

***SONOREX* TECHNIK**

High-power ultrasound



**Intensive cleaning for
industry – service – maintenance**



Ultrasonic Cleaning

⇒ economical

- using ultrasonic cleaning regularly saves money
- the material to be cleaned will last longer due to the more gentle effect of ultrasound, thus reducing the need for spare parts
- faster cleaning processes reduce standstill periods between productions

⇒ friendly to the environment

- biologically degradable cleaning agents are used instead of ecologically harmful solvents
- oil separators and bath filtration extend amount of time that the cleaning agent can be used, thus, the consumption of chemicals and waste water is reduced

⇒ efficient

- ultrasonic cleaning processes are effective
- a very high quality of cleanness is achieved
- brushing and wiping is no more necessary
- the material to be cleaned – including its surfaces – is not damaged
- even exceptional shaped parts can be cleaned

⇒ operation-friendly

Ultrasonic cleaning devices:

- easy to install
- easy to operate
- maintenance free
- do not require special training

Four main factors for successful ultrasonic cleaning

Ultrasound

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

Chemistry

The cleaning agent supports the cavitation process, reduces the water's surface tension, separates and binds dirt particles.

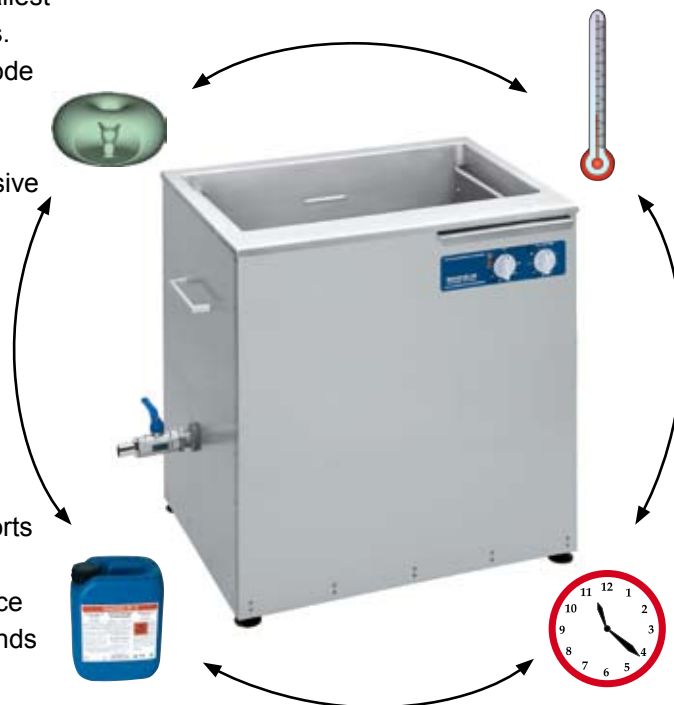
Depending on the type of dirt accumulation, different cleaning agents can be employed.

Temperature

Many cleaning agents become fully effective only at high bath temperatures. The cleaning solution can be heated by the cleaning device's heating system.

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.



Typical industrial 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

Wood working industry

Cleaning of wood working tools and maintenance of machine parts

Pharmaceutical industry

Cleaning of metal filters and tableting tools

Medicine technology

Cleaning of dentures, implants and joints

Automobile industry

Cleaning of injection nozzles, carburetors, spray guns, nozzles, shock absorbers, engine parts, circuit boards and cutting 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

Pneumatic tools

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

Industrial safety and fire protection

Cleaning of respirator masks and sooty parts

Thin-layer technology

Cleaning of sensor parts

Service

Cleaning of computer parts

Transport technology

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

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

Mould cleaning

Cleaning of plastic moulding tools



Ultrasonic cleaning of injection valves



Ultrasonic cleaning unit with transport cart

Three product lines with different configurations for application in industry, trade 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.

- ⇒ units with ultrasound and heating – for cleaning. The heating supports the cleaning effect of the chemistry.
- ⇒ units with ultrasound – for cleaning or rinsing with ultrasound support.
- ⇒ units with heating – for rinsing without ultrasound
- ⇒ units without ultrasound and without heating – for use with cascade rinsing in several tanks in a row

The following summary gives an overview of the product range and is thought 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
Tank filling 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 the 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 mixed
Operating elements	at bottom, right side	at upper right side	at upper right side

* off RM 110

One-piece ultrasonic units from 13 to 210 litres tank volume

- ⇒ **Welded cleaning tank**
made of 2 mm stainless steel AISI 316 Ti
- ⇒ **Overflow gutter for oil separator**
Oils and greases are led from the bath's surface via the overflow gutter into the 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 overflow gutter
- ⇒ **Drain for 3-way ball valve**
for emptying or refilling the tank or connecting 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



RM 40 UH

- ⇒ **Ultrasound**
on/off with pilot lamp, time setting up to 15 min. or continuous operation
- ⇒ **Ultrasonic generator (built-in)**
frequency 40 kHz

Model (selection)	Internal tank dimensions (l × w × d) mm	Filling capacity litres	External dimensions (l × w × h) mm	Ultrasonic peak output* W	HF-Output 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
Ultrasonic industrial units starting with RM 110 are equipped with spraying pipe, liquid level switch for dry run protection, ultrasonic generator supplying 40 kHz, optionally 25 kHz, and height-adjustable feet							
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

*Ultrasonic peak output is 4 times higher than HF output caused by modulation of ultrasound

**off RM 110 per phase

Mains connection RM 16... - 75...: 230 V~ 50/60 Hz, RM 110.. - 210...: 400 V 3N~ 50/60 Hz, CEKON-plug 16 A.

6 standard sizes in 4 versions each for cleaning and rinsing.

Depending on the cleaning requirements, the equipment can be individually arranged:

RM ... UH with ultrasound and heating
RM ... U with ultrasound

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

The convenient – industrial units RM

One-piece ultrasonic units from 115 to 230 litres tank volume

Basic equipment analogue to RM 110 – 210

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

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

Additional comfort

- ⇒ **Round tank corners**
at the bottom and at all sides facilitate the cleaning of the tank. Caking 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.



RM 112 UH

Model (selection)	Internal tank dimensions (l × w × d) mm	Filling capacity litres	External dimensions (l × w × h) mm	Ultrasonic peak output* W	HF-Output 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

*Ultrasonic peak output is 4 times higher than HF output caused by modulation of ultrasound

**per phase

***inclined tank bottom

RM 112...- 212...: 400 V 3N ~ 50/60 Hz, CEKON-plug 16 A.

3 standard sizes in 4 versions each for cleaning and rinsing.

Depending on the cleaning requirements, the equipment can be individually arranged:

RM ... UH with ultrasound and heating

RM ... U with ultrasound

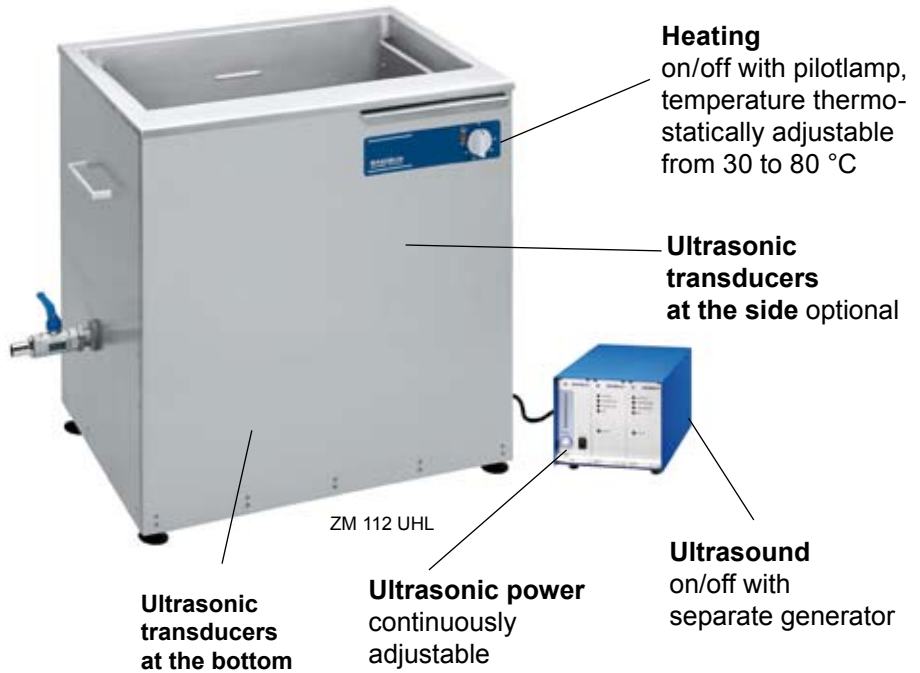
RM ... H with heating

RM ... without ultrasound and without heating

Two-part industrial ultrasonic units from 125 to 250 litres tank volume also available in TwinSonic®-versions as multi-frequency units with ultrasonic transducers at the bottom and at one side.

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
- ➔ continuous spectrum of power control



Equipment identical to RM 112... bis 212 ...

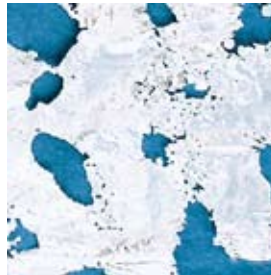
TwinSonic®-version as multi-frequency unit

Registered utility model DE 20 2004 006 380.8

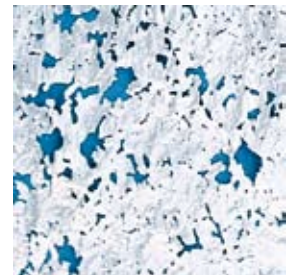
Multi-frequency units in the TwinSonic® version work with ultrasonic systems of different frequencies at the bottom and at one side.

Advantage is a more homogenous distribution of ultrasound and power, thus improving the cleaning efficiency and reducing the time needed for cleaning.

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	Filling capacity litres	External dimensions (l × w × h) mm	Ultrasonic peak output* W	HF-Output 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

*Ultrasonic peak output is 4 times higher than HF output caused by modulation of ultrasound

**per phase

***inclined tank bottom

3 standard sizes in 4 versions each equipped with ultrasonic transducers at the bottom and at the side are available for cleaning and rinsing. Depending on the cleaning requirements, the equipment can be individually arranged:

ZM ... UH with ultrasound and heating
ZM ... U with ultrasound

ZM ... UHL with ultrasound at the bottom and at the side and with heating
RM ... UL with ultrasound at the bottom and at the side

Examples of modular installations

Variable set-up: modules are rearrangeable for different requirements

RM 16 units with oscillation



Modular line RM 16 UH + RM 16 U + RM 16 H + MO 16.2 + WO 16-3



**RM units up to 60 litres
with lifting device and oscillation**

Modular line RM 16 UH + RM 16 UH + RM 16 H + RM 16 + WG 16-4 + MB 16

**RM units above 115 litres
with lifting device and oscillation**



Modular line RM 212 UH and RM 212 H with WG 210-2 and MB 210 B

Oscillation MO

The electrically driven oscillation MO enables automatic movement of the baskets in tanks of the production line RM 16 or RM 40.

The oscillating movement of the parts to be cleaned reinforces the cleaning efficiency of the ultrasonic irradiation and helps to remove dirt particles more efficiently.

	RM 16	RM 40
Oscillation	MO 16.2	MO 40
Tank rack for 1 unit	WO 16-1	-

Further tank racks WO on request.



MO 16.2

Tank rack WO

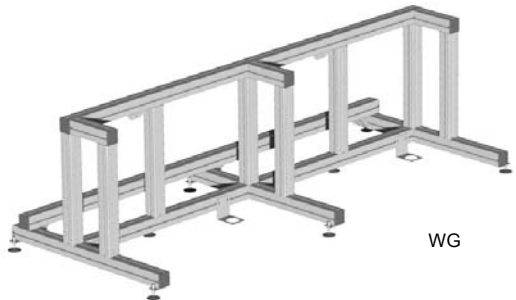
The tank racks are designed for up to 4 units of the production line RM 16, in connection with oscillation MO 16.2.



WO 16

Tank rack WG

The tank racks are designed for up to 4 units and can be combined with the electrically driven lifting device MB.



WG

Lifting device MB with Oscillation

Registered utility model No. 296 17 375

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 to be cleaned reinforces the cleaning efficiency of the ultrasonic irradiation and removes dirt particles more efficiently.



	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 parts soiled with oily or greasy contaminants are to be cleaned. Dirt accumulations floating on the bath's surface are led via the overflow gutter into the oil separator and are separated by means of 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.

	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 treatment	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



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.

	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

Special units

SONOREX TECHNIK W 65 and W 300 with extra deep tank

Specification

- tank made of 2 mm stainless steel AISI 316 Ti, with high freeboard
- W 65 frequency 35 kHz, W 300 frequency 40 kHz, on request 25 kHz
- built-in heating, thermostatically adjustable 30 to 80° C

Applications

Cleaning of oil filters, armatures and cylinder heads especially in the shipping industrie.
The extra high tank freeboards avoid overflow of the cleaning liquid during cruising.



W 65



W 300

Accessories for W 65

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

Accessories for W 300

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

Model	Inner tank dimensions (l x w x d) mm	Filling capacity litres	External dimensions (l x w x h) mm	Ultrasonic peak output* W	HF-output 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 × 600	185,0	1180 × 600 × 1000	2 × 4000	2 × 1000	7200	14,8**

*Ultrasonic peak output is 4 times higher than HF output caused by modulation of ultrasound

**per phase

W 65 mains connection 230 V~ alternatively 115 V~ 50/60 Hz, W 300 mains connection 400 V 3N~ 50/60 Hz

On request additional with integrated autotransformer for connection on the existing voltage of the ship.

Saw blade holder SA 16 and SA 40 for cleaning saw blades and cutting tools



RM 16 UH with SA 16

Features

- simple placement on existing ultrasonic units SONOREX TECHNIK RM 16 and RM 40
- removal of stubborn dirt, for example resin residues
- rapid and simultaneous cleaning of several saw blades and cutting/milling tools without second cleaning
- axis for different bore diameters

Specification

- adaptable axis for different bore diameters: \varnothing 20 – 50 mm
- maximum load 8,0 kg
- rotation speed with approx. 1 rpm
- timer 1 to 15 minutes and motor inside the ABS-housing
- mains connection 230 V~ 50/60 Hz

SONOREX TECHNIK RL 70 UH, with long tank



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

Accessories

- Basket inset **RE 70 L**
- Basket holder **KT 70 L**
- Lid **MD 70**
- Saw blade inset **SE 70 L**
(Basket holder necessary)

Model	Inner tank dimensions (l x w x d) mm	Filling capacity litres	External dimensions (l x w x h) mm	Ultrasonic peak output* W	HF-output 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~ 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 placement and removal of the baskets and for oscillating movement of parts in the cleaning or rinsing chamber.

Applications

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

SONOREX TECHNIK L 220

- separate HF generator LG 2002 T
- frequency 40 kHz
- mains connection 230 V~ 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~ 50/60 Hz
- optional lifting device LB 320 with basket

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

Model	Innner tank dimensions (l x w x d) mm	Chamber filling volume liters	External dimensions (l x w x h) mm	Ultrasonic peak output* W	HF-output W_{eff}	Current consumption A**
L 220	2200 × 300 × 300/370 ^o	185	2320 × 750 × 850	2 × 4000	2 × 1000	8,6
L 320	3200 × 300 × 370/370 ^o	270	3320 × 750 × 850	4 × 4000	4 × 1000	8,6

*Ultrasonic peak output is 4 times higher than HF output caused by modulation of ultrasound

**per phase ^oultrasonic-/rinsing chamber

SONOREX TECHNIK Vortex reactor

Applications

- ⇒ Intensifying of industrial, biotechnological and chemical processes
- ⇒ Degassing
- ⇒ Support of disinfection (bacterial elimination)
- ⇒ Disinfection of liquids
- ⇒ Producing of finest polishing pastes for wafer industry
- ⇒ Homogenizing

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



WR 4-1503.01

SONOREX TECHNIK Tube reactor SONOBLOC®

Applications

- ⇒ Ultrasonic intensive treatment of fibrous and band-shaped products
- ⇒ Support of industrial and biotechnological processes
- ⇒ Wire cleaning
- ⇒ Degassing
- ⇒ Support of disinfection (bacterial elimination)
- ⇒ Acceleration of disintegration
- ⇒ Dispersing of solid particles in liquids

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



SB 8-1002.01

Technical Data	Vortex reactorbloc - WB			Tube reactorbloc - RB	
	WB 4-1402...	WB 4-1503...	WB 4-1604...	RB 8-1002...	RB 8-1004...
Filling volume	~5 l			~2.5 l	
Ultrasound volume	2.9 l			2.0 l	
Ultrasound distance	500 mm			910 mm	
Flow-through rate	1 - 50 l/min			1 - 100 l/min	
Reaction tube (inside)	-			dia. 53 mm	
Reaction gap	15 mm			-	
Power density, max.	480 W/l	520 W/l	550 W/l	500 W/l	
Power, max.	1400 W	1500 W	1600 W	1000 W	
Frequency	25 kHz	25 and 40 kHz	40 kHz	25 kHz	40 kHz
Housing dimensions (l × w × h)	290 × 290 × 642 mm			260 × 150 × 990 mm	
Tube material / dimensions	Stainless steel AISI 316 Ti / dia. 139.7 × 2.6 mm ; dia. 104 × 2 mm			Stainless steel AISI 316 Ti / dia. 60.3 × 3.6 mm	
HF connecting cable (EMC-protected)	1 × 5 m	2 × 5 m		1 × 5 m	
Solid particles	< 5 mm			-	
Internal pressure, max.	10 bar			10 bar	
Weight, net	approx. 50 kg			approx. 35 kg	
HF generator (separate)	LG 1510 T	LG 2002 T		LG 1001 T	

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

Separate documents and pricelists on request.

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.

Ultrasonic generators starting at 30 W deliver the required ultrasonic output with a frequency of 40 kHz or optionally 25 kHz. The connection to the HF generator is made via an HF- cable with AMP- plug or the proven Quick-connect-technology.

Adequate protection covers for the ultrasonic assemblies can be supplied on request.



PVDF tank for sonication of aggressive media



Foulard ponds for sonication of dye baths



Probe flange of a refractometer



Polarimeter tube for analysis

Selection of ultrasonic oscillating systems

PZT - oscillating system (selection)	Designation	HF-output W_{eff}
PD 40 12	oscillating system, 40 kHz	50
PD 40 12 K	oscillating system, 40 kHz, for synthetics	30
PD 25 17	oscillating system, 25 kHz	50
HF-cable of 2 m length, fixed connection - with AMP- plug for TG generators - with Quick-connect-plug for LG generators		
Cover made of aluminium (IP 20), fastened with screws - up to 1000 W - more than 1000 W		

Ultrasonic generators for connection to special assemblies

TG generators
HF-output up to 500 W
Ultrasonic frequency 40 kHz



TG 50



LG 1510 T

LG generators (page 18/19)
HF-output starting at 500 W
Ultrasonic frequency 40 kHz or 25 kHz

Max. HF-output W_{eff}	Generator without timer	Generator with timer*	Dimensions
50	TG 50	TG 50 Z	235 × 160 × 100 mm
100	TG 100	TG 100 Z	235 × 160 × 100 mm
200	TG 200	TG 200 Z	305 × 310 × 142 mm
300	TG 300	TG 300 Z	305 × 310 × 142 mm
500	TG 500	TG 500 Z	305 × 310 × 142 mm
For individual assembling, the generator can be supplied as circuit board without housing and without CE mark.			
Mains connection: 230 V~ 50/60 Hz, mains plug		*1 to 15 min and continuous operation	

Examples for mounting of ultrasonic transducers

CONVEXON®

Immersible transducer TC...E with bent stainless steel pipe for hanging into the tank

Immersible transducer T...P with PTFE-protection hose, armoured stainless steel

Immersible transducer T...F with bent stainless steel pipe, for hanging into the tank

Immersible transducer T...E with bent stainless steel pipe for hanging into the tank

Flat transducer plate P with cover as protection against contact

Immersible transducer T...R with stainless steel feed through pipe

Fixed cable connection with high-strength cable gland (hoseproof)

Immersible transducer T...W with PTFE-protection hose, armoured stainless steel with 90° bend

Quick-connect-technology with connection box TA (drip-proof)

Immersible transducer T...B with bolt mounting

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

Options for the installation of immersible transducers - Quick-connect-technology

Constructional characteristics	with plug-in cable connection IP 51	with fixed cable connection IP 65
E – for hanging into the tank with tightly-welded bent stainless steel pipe and suspension hooks. This type is easily displaceable and applicable in a number of different tanks.	E	EF
B – with liquid-proof bolt mounting through tank bottom or side walls resulting in a working area being free of disturbing cables. The cable routing to the generator is arranged outside the tank.	B	BF
R- with liquid-proof feed through pipe through the tank wall	R	RF
P – with flexible PTFE-protection hose of 2 m length with armoured stainless steel braiding (AISI 304), for placing directly on the tank bottom	P	PF
W – with stainless steel bend 90 ° (AISI 304) and flexible PTFE-protection hose of 2 m length with armoured stainless steel braiding (AISI 304), for placing directly on the tank bottom when only little space is available	W	WF
Directions on 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 glands (hoseproof). Flat transducer plates are equipped with HF-sockets only, without connection boxes.		

High-power ultrasonic transducers

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



Immersible transducers T – for quick installation

Immersible transducers are used for sonication in big tanks or sinks without having to modify the existing equipment to a large extent.

Features

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

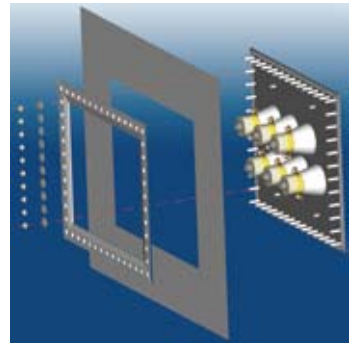
Flat transducer plates P – for a space-saving installation

Registered utility model DE 298 07 581

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

- **Drilling jigs and bores for mounting bolts are not required!**
- Installation in rectangular outcut in tank
- stainless steel plate of 3 mm, AISI 316 Ti
- Ultrasonic frequency 25 kHz, alternatively 40 kHz
- Drip-proof HF-cable connection



Examples:

HF-output W_{eff}	Radiating surface* (l x w) mm	Immersible transducer 25/40 kHz External dimensions** (l x w) mm	Flat transducer plates 25/40 kHz External dimensions (l x w) mm
200	170 x 160	230 x 160	255 x 230
300	325 x 235	385 x 235	380 x 305
400	325 x 160	385 x 160	380 x 230
500	325 x 235	385 x 235	380 x 305
1000	415 x 325	475 x 325	480 x 380
1500	595 x 355	655 x 355	680 x 430
2000	565 x 355	625 x 355	630 x 430

CONVEXON®-Immersible transducer TC - patent DE 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

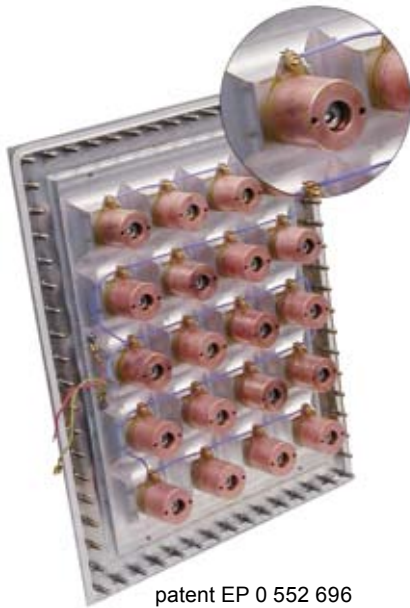
Applications

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

HF – output W_{eff}	Radiating surface * (l x w) mm	Immersible transducers TC External dimensions ** (l x w x 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.

Explosive plated compound ultrasound with extended lifetime



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.

Features

- Long lifetime 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 output along the entire surface
- Increased mechanical stability due to rugged design
- High reliability due to nonbonded transducers
- Ultrasonic frequencies: 25 kHz alternatively 40 kHz
- Unchanged connection and generator technology
- Immersible transducers TQ and flat transducers plates PQ are available with 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 – output W_{eff}	Radiating surface * (l x w) mm	TQ External dimensions ** (l x w) mm	PQ External dimensions (l x w) mm	Radiating surface * (l x w) mm	TQ External dimensions ** (l x w) mm	PQ External dimensions (l x w) mm
500		558 x 198	622 x 198	605 x 255	384 x 134	448 x 134	430 x 205
750		414 x 342	478 x 342	455 x 405	284 x 234	348 x 234	330 x 305
1000		558 x 342	622 x 342	605 x 405	384 x 234	448 x 234	430 x 305
1500		702 x 414	766 x 414	730 x 480	384 x 334	448 x 334	430 x 405

CONCAVON®-Immersible transducer TN patent DE 100 13 120



TN 40 10 6 RF

Features

- Concave radiating surface
- Uniform sound distribution of ultrasound
- Focussed cleaning 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 – output W_{eff}	Radiating surface * (l x w) mm	Immersible transducers TN external dimensions ** (l x w x 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.

Generators

Advanced high-performance ultrasonic generators with a new design

High-performance ultrasonic transducer systems are operated with powerful generators. The microprocessor controlled LG generators deliver the required HF-output 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 output is controlled via power modules M.

Flexibility

In order to increase the generator's output, additional power modules can be easily inserted into vacant slots. Mixed installations of modules with different frequencies (25 or 40 kHz) are possible. Ultrasonic transducers of other manufacturers can be connected to the power modules as well.

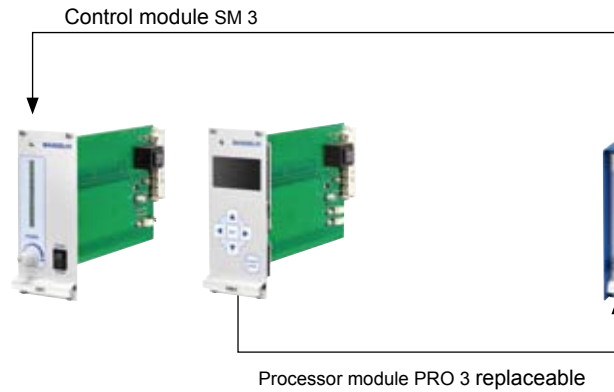
Generators

Patent DE 196 49 975

Desktop housing (T) up to 3 kW

dimensions (l x w x h):
405 x 218 x 198 mm
mains connection:
230 V~ 50/60 Hz

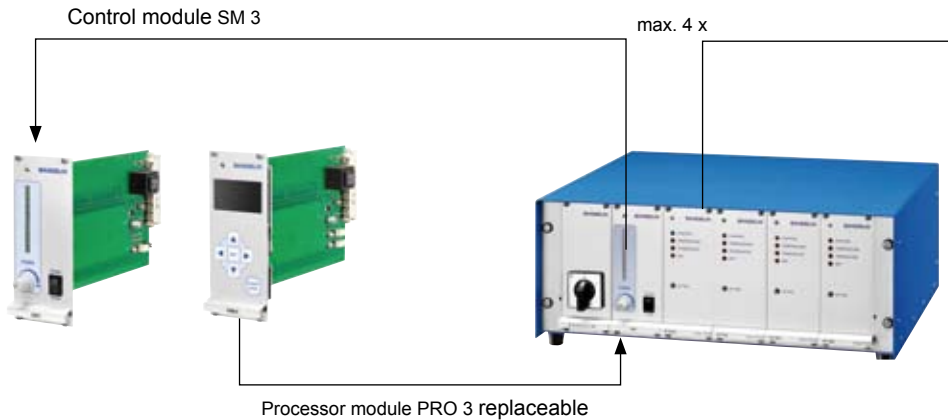
Operating modules



Industrial housing (F) up to 6 kW

dimensions (l x w x h):
405 x 488 x 203 mm
or 19"-plug-in unit
for switch cabinet
mains connection:
400 V 3N~ 50/60 Hz

Operating modules



Industrial housing (D) up to 9 kW

dimensions (l x w x h):
405 x 488 x 425 mm
or 19"-plug-in unit
for switch cabinet
mains connection:
400 V 3N~ 50/60 Hz

Operating modules



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 (see page 21).

Selection

The selection of the generators and the installation of power and operating modules depend on the needed total output of the ultrasonic transducers that are to be connected and on the desired way of controlling.

Detailed project information on request.

Power modules



M 1003 or
M 1503



M 1003 or
M 1503

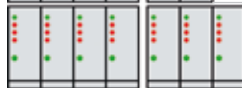
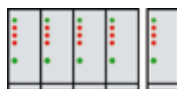
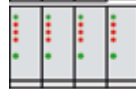


M 1003 or
M 1503

Power modules

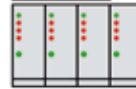
M 1003

max. 1000 W



M 1503

max. 1500 W



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

Controll module SM 3

The ultrasound output set with the adjustable rotary controller applies to all power modules of the generator. In all generator types the control module can be replaced by the processor module PRO 3.

- Continuous setting of the nominal output range from 10 to 100 % via rotary controller
- Bar display indicates the nominal output in %
- Indication of external control by a PC or SPC
- HF switch for switching on/off of the power modules



Processor module PRO 3

The processor module PRO 3 allows an individual programming of the power modules

- LCD display to indicate the outputs and settings
- Setting of processing times at the power modules
- Degas function for quick degassing
- Switching on/off of separate modules
- Elapsed time indicator
- Indication of external control by a PC or SPC
- Error indication with date and time
- Set-up function for service and maintenance



Power modules M 1003 and M 1503

High efficiency

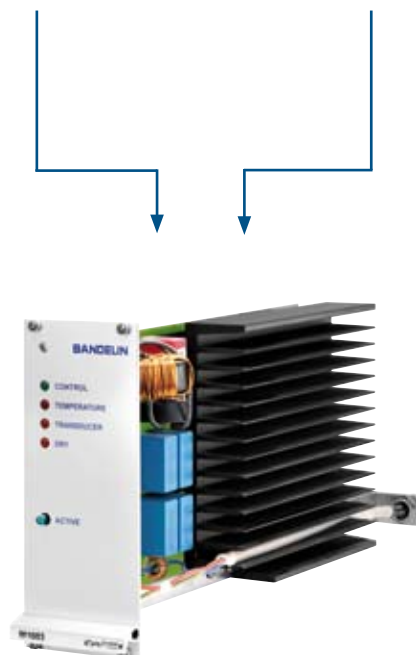
The combination of microprocessor technology with modern and powerful semiconductors in the output stage allows for an efficient circuit technology of very high efficiency.

Programmed safety

The microprocessor based status analysis guarantees a high operational reliability. LEDs on the front indicate the current operating status. The power modules are protected against short circuits, idle motion and overload.

Sweep function

The programmable sweep function that can also be operated with the processing module PRO 3 leads to a better distribution of the ultrasonic waves in the bath, hence, resulting in a constant and gentle cleaning process.



- CONTROL
Stable output
- TEMPERATURE
Excess temperature and derating
- TRANSDUCER
Breakdown
- DRY
Dry running detection
- ACTIVE
Module switch ON/OFF

Remote control

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

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 SPC 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 SPC equipment.



Generator



SPC

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.

Besides the individual setting of performance parameters, programming, saving and databasing of application related process data are possible as well. Operating status, nominal and actual output 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)

Remote diagnosis

Bandelin offers a low-cost, fast, and on-site service by employing a remote control maintenance module FWM for LG generators. By using this module, Bandelin can check the settings on the LG generator in its active state and can then adjust these settings if necessary. The remote control maintenance module is available on loan on short notice.

SONOREX Ultrasonic bathes

Applications in service, repair, maintenance and industry

SONOREX SUPER

SONOREX LONGLIFE



Characteristics

- SONOREX SUPER with rust-free stainless steel tanks
- SONOREX LONGLIFE units are characterized by a long lifespan due to welded V4A tanks of 2 mm titanium stabilized stainless steel (AISI 316 Ti)
- HF-Frequency 35 kHz - SweepTec®
- Timer for 1 - 15 minutes and continuous operation
- H/CH-types with heating, thermostatically adjustable from 30 bis 80 °C, (RK 31 H with heating fixed at 65 °C)
- Drip-proof stainless steel housing
- SONOREX SUPER units starting from RK 102 H and SONOREX LONGLIFE units are equipped with ball valve drain
- Mains connection 230 V~ 50/60 Hz, on request 115 V~ 50/60 Hz



SONOREX SUPER

Internal tank dimensions (l x w x d) mm	Capacity litres	Model (selction)	External dimensions (l x w x h) mm	Ultrasonic peak output * W	HF-output W _{eff}	Heating power W	Current consumption A
190 × 85 × 60	0,9	RK 31 H	205 × 100 × 155	240	30	70	0,5
240 × 140 × 100	3,0	RK 102 H	260 × 160 × 250	480	120	140	1,2
∅ 245 × 130	5,6	RK 106	∅ 265 × 270	480	120	-	0,6
500 × 140 × 150	9,0	RK 156 BH	530 × 165 × 300	720	180	600	3,6
1000 × 200 × 200	39,0	RK 170 H	1050 × 250 × 385	1200	300	1600	8,3
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	6,8
500 × 300 × 300	45,0	RK 1028 C	540 × 340 × 500	2000	500	-	2,2

SONOREX LONGLIFE

220 × 135 × 100	3,0	RK 102 CH	260 × 175 × 275	480	120	200	1,4
220 × 135 × 150	4,5	RK 103 CH	260 × 175 × 325	640	160	200	1,6
280 × 150 × 150	6,3	RK 255 CH	320 × 190 × 325	720	180	280	2,0
280 × 234 × 200	13,1	RK 512 CH	320 × 275 × 380	1200	300	560	3,5
280 × 234 × 300	19,7	RK 515 CH	320 × 275 × 485	1200	300	700	4,4
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

*Ultrasonic peak output is 4 or 8 times higher than HF output caused by modulation of ultrasound – SweepTec®

Accessories



K 14

Insert baskets

made of stainless steel.
Objects to be cleaned or vessels must not be placed on the tank bottom.

Further units and accessories on request

Unit	RK 31 H	RK 102 H RK 102 CH	RK 103 CH	RK 106	RK 156 BH	RK 170 H	RK 255 H RK 255 CH	RK 510 H
Accessories								
Insert baskets (l x w x h) mm	K 08 170×65×50	K 3 C 200×110×40	K 3 CL 200×110×40	K 6 ∅ 215×50	K 6 BL 460×100×50	K 7 950×150×50	K 5 C 260×110×40	K 10 250×195×50

Unit	RK 512 CH	RK 514 H	RK 514 BH	RK 515 CH	RK 1028 H	RK 1028 C RK 1028 CH	RK 1050 CH
Accessories							
Insert baskets (l x w x h) mm	K 10 B 250×195×50	K 14 275×245×50	K 14 B 275×245×50	K 15 C 250×190×50	K 28 455×245×50	K 28 C 455×245×50	K 50 C 545×450×50

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
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
Non-ferrous and precious metals, steel, stainless steel, glass, ceramics, plastics, rubber, test sieves, printed circuit boards with service cleaning. Caution with light metals!	Resinous residues, soot, grease, oils, waxes, pigments, coloured fog, silicon oils, flux media, oxides at non-ferrous and precious metals	TICKOPUR RW 77 special cleaner with ammonia, without phosphate, gentle cleaning, mildly alkaline, pH 9.9 (1 %) dosage 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

*All TICKOPUR agents are also suitable for dipping and wiping.

Separate leaflet with other sizes on request.
EC-Safety data sheets are available as PDF-data via internet at: www.bandelin.com.

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

Your partner for quality and reliability



The family-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 / 12.2000, EN ISO 13485:2003 + AC:2007.

Quality and precision combined with 60 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 Berlin.

Automated manufacturing lines ensure excellent quality and high productivity. Nevertheless, we have kept the flexibility and capability to manufacture customized equipment.



Permanent control ensures high quality.



Modern laser technology in metal processing ensures precision.



Fully-automated CNC production leads to high-quality system production

Our strengths for your benefit

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