 234	430 × 305
1500	702 × 414	766 × 414	730 × 480	384 × 334	448 × 334	430 × 405

* Radiating surface = external dimensions of installation type B
**external dimensions of installation types E, P, R and W.

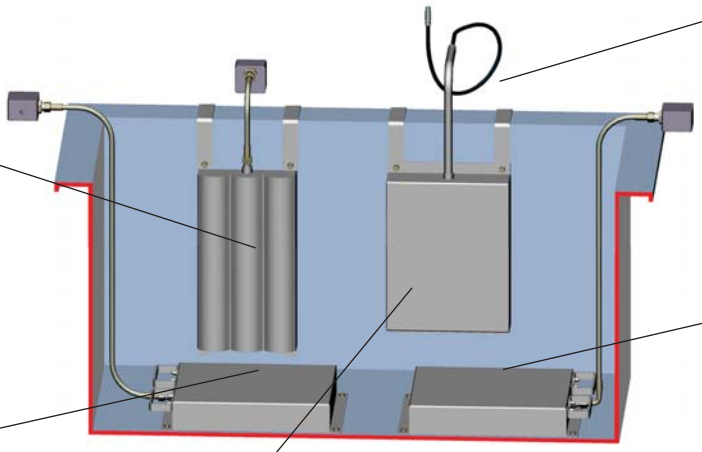
Separate project advices on request.

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 transducer 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 transducer T...P
with flexible PTFE-protection hose of 2 m length, armoured stainless steel braiding (AISI 304), for placing directly on the tank bottom



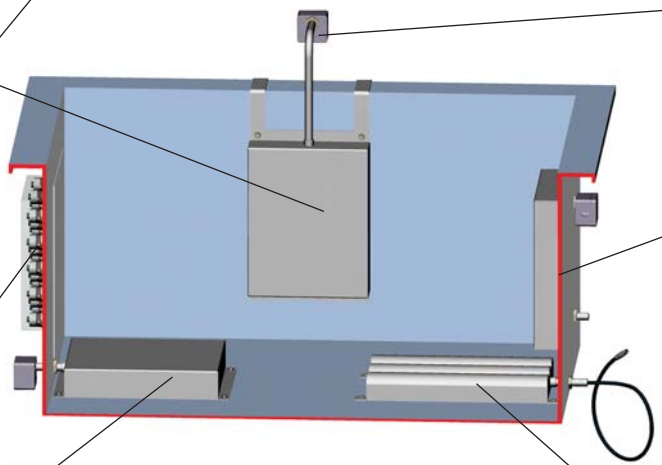
Fixed cable connection F
with high-strength cable gland (hose-proof)
– IP 65

Immersible transducer 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 transducer 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

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

Immersible transducer T...R
with stainles steel feed through pipe through the tank wall



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

Immersible transducer 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.

CONVEXON®
Immersible transducer TC...RF
with stainless steel feed through pipe through the tank wall and fixed cable

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.

High power ultrasonic generators

High power ultrasonic transducer systems are operated with powerful generators. The microprocessor controlled LG generators deliver the required HF power up to a range of 9000 Watt.

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.

Flexibilty

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. Ultrasonic transducers of other manufacturers can be connected to the power modules as well.

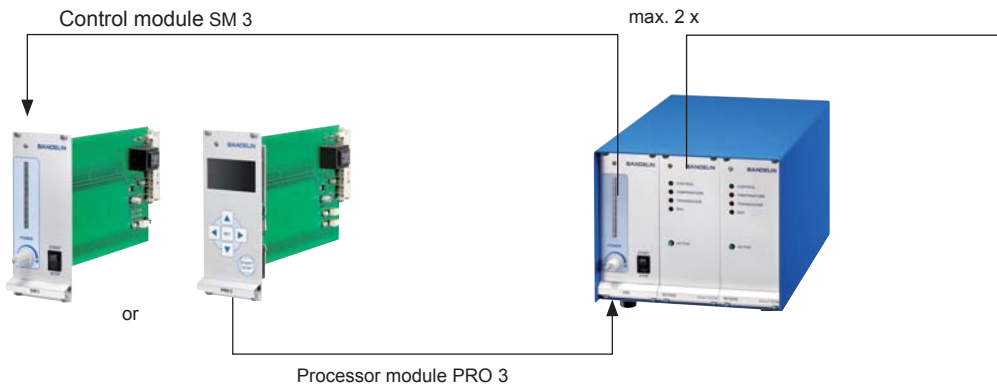
Generators

Operating modules

Desktop housing (T)
up to 3 kW

Dimensions (l × w × h):
405 × 218 × 198 mm

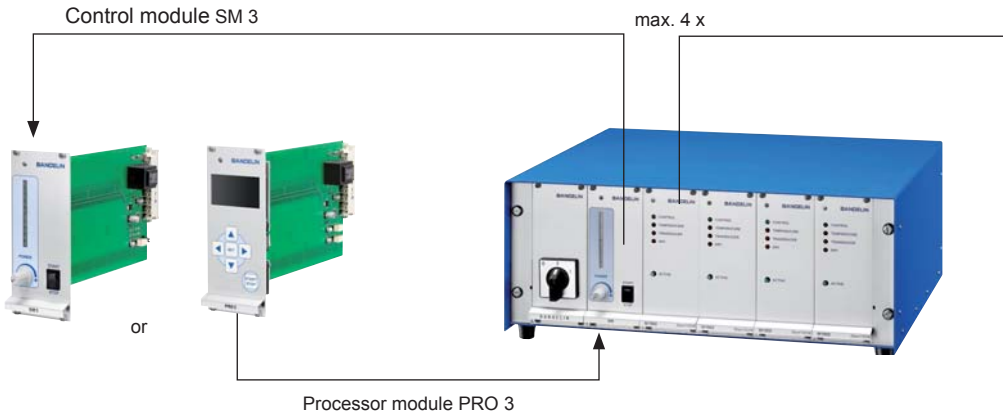
Mains connection:
230 V~ (± 10 %) 50/60 Hz



Industrial housing (F)
up to 6 kW

Dimensions (l × w × h):
405 × 488 × 203 mm
or 19”-plug-in unit
for electrical cabinet

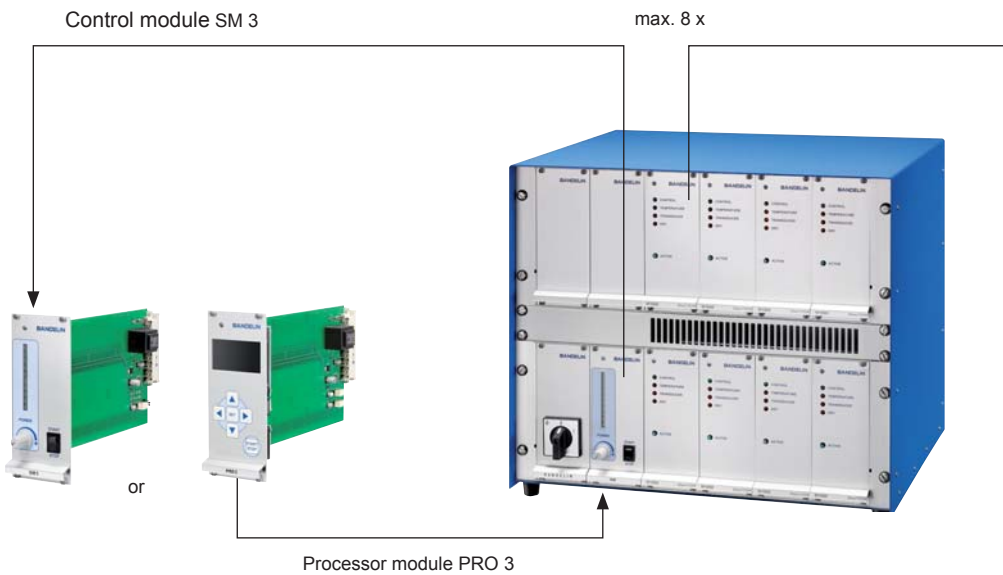
Mains connection:
400 V 3N~ (± 10 %) 50/60 Hz



Industrial housing (D)
up to 9 kW

Dimensions (l × w × h):
405 × 488 × 425 mm
or 19”-plug-in unit
for electrical cabinet

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



Keypart of every generator are uniform power modules up to 1500 W equipped with an on-board microprocessor for exact control of all working parameters.

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.

Selection

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.

Power modules

patent DE 196 49 975

M 1003 or
M 1503

M 1003 or
M 1503

M 1003 or
M 1503

Selection of generators

LG 1001 T
LG 1001 T PRO

LG 1510 T
LG 1510 T PRO

LG 2002 T
LG 2002 T PRO

LG 3020 T
LG 3020 T PRO

LG 3003 F
LG 3003 F PRO
LG 4004 F
LG 4004 F PRO

LG 4530 F
LG 4530 F PRO

LG 6040 F
LG 6040 F PRO

LG 5005 D
LG 5005 D PRO

LG 6006 D
LG 6006 D PRO

LG 7007 D
LG 7007 D PRO
LG 7550 D
LG 7550 D PRO

LG 8008 D
LG 8008 D PRO

LG 9060 D
LG 9060 D PRO

Separate project advices on request.

Power modules M 1003 and M 1503

patent DE 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

Control module SM

- 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

Ultrasonic compact generators TG – especially for mechanical engineering

TG 3003 TG 1503

For operating high power ultrasonic transducer systems. The microprocessor controlled ultrasonic generators are factory-programmed with a power of 300 to 3000 W. 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 - 1,5 kW
Dimensions (l × w × h): 250 × 460 × 110 mm
Mains connection: 230 V~ (± 10 %) 50/60 Hz

Compact generator TG 3003 - 3,0 kW
Dimensions (l × w × h): 250 × 460 × 160 mm
Mains connection: 230 V~ (± 10 %) 50/60 Hz

Separate documents on request.

Remote control

The generators can be switched on/off via an external control contact at the rear side.

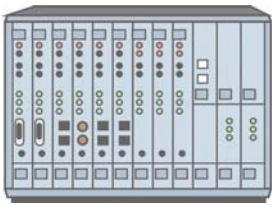
FS 7: Cable for remote control, 7 m length, with plug at one side

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.

Generator



PLC

WINSONIC® LG-Software

The PC software WINSONIC® LG allows comfortable operation and process planning under direct control through a PC. The PC connection is made via the serial interface of the generator.
Individual setting of performance parameters is possible as well as programming, saving and databasing of process data for various applications. Operating status, nominal and actual power of the power modules as well as processing times are displayed clearly.

WINSONIC® LG:

PC programm on CD, 5 m serial cable (SUB-D; 9-poles)

System requirements: Windows 2000 / XP / 7

V⊃RTEX® reactor for use in the process engineering

SONOREX TECHNIK V⊃RTEX® Reactor
EP 22 23 742

Applications

- Intensifying of industrial, biotechnological and chemical processes, disintegrating, degassing and disagglomerating
- Intense degassing of dye solutions and photographic emulsions
- CO_2 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)

Bundesministerium für Bildung und Forschung

WR 4-1503.01

Ready for use vortex reactor WR
consisting of:
Vortex reactorbloc WB and HF generator LG

Ultrasonic-UV-Reactor for use in the water treatment, aquaculture and sewerage disinfection

SONOREX TECHNIK Ultrasonic-UV-Reactor

Applications

- Killing of germs and parasites in the circulation water of aquaculture systems (fish and ornamental fish farming, leech farming)
- Disinfection (killing of bacteria) during water and sewerage treatment

gefördert durch DBU Deutsche Bundesstiftung Umwelt

UV 5-1002.05

Ready for use Ultrasonic-UV-Reactor
consisting of:
Ultrasonic-UV-Reactorbloc AQ and
HF UV generator LG

Separate documents on request.

SONOBLOC® for use in the process engineering and cleaning

SONOREX TECHNIK Tube Reactor SONOBLOC®

Bundesministerium
für Bildung
und Forschung

Applications

- Ultrasonic intensive treatment of flexible fibrous products and wire or band-shaped endless profiles
- Support of industrial and biotechnological processes in cleaning, disintegrating, degassing and disagglomerating
- Efficient cleaning by removing grease, oil, emulsions and/or crack residues with single- and multiple-wire cleaning
- CO_2 degassing of aqueous reactants
- Support of disinfection (bacterial elimination) in water and wastewater treatment
- Acceleration of disintegration and/or decomposition of organic contaminant material in treatment of sludge
- Support of disinfection of bacteria- and parasite-burdened fishbreeding circulating waters
- Dispersing of solid particles in liquids (medicine production)

SB 8-1002.01

Ready for use tube reactor SB
consisting of:
Tube reactorbloc RB and HF generator LG

Customized 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. PZT oscillating systems are glued to the external surfaces so that the irradiation efficiency is directed into the liquid or to an object placed within the liquid.

Examples

PVDF tank for sonication of aggressive media

Foulard ponds for sonication of dye baths

Probe flange of a refractometer

Polarimeter tube for analysis

Ultrasonic generators for connection to special assemblies

TG 50

TG generators
HF power up to 500 W
Ultrasonic frequency 40 kHz
or 25 kHz

LG 1510 T

LG generators
HF power starting at 500 W
Ultrasonic frequency 40 kHz
or 25 kHz

Separate documents on request.

Table top units

Applications in service, repair, maintenance and industry

Specification

- Oscillating tank made of stainless steel, RK/DT 102 H hard chromium-plated
- HF frequency 35 kHz - SweepTec®
- Mains connection 230 V~ (± 10 %), alternativ 115 V~ (± 10 %), 50/60 Hz

SONOREX SUPER RK

- Time switch for 1 – 15 min or continuous operation
- Heating, thermostatically adjustable from 30 – 80 °C
- Drip-proof stainless steel housing, with outlet

SONOREX DIGITEC DT

- Time setting 1 – 30 min or continuous operation
- Heating 20 – 80 °C, thermostatically adjustable
- Spray-proof stainless steel housing, with outlet
- Alert LED for over temperature

DT 514 BH

Drill head cleaning in the ultrasonic bath RK 102 H

SONOREX SUPER

Internal tank dimensions (l x w x d) mm	Capa-city litres	Model (selction)	External dimensions (l x w x h) mm	Ultrasonic peak power * W	HF power W_{eff}	Heating power W	Current consump-tion A
240 × 140 × 100	3.0	RK 102 H	260 × 160 × 250	480	120	140	1.2
500 × 140 × 150	9.0	RK 156 BH	530 × 165 × 300	860	215	600	3.6
1000 x 200 x 200	39.0	RK 170 H	1050 x 250 x 385	1520	380	1600	8.7
300 × 150 × 150	5.5	RK 255 H	325 × 175 × 305	640	160	280	2.0
300 × 240 × 150	9.7	RK 510 H	325 × 265 × 305	640	160	400	2.5
325 × 300 × 150	13.5	RK 514 H	355 × 325 × 305	860	215	600	3.6
325 × 300 × 200	18.7	RK 514 BH	355 × 325 × 385	860	215	600	3.6
500 × 300 × 200	28.0	RK 1028 H	535 × 325 × 400	1200	300	1300	7.0
500 × 300 × 300	45.0	RK 1028 CH	540 × 340 × 500	1200	300	1450	7.7
600 × 500 × 300	90.0	RK 1050 CH	640 × 540 × 530	2400	600	1950	11.1

SONOREX DIGITEC

240 × 140 × 100	3.0	DT 102 H	260 × 160 × 250	480	120	140	1.2
500 × 140 × 150	9.0	DT 156 BH	530 × 165 × 300	860	215	600	3.6
300 × 150 × 150	5.5	DT 255 H	325 × 175 × 305	640	160	280	2.0
300 × 240 × 150	9.7	DT 510 H	325 × 265 × 305	640	160	400	2.5
325 × 300 × 150	13.5	DT 514 H	355 × 325 × 305	860	215	600	3.6
325 × 300 × 200	18.7	DT 514 BH	355 × 325 × 385	860	215	600	3.6
500 × 300 × 200	28.0	DT 1028 H	535 × 325 × 400	1200	300	1300	7.0
500 × 300 × 300	45.0	DT 1028 CH	540 × 340 × 500	1200	300	1450	7.7
600 × 500 × 300	90.0	DT 1050 CH	640 × 540 × 530	2400	600	1950	11.1

*Corresponds to 4 times HF output

Accessories

Unit / Accessories	RK 102 H DT 102 H	RK 156 BH DT 156 BH	RK 170 H	RK 255 H DT 255 H	RK 510 H DT 510 H
Insert basket	K 3 C	K 6 BL	K 7	K 5 C	K 10

Unit / Accessories	RK 514 H DT 514 H	RK 514 BH DT 514 BH	RK 1028 H DT 1028 H	RK 1028 CH DT 1028 CH	RK 1050 CH DT 1050 CH
Insert basket	K 14	K 14 B	K 28	K 28 C	K 50 C

Insert baskets
made of stainless steel.

K 14

Further accessories on request.

Cleaning concentrates

Besides ultrasonic power, temperature and relevant processing time, specially balanced cleaning agents are also necessary to achieve optimum cleaning results.
With TICKOPUR cleaning concentrates, BANDELIN offers a wide range of adequate cleaning agents. All of the TICKOPUR cleaning agents were specially developed for ultrasonic applications. With their cavitation-aiding properties, the cleaning concentrates support the cleaning process and are gentle to the material at the same time. Depending on the cleaning tasks, either alkaline, neutral or acidic cleaning agents are recommended.
They are biologically degradable and easy to dispose of.

Objects to be cleaned	Contamination	Cleaning concentrate	Litres*
Steel, stainless steel, non-ferrous, precious and light metals, glass, ceramics, plastics, rubber, windows, glasses, electrostatic filters, respirator masks	General contamination, drilling, grinding, polishing and lapping residues, oily and greasy residues, dust, soot, ink etc.	**TICKOPUR R 33** **universal cleaner** anticorrosive, for service, industry, technology and laboratory, gentle cleaning, mildly alkaline, pH 9.9 (1 %) dosage 1 to 5 %	5 l 25 l 200 l
Steel, stainless steel, non-ferrous, precious and light metals, glass, ceramics, plastics, rubber	Light drilling, grinding, polishing and lapping residues, dust	**TICKOPUR R 30** **neutral cleaner** based on tensides, anticorrosive, gentle cleaning, emulsifying, neutral, pH 7 dosage 1 to 5 %	5 l 25 l 200 l
Steel, stainless steel, precious metals, glass, ceramics, plastics, rubber. Not for tin, zinc, light and non-ferrous metals!	Heavy mineral residues (chalk, silicate, phosphate, cement etc.), rust, temper colours, metal oxides, grease and oil films	**TICKOPUR R 27** **special cleaner** based on phosphoric acid, for decalcification and rust removal, anticorrosive, acid, pH 1.9 (1 %), dosage 5 %	5 l 25 l 200 l
Steel, stainless steel, non-ferrous, precious and light metals, glass, ceramics, plastics, rubber	Mineral residues, drifting rust, grease, oils, waxes, pigments, drilling, grinding, polishing and lapping residues	**TICKOPUR TR 3** **special cleaner** based on citric acid, gentle cleaning, without phosphate, anticorrosive, weakly acid, pH 3.0 (1 %), dosage 5 %	5 l 25 l 200 l
Steel, stainless steel, non-ferrous, precious and light metals, glass, ceramics, plastics, rubber, soldering frames	Grease, oils, waxes, pigments, flux media, soldering pastes, drilling, grinding, polishing and lapping residues	**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 %	5 l 25 l 200 l
Steel, stainless steel, glass, ceramics, plastics, rubber Not for tin, zinc and light metals! Non-ferrous metals can be affected.	Coke residues, resinous residues, soot, grease, oils, waxes, pigments, coloured fog, drilling, grinding, polishing and lapping residues	**TICKOPUR TR 13** **intensive cleaner,** demulsifying, for stubborn contamination, without phosphate and silicate, alkaline, pH 11.9 (1 %) dosage 0.1 to 10 %	5 l 25 l 200 l
Metal, glass, ceramics, plastics, rubber assembled and non-assembled printed circuit boards, soldering frames, electronic components, boards	Resinous flux, soldering paste, ionic and non-ionic residues, drilling and grinding residues fingerprints, fat, oil	**TICKOPUR TR 14** **Flux-remover**, with ammonia, tenside- and phosphate-free, non foaming, alkaline, pH 10.7 (1 %), dosage 10 %	5 l 25 l 200 l
Steel, stainless steel, non-ferrous, precious and light metals, glass, optical glass, ceramics, plastics, rubber, venetian blinds, vertical and horizontal blades	General contamination, oil, grease and distillation residues, organic and inorganic residues	**TICKOPUR R 36** **special cleaner,** tenside-free, for the analytical application and blade cleaning, non-foaming, gentle cleaning, mildly alkaline, pH 9.9 (1 %) dosage 0.25 to 5 %	5 l 25 l 200 l
Steel, stainless steel, non-ferrous, precious and light metals, blackfinished metal, glass, ceramics, plastics, rubber etc. Especially for galvanic, laser and analytical application.	General contamination, oily-, greasy- and distillation residues, organic and inorganic residues	**TICKOPUR R 32** **special cleaner,** non-chelating, anticorrosive, gentle cleaning, mildly alkaline, pH 11.1 (1 % in DI water) dosage 0.25 to 5 % Dilute with DI water!	5 l 25 l 200 l
Steel, stainless steel, glass, ceramics, plastics, rubber Not for light metals! Caution with tin, zinc and non-ferrous metal!	Coke residues, resinous residues, soot, pigments, grease, oils, waxes, silicon oils, coloured fog, drilling, grinding, polishing and lapping residues etc.	**TICKOPUR R 60** **intensive cleaner,** without phosphate, strongly alkaline, pH 12.8 (1 %) dosage 2 to 20 %	5 l 25 l 200 l

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

All TICKOPUR agents are also suitable for dipping and wiping.
*Other sizes on request.

Anticorrosive for ferrous metals

Material	Characteristics	Concentrate	Litres
Applicable for all ferrous metal such as cast iron, unprotected steels of different alloys.	Efficient anticorrosive after cleaning with TICKOPUR agents and consecutive aqueous rinsing. No formation of oil or grease films.	**TICKOPUR KS 1** **All-purpose anticorrosive** for all ferrous metals, without solvents, neutral, pH 7.4 (1 %), dosage 0.5 to 2 %	2 l 5 l

BANDELIN electronic – Berlin
Your partner for quality and reliability

The familiy-owned mid-sized company is specialized in manufacturing ultrasonic equipment, accessories and cleaning agents. It maintains a Quality Management System complying with the requirements of EN ISO 9001:2008, EN ISO 13485:2012

Our strengths for your benefit

- Free of charge test cleaning to clarify the process technology
- Short-term delivery

Quality and precision combined with 65 years experience in the precise and electronic apparatus engineering is reflected in the wide product range.
Our products for a vast variety of applications underline the present importance of efficient ultrasonic technology.
The production site is located in the capital of germany, Berlin.

28220 GB/2014-04

Subject to technical alterations without notice.
All units are CE-marked.

Dimensions are subject to manufacturing tolerances.

BANDELIN
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Member in
FIT
FACHVERBAND INDUSTRIELLE TEILEREINIGUNG E.V.

65 years of experience in ultrasound

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