BANDELIN
Ultraschall seit 1955

High-power ultrasound
for reprocessing in clinics and practices

Disinfection and cleaning of medical instruments

2019

Content

SONOREX Ultrasonic baths
for disinfection and cleaning of medical instruments

Use on patients

Storage / Readiness

Dry deposit

Packing / Sterilisation

Function and Cleanliness tests

Disinfection and cleaning of instruments in the ultrasonic bath for 5 minutes with STAMMOPUR DR 8 (2 %)

Rinsing / Drying

Instrument cycle

Medical instruments before ...

... and after cleaning with ultrasound

Ultrasound and cavitation – what are they?

Oscillations at frequencies above 18 kHz (18,000 oscillations per second) are termed ultrasound. During the tension phase these oscillations cause the generation of millions of tiny vacuum bubbles in all liquids, which then implode in the compaction phase, causing highly effective pressure surges. This process is called cavitation.

How does ultrasound help in the cleaning of instruments?

Cavitation causes dirt residue and infectious agents in the instruments placed in the liquid to be positively "exploded away". Locations, surfaces, corners and openings that are hard to access can be reached and cleaned by ultrasound ("electronic brushes"). Ultrasound performs the cleaning in a few minutes, and surpasses any manual cleaning.

At the same time it acts gently, as it causes no mechanical damage such as scratching.
BANDELIN ultrasonic baths operate at the intensive cleaning frequency of 35 kHz.
All are equipped with SweepTec technology to provide a homogeneous ultrasound field.

Advantages of instrument treatment in the ultrasonic bath

- Rapid instrument circulation
- Shorter disinfection time of 5 minutes (microbiological verification available)
- Gentle on instruments
- High cleaning effect in hard-to-access locations such as drill holes, articulations or joints – with no mechanical damage
- Economical use of water, chemicals and energy

Recommendations on the application

BANDELIN ultrasonic baths, in combination with the right accessories and preparations made especially for use with ultrasonic baths, permit fast and thorough disinfection and cleaning of medical instruments.
They are used
- as mechanical support for manual cleaning processes
- for removing stubborn soiling before or after mechanical reprocessing
- for cleaning support as an integral part of the mechanical reprocessing procedure.
- for shorter disinfection times while still maintaining intensive cleaning levels

It is important to remember that all cleaning objects must be thoroughly rinsed under running water after use in the ultrasonic bath.

Objects to be cleaned	Disinfection and cleaning agents	Usage notes
Standard instruments (scissors, needle holders, tweezers, forceps, trocars) MIS instruments and accessories, micro-clamps, take-apart tube shaft instruments Micro-instruments for neurosurgery/ophthalmology Endoscope accessories such as biopsy forceps, snares, valves EKG/EEG elektrodes Small parts	**STAMMOPUR DR 8** VAH certified for simultaneous cleaning and disinfection, **STAMMOPUR R** Intensive cleaning	Direct sonication in insert baskets following dry deposits or non-fixing wet deposits Silicone knob mats for placement of sensitive instruments Fixing clamps for fixation of flexible endoscope accessories in the basket
Robotic instruments	**STAMMOPUR R** Intensive cleaning	Direct sonication in the moving device
Stained, encrusted or oxidised instruments	**STAMMOPUR GR** Basic cleaning	Indirect sonication in an insert beaker or insert tub

Knowledge of ultrasound

Which ultrasonic bath should I select?

The size of the cleaning object will determine the size of the bath and thus the device type. Basket dimensions must be taken into account when selecting a device. To prevent device overload, it is always better to choose a somewhat larger device. This also results in additional space for other uses.

Further important criteria for the decision are the operating controls and the desired design – see following page. For rinsable MIS instruments and complex robotic instruments, ultrasonic baths with additional functions such as rinsing and instrument motion are available, in order to meet the higher cleaning requirements.

Does an ultrasonic bath need a heating?

Devices without heating are preferred for disinfection and cleaning after dry deposits, as at temperatures above 40 °C there is a risk of protein coagulation, which will hamper cleaning and disinfection. Devices with a heating are used for basic cleaning of instruments, as in such cases, heating of the bath fluid shortens the cleaning time and removes soiling more quickly.

What accessories are necessary?

Cleaning objects must not lie on the bottom of the bath. Baskets and other insert beakers prevent scratching both to the cleaning objects and the bottom of the bath floor. When cleaning very small or sensitive parts, further accessories may be advisable to facilitate careful placement. For safety reasons, it is recommended that ultrasonic baths be kept covered (see TRBA 250).

What fluids should be used?

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

How can ultrasonic baths be tested?

The effectiveness of ultrasonic baths depends on the intensity and distribution of the process-typical cavitation in the oscillating tank. The foil test (in accordance with IEC/TR 60886: 1987) is a simple procedure for demonstrating the intensity and distribution of cavitation in an ultrasonic bath. In this test, an aluminium foil placed in the tank is perforated / destroyed to a certain degree by cavitation, depending on the duration of sonication. To achieve reproducible foil test results, it is important to provide similar testing conditions in each case. Suitable setups for performing foil tests are available as accessories for the ultrasonic baths.

If you want to know more …

… visit our website or our YouTube channel with a lot of helpful tutorials!

Or contact us directly… we are always pleased to provide advice, so call us at +49 (0)30 76880-212.
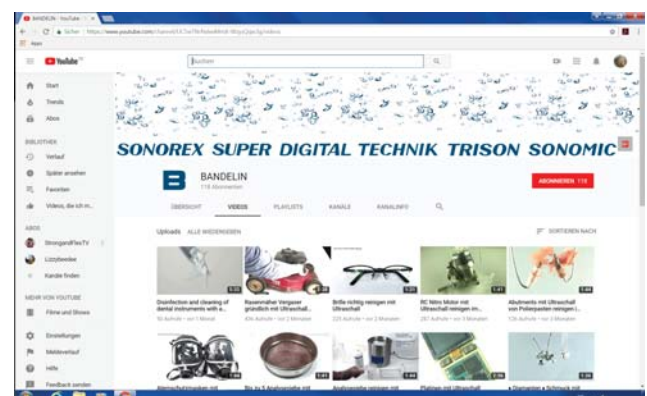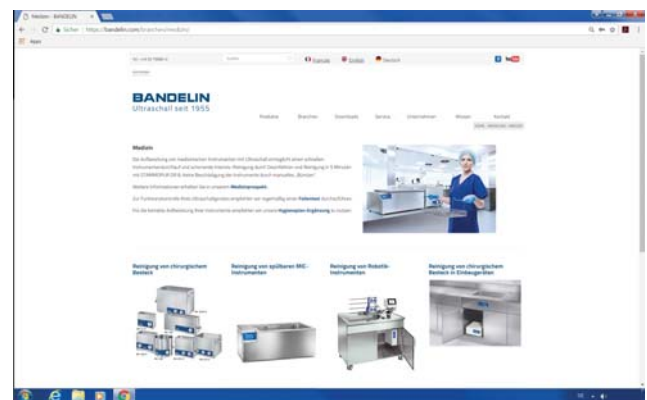
SONOREX Ultrasonic baths
Digital or analogue – compact or built-in bath – **your choice!**

	DIGITEC DT … /M	SUPER RK …	ZE … DT	ZE …
Capacity [l]	0.9 – 46.0	0.9 – 28.0	29.0 – 46.0	29.0 – 46.0
Ultrasonic frequency [kHz]	35	35	35	35
Pulse function	✓	✓	✓	✓
SweepTec	✓	✓	✓	✓
Fast degassing DEGAS	✓	–	✓	–
Additional ultrasound from the side	–	–	ZE 1032 DT / 1059 DT	ZE 1032 / 1059
Time setting [min]	1, 2, 3, 4, 5, 10, 15, 30, ∞	1 – 15, ∞	1, 2, 3, 4, 5, 10, 15, 30, ∞	1 – 15, ∞
Program storage	1 program	–	1 program	–
Safety shut-down	after 12 hours	–	after 12 hours	–
Heating thermostatically adjustable [°C]	version "H" : 20 – 80	version "H" 30 – 80 RK 31 H: 65 fixed	–	–
Setting accuracy of bath temperature [K]	± 2,5	± 5	–	–
Protection against boiling retardation	switchable	–	–	–
Excess temperature signal	✓	–	✓	–
Thickness tank material [mm]	0.8	0.8	2.0	2. 0
Inclined tank bottom for complete emptying	DT 1058 M	–	✓	✓
Filling mark for safe dosage	✓	✓	✓	✓
Outlet	one-piece welded from DT 106	one-piece welded from RK 106	bead 1½″ (drain set G 1½ optional)	
Degree of protection	IP 33	IP 32	–	–
Mains supply: 230 V~ (± 10 %), 50/60 Hz 115 V~ (± 10 %), 50/60 Hz	✓ ✓	✓ ✓	✓ ✓	✓ ✓
CE-marked according to MDD	✓	✓	✓	✓

SONOREX DIGITEC   DT
Ultrasonic baths with digital operation

SONOREX SUPER   RK
Ultrasonic baths with easy-to-operate turning knobs

Type	Internal tank dimensions l × w × d [mm]	Capacity [l]	Code No.	External dimensions l × w × d [mm]	Ultrasonic peak output* [W]	Ultrasonic nominal output [W]	Heating power [W]	Outlet ball valve
DT 31			3200				–	
DT 31 H			3220				70	
RK 31			329				–	
RK 31 H	190 × 85 × 60	0.9	044	205 × 100 × 180	160	40	70	–
DT 100			3210				–	
DT 100 H			3230				140	
RK 100			301				–	
RK 100 H	240 × 140 × 100	3.0	312	260 × 160 × 250	320	80	140	–
DT 106			3270				–	
RK 106	Dia. 240 × 130	5.6	306	Dia. 265 × 270	480	120	–	G ¼
DT 156			3275				–	
RK 156	500 × 140 × 100	6.0	305	530 × 165 × 245	640	160	–	G ¼
DT 255			3215				–	
DT 255 H			3240				280	
RK 255			3066				–	
RK 255 H	300 × 150 × 150	5.5	316	325 × 175 × 295	640	160	280	G ¼
DT 514			3250				–	
DT 514 H			3211				600	
RK 514			277				–	
RK 514 H	325 × 300 × 150	13.5	207	355 × 325 × 305	860	215	600	G ½
DT 1028			3255				–	
DT 1028 H			3231				1300	
RK 1028			322				–	
RK 1028 H	500 × 300 × 200	28.0	324	535 × 325 × 400	1200	300	1300	G ½
DT 1058 M	600 × 400 × 200/220+	46.0	304120	670 × 470 × 400	2400	600	–	G ¾

*corresponds to 4 times output   + inclined tank bottom

SONOREX ZE
Ultrasonic built-in baths

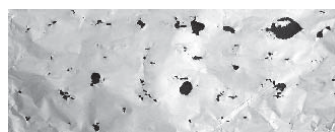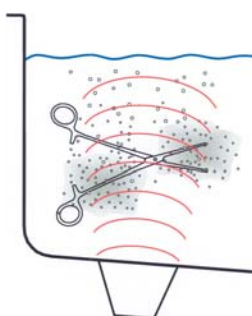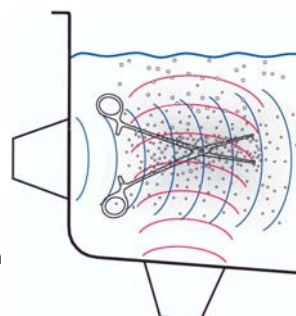Mounting example

Advantages of built-in baths
- Hygienic, unobstructed work surfaces thanks to under-table mounting
- Inclined tank bottom for easier emptying
- Hygienic maintenance due to rounded tank corners
- Operating control on the front side
- Ultrasonic generators may be installed optional to the right or left
- Suitable for 1/1 DIN baskets as of model ZE 1031 and ISO baskets as of ZE 1058
- Built-in bath with ultrasound and rinsing tank without ultrasound – an option to expand your worktop

Built-in baths with bottom and side sonication
The foil test figures below show that ultrasonic baths with bottom and side sonication generate a more homogeneous sound field than baths with bottom sonication alone. This means a more gentle and uniform cleaning, an important consideration for highly sensitive instruments.

- Optimum sound distribution and reduction of acoustic shadows as a result of additional side sonication
- Electronically induced movements of the sound field by means of TwinSonic technology reduce local peaks of impact
- No additional oscillation necessary for the instrument basket, and no further space is needed in the working area
- The latest generator technology with SweepTec automatic frequency control
- Existing built-in baths with bottom sonication are easy to replace, thanks to an identical tank edge design

Foil after foil test in an ultrasonic bath with bottom sonication

Foil after foil test in an ultrasonic bath with sonication from bottom **and** side

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Type	Internal tank dimensions l × w × d [mm]]	Capacity [l]	Code No.	External dimensions l × w × d [mm]	Ultrasonic peak output* [W]	Ultrasonic nominal output [W]	Outlet
... with bottom sonication							
ZE 1031 ZE 1031 DT	510 × 300 × 200/220+	29.0	3060 3217	570 × 360 × 270/290+	1200	300	bead 1½"
ZE 1058 ZE 1058 DT	600 × 400 × 200/220+	46.0	3050 3234	660 × 460 × 270/290+	2400	600	bead 1½"
... with bottom and side sonication							
ZE 1032 ZE 1032 DT	510 × 300 × 200/220+	29.0	3075 3223	570 × 404 × 270/290+	1760	440	bead 1 ½"
ZE 1059 ZE 1059 DT	600 × 400 × 200/220+	46.0	3085 3248	660 × 504 × 270/290+	2400	600	bead 1 ½"

Rinsing tanks without ultrasound, for installation in working plates

suitable for bath	Type	Code No.	Internal tank dimensions l × w × d [mm]	External dimensions l × w × d [mm]	Description
ZE 1031/1032 / ... DT	**SW 31 Z**	3048 *3166*	510 × 300 × 200/220+	570 × 360 × 205/225+	with bead 1 ½", without drain set *optional: drain set G 1 ½ with bowden cable*
ZE 1058/1059 DT	**SW 58 Z**	3049 *3166*	600 × 400 × 200/220*+	660 × 460 × 205/225+	with bead 1 ½", without drain set *optional: drain set G 1 ½ with bowden cable*

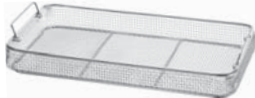## Digital control unit with temperature display

suitable for bath	Type	Code No.	Description
ZE 1031 bis ZE 1059	**ST 30 DT**	309803	The ST 30 DT digital control unit has an integrated temperature display and offers the user added safety to prevent protein coagulation. If the bath fluid heats up to > 40 °C, a red warning LED will also flash.

*corresponds to 4 times output   + inclined tank bottom, mounting from below
Dimension without ultrasound generator, external dimensions of ultrasound generators 360 × 310 × 142 mm (l × w × h)

SONOREX Accessories

Appropriate accessories facilitate ultrasonic application and simultaneously protect the oscillating tank and instruments.
Objects to be cleaned or beakers must not be placed onto the tank bottom!

Accessories	Material	Function	Images (selection)		RK 31 / H DT 31 / H	RK 100 / H DT 100 / H
Lid	stainless steel	protects the bath fluid from contaminants from the outside condensation water runs back into the tank lid D...T especially for insert baskets with hinged handles	D 514	Type Code No.	D 08 218	D 100 / D 3 T 3003 / 114
Hinged lid	stainless steel	protects the bath fluid from contaminants from the outside condensation water runs back into the tank hinged lid D...G for built-in units	D 1031 G	Type Code No.	–	–
Insert basket	stainless steel	to use for the instruments to be cleaned	K 14	Type l × w × d [mm] Code No.	K 08 170 × 65 × 50 209	K 3 C 200 × 110 × 40 3025
Insert basket	stainless steel	to use for the instruments to be cleaned. baskets with hinged handles in standard formats for instrument cleaning without basket change basket holder KT is necessary	K 29 EM	Type l × w × d [mm] Code No.	–	–
Basket holder	stainless steel	support for insert baskets or DIN 1/1 and 1/2 sieve trays KT...Z is equipped with handles	KT 57	Type Code No.	–	–
Insert tub	plastic, with lid	especially for basic instrument cleaning with STAMMOPUR GR don't use at temperatures higher 60 °C	KW 3	Type l × w × d [mm] Code No.	–	KW 3 195 × 115 × 88 715
Knob mat	silicone	for contact-free placement of highly-sensitive instruments, especially micro-instruments, during cleaning prevents damage to instruments; permeable for ultrasound	SM 14	Type l × w [mm] Code No.	–	SM 3 170 × 97 093
Fixing clamp set	plastic	fixing of biopsy forceps and instruments - prevents damages to instruments a set consists of 2 large clamps and 5 small clamps	FE 12 in a basket	Type set Code No.	–	–
Frame for foil test	stainless steel	The frame is used for foil test, which is as simple method for displaying the intensity and distribution of the cavitation in an ultrasonic bath.	FT 1	Type Code No.	FT 1 3190	FT 4 3074

RK 106 DT 106	RK 156 DT 156	RK 255 / H DT 255 / H	RK 514 / H DT 514 / H	RK 1028 / H DT 1028 / H	DT 1058 M	ZE 1031 / DT ZE 1032 / DT	ZE 1058 / DT ZE 1059 / DT
D 6 346	D 156 3004	D 255 / D 5 T 3007 / 3054	D 514 / D 14 T 3010 / 3062	D 1028 / D 28 T 3011 / 3063	D 1058 M 7526	D 30 7522	D 57 7520
–	–	–	–	–	–	D 1031 G 3229	D 1058 G 3232
K 6 dia. 215 x 50 356	K 6 L 460 × 100 × 50 202	K 5 C 260 × 110 × 40 3027	K 14 275 × 245 × 50 354	K 28 455 × 245 × 50 358	–	–	–
–	–	–	K 14 EM 230 × 240 × 45 226	K 29 EM 470 × 240 × 45 688	K 29 EM 470 × 240 × 45 688	K 29 EM 470 × 240 × 45 688	K 29 EM 470 × 240 × 45 688
–	–	–	KT 14 131	KT 30 7517	KT 57 7504	KT 30 / KT 30 Z 7517 / 7507	KT 57 / KT 57 Z 7504 / 3078
–	–	KW 5 254 × 96 × 130 240	KW 14 280 × 215 × 145 613	KW 28-0 437 × 230 × 155 717	–	–	–
–	SM 6 426 × 97 110	SM 5 213 × 97 101	SM 14 235 × 245 118	SM 29 470 × 245 178	SM 29 470 × 245 178	SM 29 470 × 245 178	SM 29 470 × 245 178
FE 12 117	–	–	FE 12 117	FE 12 117	FE 12 117	FE 12 117	FE 12 117
FT 4 3074	FT 6 3222	FT 4 3074	FT 14 3084	FT 40 3094	FT 37 3674	FT 36 3673	FT 37 3674

SONOMIC
Ultrasonic baths for rinsable MIS instruments and standard instruments

Three patents in one device!

Mounting example SONOMIC MC 1001 E

The reliable internal cleaning of MIS instruments and rinsable parts of other instruments ensures their continued use.
SONOMIC has been specially developed for these instruments and combines the effects of

> **damage-free ultrasonic cavitation,**
> **the effective suction rinsing** and
> **individual testing of instruments**

in one device.

The integrated flow-control monitoring for each connected instrument guarantees reliable cleaning results and prevents instrument malfunction.

Advantages at a glance:
- Safety as a result of patented individual instrument rinsing and testing
- Patented suction rinsing principle
- Patented universal adapter for instrument connection without change of seal
- Temperature and filling level monitoring
- Reproducible program sequences
- Versatility:
  Can be used for standard instruments too
- Documentation by means of protocol print-outs
- Available as compact bath or built-in bath

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Individual instrument examination rather than general testing

If different MIS instruments are rinsed at the same time, the rinsing result for the individual instruments cannot be checked.

With SONOMIC this problem is solved by means of the innovative channel selector (patent EP 19 20 797). Only one instrument at a time is released for rinsing, thus permitting individual flow-through monitoring. The minimum flow-through rate is 2 ml/s at 0.8 bar vacuum, otherwise the instrument will be identified as "not rinsable" and so indicated on the touch screen. The determination, classification and clear indication of successful rinsability for each instrument ensures a higher safety level during reprocessing.

SONOMIC suction rinsing compared to pressure rinsing from other suppliers

Generally, the majority of the soiling is concentrated at the distal end of MIS instruments. In comparable devices from other manufacturers, all MIS instruments are rinsed under pressure from the distal end. As a result, contamination is forced through the whole lumen of the instruments, thus presenting an increased risk of undesirable deposits, especially in constricted areas near the handles and in other difficult-to-reach areas of the instruments. The direct entry of dissolved contamination into the bath fluid is a further negative effect. The suction rinsing function (patent DE 20 2006 020 523) exerted by the SONOMIC at the distal end of the instruments removes soiling against the direction of penetration, while fresh disinfection and/or detergent solution takes its place. This avoids unnecessary contamination of the rear lumen parts of the instruments. The removed contamination moves through the adapter into the exchangeable filter, rather than back into the bath fluid.

SONOMIC suction rinsing

Pressure rinsing from other suppliers
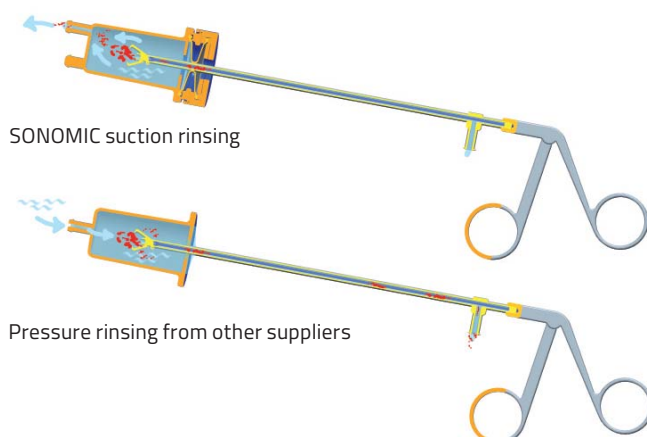
Connection of instruments to the universal adapter without change of seal

In the SONOMIC, twelve rinsable MIS instruments with diameters from 1 to 10 mm can each be connected to one of the identical adapters without having to change the adapter seal. The seal has an innovative torsion principle (patent EP 19 20 727) that guarantees complete fluid-tightness against the outer shaft of the instruments. The highly elastic sealing material has been ultrasonically tested and is resistant to the preparations STAMMOPUR DR 8 and STAMMOPUR R.
A maintenance-related exchange of the seals is necessary after more than 500 load cycles. Because of the user-friendly adapter design the exchange of the seals can be applied without any tools.

Rotary principle of the adapter seal

Filling level and temperature monitoring

The Sonomic monitors the correct bath fluid level with an integrated filling level sensor. In case of non-compliance, it will not be possible to start the sonication, and the user will receive an error message on the touch screen.

Before each cycle, a temperature sensor tests whether the bath temperature is within the permitted range. If the bath fluid temperature is too low (< 18 °C), the heating automatically switches on. To prevent protein coagulation, a warning message appears at temperatures of about 40 °C.

Safety as a result of reproducible program sequences

The SONOMIC operating program contains a self-test and provides the user with clear instructions for all necessary work stages. For instance, an adapter test is performed prior to each load, an indispensable measure for reliable identification of non-penetrable instruments.

Documentation by means of protocol print-outs

For quality verification, SONOMIC provides several interfaces. When required, protocols with the following data can be printed out: cleaning mode, bath temperature, result of rinsing examination, etc.

SONOMIC MC 1001

Ready-to-use set:
- Ultrasonic bath MC 1001
- Basket K 1001 MC
- 12 adapters with seal and hose ADS 1000
- 12 adapter seals AD 1000
- Adapter testing strips APB 1000
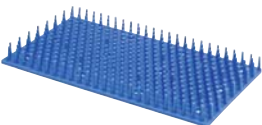- 30 filter cartridges EF 1001
- Frame for foil test FT 38

SONOMIC MC 1001 E (for built-in)

Consisting of:
- Oscillating tank TE 1001 E
- Ultrasound generator GT 1001 E
- Control unit ST 1001 E
- Basket K 1001 MC
- 12 adapters with seal and hose ADS 1000
- 12 adapter seals AD 1000
- Adapter testing strips APB 1000
- 30 filter cartridges EF 1001
- Frame for foil test FT 38

	SONOMIC MC 1001	SONOMIC MC 1001 E
Internal tank dimensions l × w × d [mm]	650 × 400 × 160/170[+]	650 × 410 × 160/170[+]
Capacity [l]	42.5	43.5
Operating volume [l]	27.0	27.5
Code No.	3315	3345
External dimensions l × w × d [mm]	860 × 490 × 325	oscillating tank: 855 × 475 × 250 ultrasound generator: 455 × 155 × 360 (with rinsing module)
Ultrasonic peak output* [W]	2400	2400
Ultrasonic nominal output [W]	600	600
Frequency [kHz]	40	40
Operation: touchscreen 96 × 61 mm	integrated	control unit
Preservation heating, program-controlled [W]	400	400
Pulse function	✓	✓
Temperature monitoring	✓	✓
Thickness tank material [mm]	2.0	2.0
Level sensor	✓	✓
Outlet	ball valve ¾", thread feed pipe G ¾, at the rear side	G 1½ drain set with turning knob and stainless steel stopper
Mounting into the working plate	–	from below
Interfaces	USB-B, RS-232, LPT	USB-B, RS-232, LPT
CE-marked according to MDD	✓	✓

*corresponds to 4 times output   [+] inclined tank bottom

SONOMIC Accessories and Consumables

Accessories

	MC 1001	MC 1001 E
Lid Code No.	D 1000 MC 3312	
Hinged lid Code No.	D 1001 G 3310	D 1001 GE 3326
Insert basket l × w × d [mm] Code No.	K 1001 MC 520 × 340 × 50 3324	
Knob mat l × w [mm] Code No.	SM 1000 MC 245 × 340 3313	
Frame for foil test Code No.	FT 38 550 × 470 3672	

Consumables

Filter cartridges Code No.	EF 1001 à 30 pcs. / EF 1001 à 100 pcs. 3365 / 3366	
Adapter seals Code No.	AD 1000 à 12 pcs. / AD 1000 à 24 pcs. / AD 1000 à 36 pcs. 3353 / 3354 / 3355	
Adapters with seals and hose Code No.	ADS 1000 à 1 pc. / ADS 1000 à 12 pcs. 3350 / 3351	
Adapter testing strips Code No.	APB 1000 à 2 pcs. 3358	

TRISON
Ultrasonic baths for robotic instruments, rinsable MIS instruments and standard instruments

The new standard for pre-cleaning of robotic instruments

Mounting example TRISON Xi

An effective cleaning process for robotic instruments verifiably takes place when constant movement allows optimum access by the ultrasound to the working tools and cables of the instrument.
TRISON is a new modular ultrasonic bath for intensive pre-cleaning of high-grade medical instruments, particularly robotic surgery instruments.
For the first time, and uniqe in the world, it combines

Ultrasound
Individual rinsing and
Moving of instruments

for optimum cleaning results in complex robotic instruments.

Advantages at a glance:
- Improved cleaning through a combination of ultrasound, rinsing and moving for robotic instruments
- Designed for robotic instruments
- Reliability as a result of individual instrument rinsing and examination
- Simple instrument connection
- For robotic instruments, but also for rinsable MIS and standard instruments
- Temperature monitoring with warning function
- Protocol function
- Ergonomic, hygienic controls
- Flexible, space-saving system for the workplace thanks to different mounting options

Moving improves the cleaning effect!

The heart of the TRISON is the innovative moving device TRISON Twist for up to four robotic instruments. Special sprung actuators engage with the bottom of the instruments and move them during sonication. The surgical working tools are rotated and manipulated at their tips for all-over ultrasonic effect. Integrated friction clutches prevent damage to filigree cables and drive rollers.

Instrument tip in movement

The cleaning process is also supported by the permanent internal rinsing of the instruments. To allow this, the instruments are connected with hoses to the rinsing cycle of the TRISON Base control unit.
The removed soiling is guided directly into the exchangeable filter, rather than back into the bath fluid. Various series of experiments with actually contaminated instruments and with standardised test contamination confirm the effectiveness of the new TRISON cleaning concept.

Ultrasonic bath specifically for robotic instruments

The TRISON ultrasonic oscillating bath has been specially dimensioned for extremely long robotic instruments. Thanks to the high-performance ultrasonic oscillating systems on the bottom and sides, drive adapters, instrument shafts and working tools at their tips are optimally reached by ultrasound and possible acoustic shadows are avoided. The TRISON ultrasound generator is equipped with the SweepTec automatic frequency control system in order to minimise standing waves and to guarantee a homogeneous ultrasonic intensity distribution. In a cleaning program designed in consultation with the manufacturer, robotic instruments are first soaked for approx. 30 min. in order to partially dissolve or break down organic residues. In the subsequent alternating suction and pressure rinsing process with ultrasound support, the control housing and shaft of each instrument is rinsed and tested for

flow-through. In this way, even stubborn contamination is reliably stripped off and removed.

Individual instrument rinsing and examination for even greater reliability

During sonication, each instrument is individually released for rinsing and checked for flow-through (patent DE 20 2006 020 523). Non-rinsable instruments are reliably identified and displayed on the touch screen at the end of the process. The determination, classification and clear indication of successful rinsability for each instrument ensure a higher level of safety for reprocessing.

Simple instrument connection

The TRISON Twist allows the fixation of up to four robotic instruments by means of a simple push-on mechanism – no additional basket is required. Connection to the rinsing cycle is made with one double Luer connector per instrument.
The special TRISON Rack basket allows up to eight MIS instruments to be connected for rinsing, using the reliable SONOMIC adapter.
Connection to the TRISON Base control unit is performed quickly and without risk of mix-up by using two multi-hose connectors.

Robotic instruments before ...

... and after cleaning

TRISON Twist for robotic instruments

TRISON Rack for MIS instruments

Insert basket for standard instruments

Versatility: Three cleaning options in one device

TRISON has been specially developed for robotic inst-ruments. With the use of suitable accessories, however, MIS instruments and standard instruments can also be effectively cleaned. In order to best meet the various cleaning requirements, a cleaning program is available for each instrument type.

Temperature monitoring with warning function

TRISON contains a temperature sensor and, prior to each cleaning cycle, tests whether the temperature of the bath fluid is within the permitted range. To prevent protein coagulation, a warning message appears at temperatures of about 45 °C. If the bath fluid tempe-rature is too low (< 16 °C), a warning message is also given.

Logging of the reprocessing cycles through an ether-net or USB interface

For quality verification, TRISON provides two inter-faces. A USB interface allows for simple and flexible data transfer using a USB stick. The ethernet interface allows link-up to central sterile services management software or similar. Logging includes: cleaning mode, bath temperature, result of rinsing examination, etc.

Ergonomically designed user interface, hygienic touch screen operation

When designing TRISON, special value was assigned to ergonomics and fitness for use in the intended work environment within a hospital's central sterile services department. The result was device control via an easy-to-clean touch screen. The user-friendly operator soft-ware includes many self-explanatory images without lengthy operating texts.
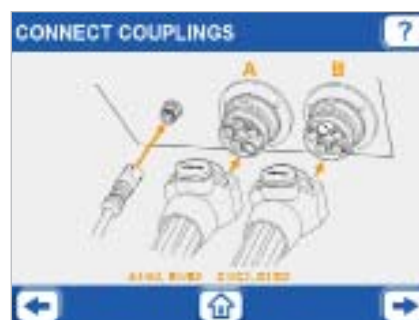
Flexible installation options

The swivelling control unit TRISON Base can be flex-ibly mounted/installed on the right or left side of the ultrasonic oscillating tank. This allows TRISON to be adapted to the different installation conditions accord-ing to the space available.

TRISON 4000 R / L

Consisting of:

- Oscillating tank TRISON TE 3000 with drain set ①
- Ultrasound generator TRISON GT 3000 M-C ②
- Control unit TRISON Base TB 4000 R/L ③
- Mains supply switch NW 3000 ④
- Moving device TRISON Twist
  TT 4000 Xi R/L ⑤ or TT 4000 Si R/L ⑥
- Pivot mounted arm TRISON Lift TL 4000 ⑦
- 30 filter cartridges EF 1001
- Frame for foil test FT 42

	TRISON 4000 Xi	TRISON 4000 Si
Internal tank dimensions, l × w × d [mm]	770 × 420 × 165/190$^+$	
Capacity [l]	60.0	
Operating volume [l]	35.0	
Code No.	7885 R / 7985 L	7884 R / 7984 L
External dimensions, l × w × d [mm]	oscillating tank: 900 × 480 × 245/275$^+$ ultrasound generator: 360 × 310 × 142 control unit: 370 × 190 × 380 mains supply switch: 220 × 60 × 145 pivot mounted arm: 240 × 95 × 350	
	moving device Xi: 345 × 160 × 175	moving device Si: 405 × 205 × 190
Ultrasonic peak out* [W]	3040	
Ultrasonic nominal output [W]	760	
Frequency [kHz]	38	
Pulse function	✓	
SweepTec	✓	
Temperature monitoring	✓	
Thickness tank material [mm]	2.0	
Outlet	G 1½ drain set with turning knob and stainless steel stopper	
Mounting into the working plate	from below	
Mains supply: 230 V~ (± 10 %), 50/60 Hz	✓	
Current consumption** [A]	3.5	
Interfaces	USB, Ethernet	
Inlet pressure [bar]	5 ... 9, ISO 8573-1 (7:4:4)	
CE-marked according to MDD	✓	

*corresponds to 4 times ultrasonic nominal output   ** in case of 230 V~[± 10%] 50/60 Hz $^+$inclined tank bottom

TRISON Accessories and consumables

Accessories

	Type	Code No.	External dimensions l × w ×d [mm]	Function
Moving device TRISON Twist Xi / Si	TT 4000 Xi R / L TT 4000 Si R / L	7821 R / 7921 L 7820 R / 7920 L	345 × 160 × 175 405 × 205 × 190	for Xi- or Si-robotic instruments available either as right or left version to use with TRISON Lift.
Pivot mounted arm TRISON Lift	TL 4000	7930	240 × 95 × 350	for TRISON Twist 4000
TRISON Rack	TR 3001 R/ L	7631 R / 7731 L	640 × 405 × 150	basket with connections for up to eight MIS instruments available either as right or left version
Insert basket	K 29 EM	688	470 × 240 × 45	to use for the instruments to be cleaned (e. g. standard instruments)
Basket holder	KT 3000 Z	7761	–	support of the insert basket
Lid	D 4000 A-R/L	7955 R / 7956 L	–	universal for all TRISON applications; for TRISON Twist only in lowered position
Frame for foil test	FT 42	3224	700 × 440	The frame is used for foil test, which is as simple method for displaying the intensity and distribution of the cavitation in an ultrasonic bath.
Temperature sensor	TM 4000	7741	–	for measuring the temperature of the bath during the cleaning of standard instruments

Consumables

Filter cartridges Code No.		EF 1001 à 30 pcs. / EF 1001 à 100 pcs. 3365 / 3366
Adapter seals Code No.		AD 1000 à 8 pcs. / AD 1000 à 24 pcs. 3361 / 3354
Adapter with seal Code No.		ADT 1000 à 1 pc. / ADT 1000 à 8 pcs. 7770 / 3359
Adapter testing strips Code No.		APB 3000 à 2 pcs. 7771
Hose set with coupling for TRISON Twist Code No.	for Xi: SLS 4000 TT à 1 pc. 3362	for Si: SLS 3000 TT à 1 pc. 3363
Hose set with coupling for TRISON Rack, without adapters Code No.		SLS 3000 TR 3364

SONOBOARD
Ultrasonic baths in stainless steel cabinets

The practical supplement to your sink unit facility, or for individual use!

SONOBOARD TRISON Xi

The double-walled stainless steel cabinets are equipped with overlapping fronts and all-round rubber seals on the doors and panels. Their flexible positioning (thanks to lockable casters), ergonomic working height and additional storage space make them a high quality and irreplaceable item of clinic equipment. SONOBOARD has a high resilience to scratches and impacts, and is extremely resistant against chemicals. The smooth stainless steel surfaces reduce the accumulation of germs and bacteria to a minimum, and meet the most rigorous hygiene requirements.

■ **Start-up and operation is fast and simple!**

SONOBOARD is delivered as a ready-to-use set; only the utility services need to be connected. Three variations are available, designed for different instrument types.

Features SONOBOARD STANDARD
- Operation on the front side
- Digital control unit with temperature monitoring
- Suitable for 1/1 DIN and ISO baskets

Features SONOBOARD MIC
- Safety as a result of patented individual instrument rinsing and testing
- Patented suction rinsing principle
- Patented universal adapter for instrument connection without change of seal
- Temperature and filling level monitoring
- Reproducible program sequences

Features SONOBOARD TRISON
- Improved cleaning through a combination of ultrasound, rinsing and movement for robotic instruments
- Designed for robotic instruments
- Reliability as a result of individual instrument rinsing and testing
- Simple instrument connection
- Temperature monitoring with warning function
- Protocol function
- Available as left and right version

SONOBOARD STANDARD
for standard instruments

Ready-to-use set:
- Functional cabinet FS 900 S
- Oscillating tank TE 1058.2
- Ultrasound generator GT 1003 M-C
- Control unit ST 30 DT
- Basket holder KT 57 Z
- Frame for foil test FT 37

SONOBOARD MIC
for rinsable MIS instruments and standard instruments

Ready-to-use set:
- Functional cabinet FS 1200 ML
- Oscillating tank TE 1001 with drain set
- Ultrasound generator GT 1001 E with rinsing module
- Control unit ST 1001 E
- Basket K 1001 MC
- 12 adapters with seals and hose ADS 1000
- 2 Adapter testing strips APB 1000
- 30 filter cartridges EF 1001
- 12 adapter seals AD 1000
- Frame for foil test FT 38

SONOBOARD TRISON
for robotic instruments, rinsable MIS and standard instruments

Ready-to-use set:
- Functional cabinet FS 1200 TR/TL
- Oscillating tank TE 3000 with drain set
- Ultrasound generator GT 3000 M-C
- Control unit TB 4000 R/L
- Mains supply switch NW 3000
- Pivot mounted arm TL 4000
- Moving device TT 4000 Xi-R/L
- 30 filter cartridges EF 1001
- Frame for foil test FT 42

	SONOBOARD STANDARD	SONOBOARD MIC	SONOBOARD TRISON
Internal tank dimensions l × w × d [mm]	600 × 400 × 200 / 220[+]	650 × 410 × 160 / 170[+]	770 × 420 × 165/190[+]
Capacity [l]	46.0	43.5	60.0
Operating volume [l]	32.0	27.5	35.0
Code No.	3452	3454	3457 R / 3456 L
External dimensions incl. rolls, l × w × h [mm]	900 × 700 × 930	1200 × 700 × 930	1200 × 700 × 930
Ultrasonic peak output* [W]	2400	2400	3040
Ultrasonic nominal output [W]	600	600	760
Frequency [kHz]	35	40	38
Pulse function	✓	✓	✓
SweepTec	✓	✓	✓
Time setting [min]	1, 2, 3, 4, 5, 10, 15, 30, ∞	menu controlled	menu controlled
Temperature monitoring	✓	✓	✓
Thickness tank material [mm]	2.0	2.0	2.0
Fill level mark	✓	✓	✓
Level sensor	–	✓	–
Outlet	G 1½ drain set	G 1½ drain set	G 1½ drain set
Mains supply: 230 V~ (± 10 %), 50/60 Hz 115 V~ (± 10 %), 50/60 Hz	✓ ✓	✓ ✓	✓ –
Current consumption [A]**	2.7	3.0	3.5
Interfaces	–	USB-B, RS-232, LPT	USB-A, Ethernet
CE-marked according to MDD	✓	✓	✓

*corresponds to 4 times output   **in case of 230 V ~ (± 10 %) 50/60 Hz [+] inclined tank bottom

SONOBOARD
Accessories

	SONOBOARD STANDARD		SONOBOARD MIC		SONOBOARD TRISON	
for standard instruments Code No.	Basket holder KT 57 Z 3078	Insert basket K 29 EM 688	Basket holder KT 57 Z 3078	Insert basket K 29 EM 688	Basket holder KT 3000 Z 7761	Insert basket K 29 EM 688
for MIS instruments Code No.	–		Insert basket K 1001 MC 3324		TRISON Rack TR 3001 R/L 7631 R / 7731 L	
for robotic instruments Best.-Nr.	–		–		TRISON Twist TT 4000 Xi R/L 7821 R / 7921 L	TRISON Twist TT 4000 Si R/L 7820 R / 7920 L
Lid Code No.	D 57 7520		D 1000 MC 3312		D 4000 A–R/L 7955 R / 7956 L	
Hinged lid Code No.	D 1058 G 3232		D 1001 GE 3326		–	
Frame for foil test Code No.	FT 37 3674		FT 38 3672		FT 42 3224	

Practical work aid

The foil test

A foil test is recommended for testing ultrasonic baths. It is to be conducted upon initial startup, and at regular intervals thereafter (e.g. every 3 months). The frequency of testing is the responsibility of the user.
The foil test is a simple procedure to demonstrate the intensity and distribution of cavitation in an ultrasonic bath. To do so, aluminium foil is stretched over a foil test frame. It is perforated or destroyed to a certain degree by cavitation, depending on the duration.

For purposes of reproducibility, it is important that the test conditions remain constant:

- Fill level in the oscillating tank (⅔)
- Temperature of tank contents
- Degassing time, if needed (degassing 5 to 30 min. before the test, depending on the tank contents)
- Time may need to be extended with acidic cleaning solutions.
- Frame positioning
- Foil properties (thickness, surface)
- Sonication time
- Concentration and type of ultrasound preparation

http://bandelin.com/foiltest/
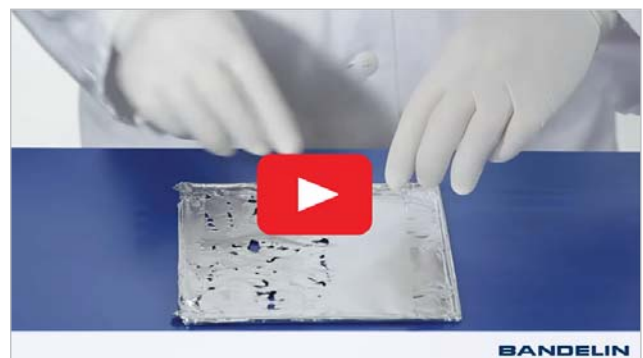
Foils can be archived in a suitable way (scanning, photos, etc.) This allows the foils to be compared at any time. The perforated areas of all foils should have approx. the same dimensions and distribution – the results are never identical.
A process validation, e.g. for the treatment of medical products, can only be achieved by conducting regular foil tests.

To execute the foil test, different foil test frames FT can be ordered from the manufacturer (for a fee). The foil test frames are available for a wide range of tank dimensions. Aluminium household foil is also required to conduct the test and is not included in the delivery.

STAMMOPUR

Disinfection and cleaning agents

For optimum cleaning results in the ultrasonic bath, specially formulated disinfection agents and detergents are required alongside ultrasound performance, temperature and time. BANDELIN offers a balanced range of special disinfection agents and detergents from DR. H. STAMM GmbH.

With their cavitation-conducive properties, these preparations support the cleaning process while protecting the materials.

The preparations are biologically degradable in accordance with the regulations of the Detergents Directive. In treating the instruments, it is important to rinse them thoroughly after using the ultrasonic bath.

Important: Some common disinfection and cleaning agents from other manufacturers may contain components that attack the ultrasonic oscillating tank and could lead to breakdown due to pitting.

Product information and EC safety data sheets are available as pdf downloads from **safetydatasheets.bandelin.com**

For optimum cleaning results in the ultrasonic bath, specially formulated disinfection agents and detergents are required alongside ultrasound performance, temperature and time.

To facilitate dosing, we provide a dosing table available that is only suitable for Bandelin equipment. The dosage table is available online: **dosingtable.bandelin.com**

Dosing table

Preparation	Description	Application with ultrasound (time)	Litres	Code No.
STAMMOPUR DR 8* – VAH-certified – CE 0124 – Concentrate–	**Disinfection and intensive cleaning of instruments after dry deposit.** High blood dissolution, for instruments heavily contaminated with incrustations of blood and secretions. Due to short irradiation time espe-cially recommended for the disinfection and cleaning of very sensitive and valuable micro-surgical, MIS instruments and endoscopic accesso-ries. Recommended by known manufacturers of endoscopes. Solution applicable under strain for 3 sequent days. Very high material compatibility. Non-odiferous. Anticorrosive. Without aldehydes, chlorine, phenols. Bactericidal, yeasticidal, virucidal against Vaccinia, BVDV, Papova, Adeno, HBV, HCV, HIV, H5N1, mildly alkaline, pH 9.4 at 1 %. 100 g contain: 9.9 g bis(3-aminopropyl)dodecylamine, 8.4 g didecylme-thylpolyoxyethylammoniumpropionate, 5 – 15 % non-ionic tensides, 30 – 50 % solvents, complexing agents, pH-regulators, adjusting agents, corrosion protection. Expertises: Bacteria, fungi: Dr. F.-A. Pitten, Gießen 11/05, Prof. Dr. Werner, Schwerin 10/08; HBV/HIV: Prof. Dr. Frösner, München 08/99; Time durability: Prof. Dr. Werner, Schwerin 10/99; Ultrasound time reduction: Dr. Färber, Gießen 08/02; Vaccinia, BVDV, H5N1: Prof. Dr. L. Döhner, Dr. D. Becher, Greifswald 08/06; Papova: Prof. Dr. L. Döhner, Dr. D. Becher, Greifswald 01/07. Adeno: Dr. M. Büttner, Dr. D. Becher, Greifs-wald 11/08.	**2 % –5 min** Papova with high protein burden: 2 % – 10 min Adeno with high protein burden: 3 % – 15 min Application without ultrasound: 1 % – 60 min 2 % – 30 min 3 % – 15 min	 2 5 25	 972 974 936
STAMMOPUR R CE – Concentrate –	**Intensive cleaner for routine cleaning of medical instruments in the ultrasonic bath.** High cleaning efficiency, even for instruments heavily contaminated with incrustations of blood and secretions. Anticorrosive, very high material compatibility, applicable for all mate-rials.Also applicable as contact liquid in the ultrasonic bath – e.g. for recommended basic cleaning of spotted and ugly looking instruments with STAMMOPUR GR. Without phosphates, aldehydes and chlorine. Main active agents: tensides, mildly alkaline, pH 9.6 at 1 %.	 2 % 2 – 10 min	 2 5 25	 934 989 976
STAMMOPUR GR* CE – Concentrate –	**Basic cleaning of spotted, encrusted and ugly looking instruments in the ultrasonic bath.** Removes tarnish, metal oxides, rust, spotting, burned-in residues after sterilisation and mineral residues e.g. lime. Caution with damaged chro-ming and nickel-plated parts. Not for light metals, tin and zinc. Not to be used for routine cleaning. Application at 50 – 60 °C only in a insert tub. Main active agents: phosphoric acid, tensides, pH 1.9 at 1 %. **Only to be used for basic cleaning.**	 5 % 2 – 10 min	 2 5 25	 938 969 970

*Transport regulations for "dangerous goods" have to be observed.

Dosing aids

Dosing aids	usable for	Code No.
Pump ①	5-l-jerrycan	268
Pump ①	25-l-jerrycan	266
Stop cock ②	25-l-jerrycan	252
Measuring beaker ③	100 ml	294

① ② ③

BANDELIN Ultrasound since 1955

Company portrait

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

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

As early as 1955, our company began developing and manufacturing high-performance ultrasonic devices. The constant expansion of the product range and a sharp rise in sales led to an expansion of the production area in 1985. In 1992, ultrasonic homogenisers and controllable, power-constant ultrasonic generators were introduced to the market.
The period from 1996 to 2004 was characterised by the development and production of innovative ultrasonic baths and immersible transducers as well as tube reactors for industrial applications.

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

Today, the reputation of our brands SONOREX, SONOPULS, SONOMIC and TRISON stand for the high quality awareness of our employees and is equated in expert circles with ultrasound.
The most important product groups include:

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

We are innovation leaders in the development of ultrasonic devices and new areas of application. In the past we have registered 79 patents / utility models as well as 68 trade brands. Our participation in various committees in the development of new standards and guidelines serve to ensure the highest standards for ultrasonic applications.
As the only complete supplier of ultrasonic devices, accessories, disinfectants and cleaning agents with approvals and certifications according to ISO 9001 and ISO 13485, BANDELIN is the market leader.
Over one million units have already been delivered to our customers.

More information about our company you will find here:
bandelin.com/prospekte/Company_history_GB.pdf

Tell us your requirements –
We will pleased to advice you at no obligation.

+49 30 76880-212

www.bandelin.com