

Information on ultrasonic cleaning units

Elmasonic ultrasonic cleaning units are subject to the CE marking criteria. The manufacturer tests the units through strict quality inspections before they are distributed. In these inspections the electric functioning and the power consumption are tested in long-term trial runs. The quality inspection results for each unit are recorded in individual test reports.

Please observe the instructions given in the operating manual, in particular the safety warnings and the instructions on initial operation and on maintenance and service.

Basic information on the ultrasonic cleaning process

The electric high-frequency vibrations produced by the ultrasonic generator are transformed into mechanic vibrations by one or several transducer elements which are mounted to the bottom of the tank. In this process the highly energetic sound waves are transmitted into the cleaning liquid (ordinarily water + tensides added to reduce the surface tension) in alternating phases of high and low pressure. During the low-pressure phase of a sound wave millions of minuscule vacuum bubbles are created which collapse in the high-pressure phase. These implosions produce jets moving through the liquid at a speed of up to 3,000 m/sec and releasing a very high energy. This effect is called cavitation. The cavitation process works best on surfaces of immersed items and dissolved substances. Particles are "blown off" and dissolved in the cleaning liquid. This secondary effect of the cavitation process and the implosion is audible as a hissing sound.

The transducer elements are designed so that the ultrasonic energy reaches the immersed items as evenly as possible. The sweep mode which can be switched on during operation guarantees a uniform sound field distribution and prevents the forming of dead zones in the cleaning liquid.

General information on the heating of the cleaning liquid due to ultrasound

Cleaning liquids heat up during ultrasonic operation, in particular when the unit is operated over prolonged periods of time. The temperature inside the cleaning bath can easily reach 60 °C or more depending on the operation period.

Check the temperature regularly / at least before each new cleaning cycle, by means of a digital thermometer (with the ultrasound switched off).

Evaporation and exposition

Prevent the evaporation of the cleaning liquid by operating the unit with a suitable cover.

Routine inspections

The operating functions of the Elmasonic units must be checked according to the relevant instructions, at least on each work day before putting into operation; the unit must be monitored during operation. For this please apply the methods listed in this information brochure (see section *Inspection of the functioning of the unit – Detection of malfunctions*).

Putting into operation

Fill the ultrasonic tank up to the proper filling level (approx. 2/3 or level marking on the tank wall) with water and add a wetting agent, e.g. cleaning chemical. Please note: The distribution of power is influenced by the reflection of the ultrasonic waves at the surface of the water, i.e. a filling level that differs considerably from the recommended level can reduce the ultrasonic performance.

When a new cleaning bath is filled, oxygen from the air is taken into the bath. The oxygen in the bath absorbs the ultrasonic power and effects the first cleaning cycle negatively. Therefore operate the ultrasonic unit for several minutes to degas the bath **before you put any cleaning items inside and start the cleaning process**. Ultrasonic units of the Elmasonic S series are fitted with the additional Degas operating mode.



Place the cleaning items into the cleaning baskets

For placing the cleaning items into the cleaning baskets please observe the following instructions:

Put instruments into the cleaning basket in one layer only and avoid contact of one instrument with another if possible, to ensure that the baskets are not overloaded and to avoid ultrasonic shadow zones.

Inspection of the cleaning result

Sensitive surfaces can be damaged when exposed to ultrasound over prolonged periods, particularly at low cleaning frequencies.

Ensure that sensitive surfaces are exposed to ultrasonic activity for a suitable period only.

If in doubt check the cleaning progress regularly and observe the state of the surface material.

The inspection of the cleaning results requires knowledge and experience and lies within the responsibility of the operator/user. The inspection is carried out by visual inspection with a lighted magnifying glass and sufficient ambient light.

Inspection of the functioning of the unit – Detection of malfunctions

The operating functions of the Elmasonic S units must be checked according to the relevant instructions, at least on each work day before putting into operation; the unit must be monitored during operation. For this please apply the methods listed in this information brochure.

Visual inspection of the unit functions:

When the unit is operating the ultrasonic activity is perceptible as hissing sound in the ultrasonic tank. The surface of the cleaning bath shows moving waves.

In case of a malfunction in the **electronics** of the unit both the hissing sound and the waves do not occur.

The Elmasonic S units usually indicate this type of malfunction by a running light on the front diodes. If this malfunction occurs try a reset first: for this switch off the unit and pull the mains plug. If the malfunction occurs again after restart of the unit, please send the unit to an authorized service point or return it to the manufacturer for repair.

If there is a malfunction in the **transducer systems** the consequence may be one of the following:

- a. **complete breakdown** or
- b. **reduced power** inside the ultrasonic tank

In case of a **total breakdown** of the unit the generator automatically switches off and the malfunction is indicated by a running light of the front diodes, or the unit is completely without function (all diodes are dark).

In case of **reduced power** the generator does not necessarily switch off and the front diodes do not indicate a malfunction.

In order to prevent bad cleaning results due to **reduced power** we recommend to carry out the following inspections. Please follow the intervals suggested here, unless there is reason for a different procedure.



daily / continuous monitoring:
Check the ultrasonic power with a wattmeter



monthly (or if necessary because of considerable deviations of power):
Check the ultrasonic activity using SonoCheck Dosimeter

or



monthly (or if necessary because of considerable deviations of power):
Check the ultrasonic activity by means of the aluminum foil test

Inspection of the ultrasonic power with wattmeter

Measuring the power consumption (watt) is an easy test to check if the unit produces the required ultrasonic power. There are various standard wattmeter units that can be used as plug-in between the ultrasonic unit and the mains socket (e.g. Energy Monitoring 3000 made by Conrad).

How to proceed:

1. Connect the wattmeter between the ultrasonic unit and the mains socket.
2. Fill the ultrasonic tank with the correct amount of water and add some cleaning medium (filling level 2/3 or level marking on the tank wall).
3. Switch on the ultrasound (operate the unit without heating!).
4. Take the power consumption (watt) from the wattmeter and compare the measured value with the value indicated in the Operating Instructions. The deviation must not exceed +/- 15 %.
5. Keep a record of all measured values.

Even if there is a deviation of power exceeding the given tolerance of +/- 15 %, the ultrasonic unit might still operate with sufficient power for the cleaning job at hand. In this case the cleaning results must be inspected more thoroughly.

We recommend to check the ultrasonic power in an additional test with SonoCheck dosimeter tubes. For this please follow the instructions given in section **Inspection of the ultrasonic power with SonoCheck dosimeter tubes.**

The SonoCheck dosimeter tubes can be obtained from: www.bag-germany.com

You can also check the ultrasonic power of the ultrasonic unit by the aluminum foil test. However, this test is not easy to interpret. Please see section **Inspection of the ultrasonic power by aluminum foil test.**

Should one or both inspections show negative results please contact your supplier or the manufacturer.

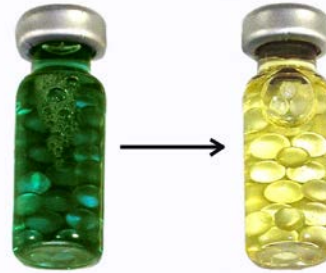


Inspection of the ultrasonic power with SonoCheck Dosimeter tubes

SonoCheck Dosimeter tubes show the cavitation (ultrasonic effect) inside the ultrasonic tank by a change of colour (green >> yellow).

The test is carried out under standard conditions (see section **Putting into operation**), but generally without cleaning items inside the tank.

Loading with cleaning items – see loading examples



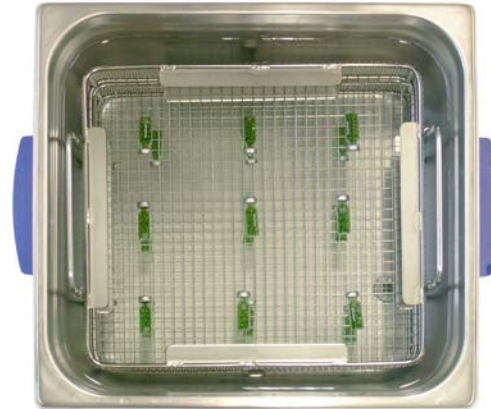
Elmasonic S 30

1. Place 5 SonoCheck Dosimeter tubes into the cleaning basket. Arrange the tubes as shown in the picture.
2. Operate the unit with immersed tubes for 5 minutes (if the Dosimeter tubes change their position during ultrasonic operation the test results will not be influenced).
3. After max. 5 minutes all Dosimeter tubes must have changed colour (yellow).



Elmasonic S 180

1. Place 9 SonoCheck Dosimeter tubes into the cleaning basket (if you use a stack basket 2 x 9 tubes). Arrange the tubes as shown in the picture.
2. Operate the unit with immersed tubes for 10 minutes (if the Dosimeter tubes change their position during ultrasonic operation the test results will not be influenced).
3. After max. 10 minutes all Dosimeter tubes must have changed colour (yellow).



Elmasonic S 150

1. Place 12 SonoCheck Dosimeter tubes into the cleaning basket. Arrange the tubes as shown in the picture.
2. Operate the unit with immersed tubes for 10 minutes (if the tubes change their position during ultrasonic operation the test results will not be influenced).
3. After max. 10 minutes all Dosimeter tubes must have changed colour (yellow).



Inspection of the ultrasonic power with the aluminum foil test

This method is an easy way to check the ultrasonic activity/cavitation. The produced cavitation power is illustrated by marks and small holes in the aluminum foil.

If possible you should carry out this test with the new unit and repeat it regularly under the same conditions to compare the results.

1. Cut a piece of standard household aluminum foil according to the base size of the basket or of the cleaning tank.
2. Fill the cleaning tank as described (water + wetting agent) and degas the bath.
3. Place the aluminum foil into the basket or hold it into the ultrasonic tank (wear textile gloves).
4. Switch on the ultrasound and operate the unit for 1 minute (without basket 1/2 minute).
5. Switch off the ultrasound, remove the foil and dab it dry: there should now be marks and holes (at the ultrasonic nodes) visible in the foil.
6. Mark the foil with a suitable pen and store it, e.g. in a transparent sleeve.



Example: aluminum foil after ultrasonic treatment in an Elmasonic S30.

Inspection of the timer

Check the correct functioning of the timer regularly at least once per month.

1. Set the cleaning period to 15 minutes and switch on the unit.
2. Take the time with a suitable watch.
3. The measured deviation should be less than 5% (45 seconds). If the results of the inspections are not satisfying or if you have further queries please contact the manufacturer of the unit.

Inspection of the temperature sensor

The temperature sensor is mounted on the outside of the ultrasonic tank approx. 5 cm from the tank floor. The sensor measures the temperature at the exact spot where it is fixed to the tank wall. In order to make sure that the measured temperature is the correct temperature throughout the ultrasonic cleaning bath, it is necessary to have an even distribution of heat in the bath. Zones of different temperature levels can be avoided by regularly stirring the cleaning liquid during the heating up process, e.g. by operating the ultrasound.

How to proceed

Fill the ultrasonic tank with water and a few drops of a cleaning agent up to the filling level marking (or 2/3 of the maximum filling capacity). The temperature should be approx. 20 °C.

1. Use the turning knob for setting the cleaning bath temperature (see fig. E.) to set a temperature of **35 °C** (see fig. D.).

The second LED from the bottom is lighted.

2. Use the turning knob for setting the cleaning time (see fig. A.) to set a cleaning time of e.g. 15 min; the set cleaning time is indicated by the diodes (see fig. B.).

3. Press the Start key to start the ultrasonic operation (see fig C.).

The unit starts heating up the cleaning bath with the ultrasound stirring up the liquid.

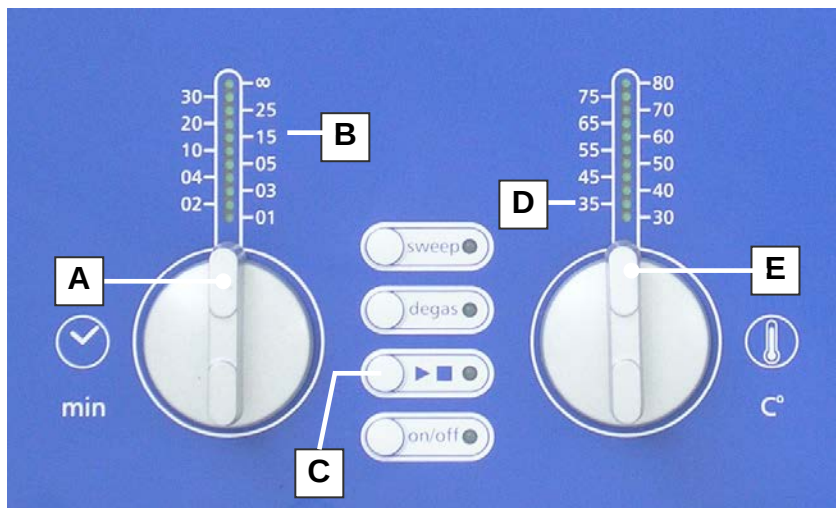
4. Check the LED indicating the temperature. As soon as the cleaning bath has reached a temperature of 30 °C, a second LED starts flashing.

5. When the temperature has reached the set value of 35 °C, the flashing LED turns dark and only the LED indicating the 35 °C is lighted.

Now switch off both ultrasound and heating and take the temperature in the cleaning bath.

The measured temperature must not deviate from the set temperature by more than 2-3 °C.

If the measured temperature differs from the set temperature by more than that after repeated takings, please contact your supplier or the manufacturer of the unit.



Operating elements Elmasonic S

For further information please contact us at support@elma-germany.com