Operating Instructions

Elmasonic S50R Lab Technology

Ultrasonic Unit

• english •

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Contents

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1 General

The present Operating Instructions are part of the delivered equipment. They must be ready for use at any time and remain with the unit in case of resale.
We reserve the right to carry out technical modifications on the unit due to advanced development.

2 Important safety warnings

Please observe any additional national safety regulations that may apply.

2.1 Instructions for the use of the present manual

Carefully read the Operating Instructions before you operate the unit. Do not use the present electrical unit for any purpose other than described in the Operating Instructions.

Warning symbols used in the present manual:


This symbol warns of the risk of injury caused by electricity.


This symbol warns of the risk of injury caused by explosion and/or deflagration.


This symbol warns of the risk of injury caused by hot surfaces and liquids.


This symbol warns of the risk of injury.


This symbol warns of the risk of damage to the equipment.


This symbol marks additional information.

Signal words used in the present manual

Danger The signal word Danger warns of a potential risk of serious injury and danger to life.

Warning The signal word Warning warns of the risk of serious injury and heavy damage to the equipment.

Caution The signal word Caution warns of the risk of light injury or damage to the equipment.

Attention The signal word Attention warns of the risk of damage to the equipment.

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2.2 Instructions for the use of the unit

Intended use

The present Elma ultrasonic cleaning unit has been designed for the treatment of **items** and **liquids** only.

No cleaning of living beings or plants!

User

Operation of the unit by authorized and instructed staff only. Observe the instructions given in the manual.

Mains connection

For safety reasons, the present unit must be connected to a correctly grounded socket only. The technical details indicated on the nameplate must correspond with the available mains connection details, in particular those of the mains voltage and current connected value.

Prevention of electrical accidents

For purposes of maintenance and care of the unit, in case of suspected humidity inside the unit or in case of malfunctions and after operation pull the mains plug.
The unit must be opened by authorised specialised personnel only.

Cleaning liquid

Fill the unit with a sufficient quantity of cleaning liquid before switch-on. Flammable liquids must not be treated by ultrasound directly in the cleaning tank: risk of fire and explosion!

Hot surfaces and liquids

Risk of burning and scalding! Depending on the operational period of the unit, unit surfaces, cleaning liquid, basket and cleaning items can heat up considerably.

Noise emission

Ultrasonic units can produce annoying sounds.
Wear personal ear protection devices when working close to an ultrasonic unit which is operated without cover.

Sound transmission at physical contact

Do not reach inside the cleaning liquid or touch sound-carrying parts (tank, basket, cleaning items, etc.) during operation.

Exclusion of liability

The manufacturer cannot be held liable for damages on persons, equipment or cleaning items caused by improper use. The operator is responsible for the instruction of the operating staff.

3 Functioning

Today, cleaning by ultrasound is the most modern fine cleaning method.

The electric high-frequency energy created by an ultrasonic generator is transformed into mechanical energy by piezo-electrical transducer systems and is then transmitted into the bath.
This process creates millions of tiny vacuum bubbles which implode due to the variations of pressure caused by the ultrasonic activity. Highly energetic liquid jets are created. These jets remove dirt particles from surfaces and even from the smallest grooves and bores.

3.1 Ultrasonic cleaning factors

Basically, the cleaning result depends on four factors:

Mechanical energy

Ultrasonic energy is probably the most important mechanical factor in the cleaning process. This energy must be transmitted through a liquid medium to the surfaces which are to be cleaned.

The present Elmasonic unit is fitted with the innovative sweep function device: electronic oscillation of the sound field (sweep function) prevents the formation of zones of low performance in the ultrasonic bath.

Cleaning media

For saponification and removal of the dirt particles a suitable cleaning agent is required. Elma has a large range of cleaning media on offer.

Cleaning chemicals are also necessary to reduce the surface tension. This increases considerably the efficiency of the ultrasonic activity.

Cleaning period

The cleaning period depends on the degree and the kind of contamination and on the correct selection of ultrasonic energy, cleaning agent and temperature.

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4 Product description

4.1 Elmasonic S product features

- ultrasonic tank made of cavitation-resistant stainless steel
- casing made of stainless steel, hygienic and easy to clean
- high-performance sandwich transducer systems
- „sieve cleaning“ mode for the optimized cleaning of analysis sieves
- „sample prep.“ mode for standard applicatins such as mixing, dissolving, dispersing, cleaning, etc.
- „degas“ mode for the quick degassing of HPLC solvents
- Auto-Degas mode for automatic degassing, e.g. of fresh cleaning liquid
- detachable mains cable
- diodes indicating both set and actual values
- splashwater-proof operating panel
- plastic carrying handles
- connection for laboratory stand on the unit back
- automatic switch-off after 12 h operation to prevent unintended permanent operation

4.2 CE conformity

The present Elma ultrasonic unit is in compliance with the CE marking criteria.

The declaration of conformity is available from the manufacturer.

4.3 Delivered equipment

- ultrasonic unit
- mains cable
- operating instructions

For information on accessory equipment please see section 4.9.

4.4 Unit front view / side view

Illustration 4.4 Unit front view

A **Stainless-steel tank with filling level marking** indicates the recommended filling level with litre scale (description see *section 4.6.*).

B **Plastic handles** for the safe transportation of the unit even when the casing is hot.

C **Operating panel** for the control of the operating modes and functions (description see *section 4.7.).*

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4.5 Unit back view

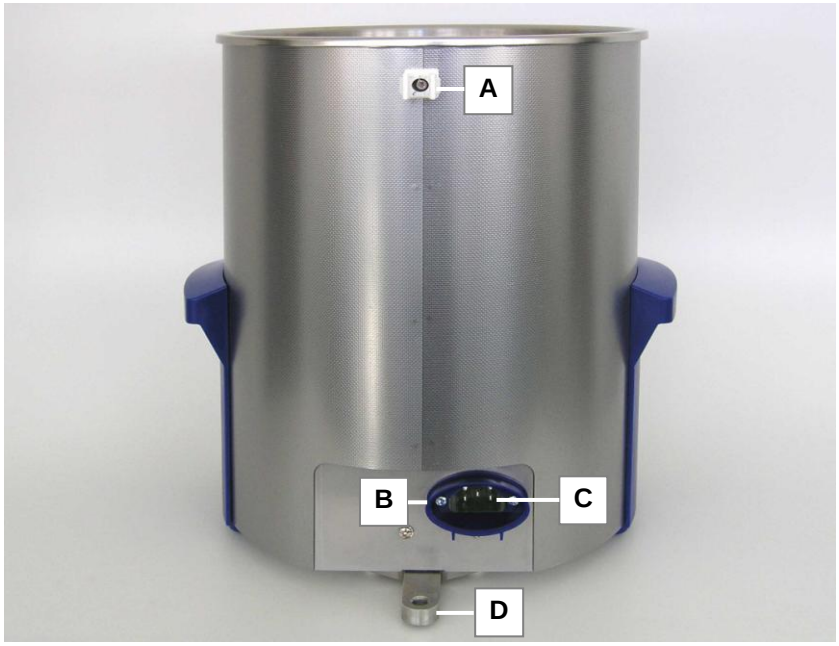

Illustration 4.5 Unit back view

A **Supporting clip for the rod of the laboratory stand**

B **Mains input socket** for the easy mounting and removing oft he mains cable, e.g. for transporting the unit.

C **Splashwater protection** to protect the mains input socket against water ingress

D **Holding support for the rod of the laboratory stand** threaded

4.6 Filling level marking in the tank

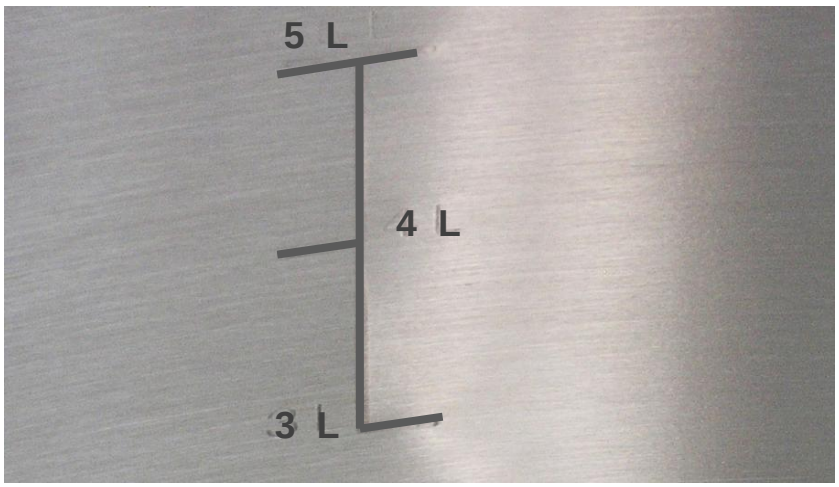

Illustration 4.6 Filling level marking

The filling level marking indicates the minimum filling level (3 L) and the maximum filling level (5 L). The litre scale facilitates the correct dilution of the cleaning chemical.

4.7 Description of operating elements

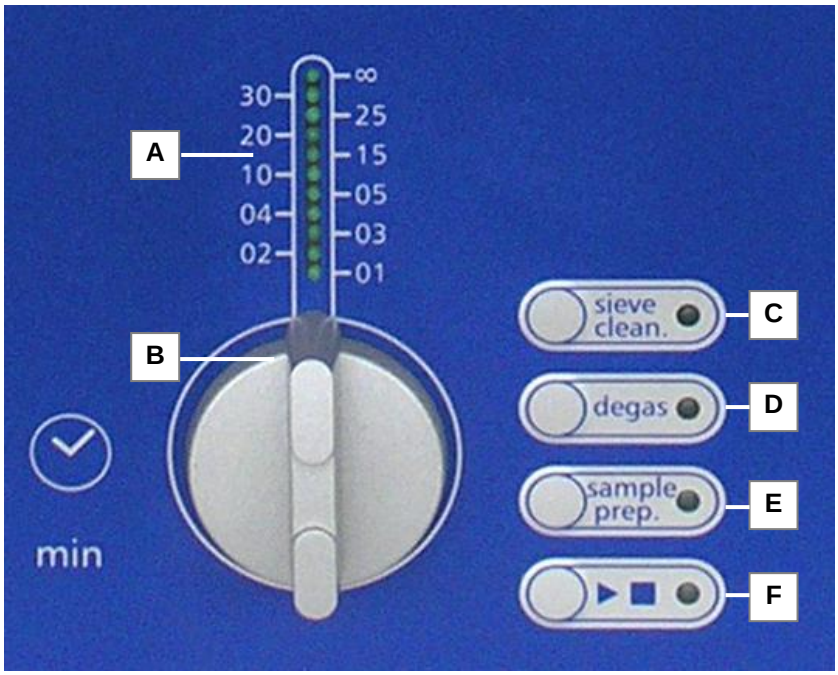

Illustration 4.7 View operating elements, turning knob (B) in position „Off“

A **LED indicating the cleaning period** for both set time and remaining time.

B **Turning knob cleaning time *** for switching the unit on and for setting a cleaning timel. Possible settings: short-time operation: 1; 2; 3; 4; 5; 10; 15; 20; 25; 30 min (with automatic switch-off). Symbol ∞ for continued operation, switch-off by hand.
For reasons of safety the unit automatically switches off after 12 h continued operation.

C **Key sieve cleaning mode**** for the cleaning of analysis sieves. LED *siev.clean* is lighted during operation of this mode.

D **Key degas mode**** for the optimized degassing of HPLC solvents and fresh mixed cleaning liquid (Auto-Degas). LED *degas* is lighted during operation of this mode.

E **Key sample preparation mode**** for standard applications, such as mixing, dissolving, cleaning, etc. LED *sample prep*. is lighted during operation of this mode.

F **Key ultrasonic operation** to start up the ultrasonic activity. LED ultrasound is lighted during ultrasonic operation.

* Setting the time: turn **clockwise**
setting back the time: turn **anticlockwise**
** to start the operating cycle switch the unit on at the key ultrasonic operation

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4.8 Description of optional accessory equipment

4.8.1 Holder for glass flasks for HPLC degassing

The holder for glass flasks consists of a three-fingered clutch (*Illustration 4.9.1.A*.), fastening socket (*Illustration 4.9.1.B.*) and stand rod (*Illustration 4.9.1.C*).

Elma order number Holder set for glass flasks: 104 9786

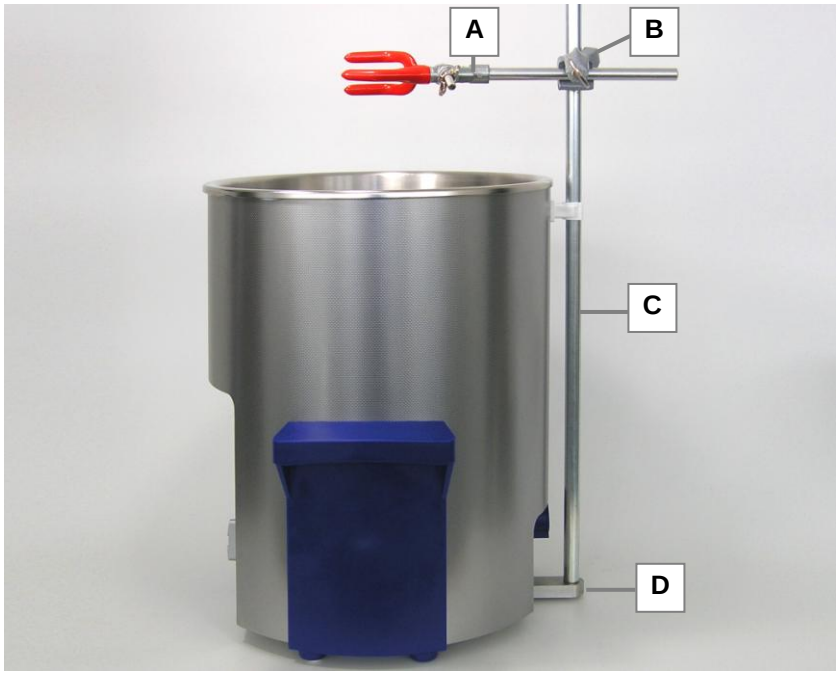

Illustration 4.9.1. Stand rod mounted

Mounting Screw the threaded end (M10) of the stand rod into the support rack on the back of the unit (*Illustration 4.9.1.D.*).

4.8.2 Sieve holder for laboratory sieves

The special sieve holder takes laboratory sieves with a diameter from 100 mm up to 200 mm. For examples of use please see *Illustrations 4.9.2.1/2/3*.

Elma order number Sieve holder for laboratory sieves: 104 9704

Illustration 4.9.2.1. Sieve holder with laboratory sieve 100 mm

Illustration 4.9.2.2. Sieve holder with laboratory sieve 200 mm

Illustration 4.9.2.3. Sieve holder with laboratory sieve 200 mm with transponder

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4.8.3 Stainless-steel basket

The stainless-steel basket can take laboratory vessels and other items.

Inner diameter: 220 mm

Height of the stainless-steel mesh: 70 mm

Elma order number

Stainless-steel basket: 104 6006

Illustration 4.9.3. Stainless-steel basket

4.8.4 Plastic cover with orifice

The cover with orifice allows glass beakers with a diameter between 90 and 97 mm to be inserted into the bath for direct ultrasonic treatment.

The manufacturer offers glass beakers with a volume of either 600 ml or 1000 ml, the rubber ring that keeps the glass beaker in a certain position and the fitting plastic cover for the beakers.

Elma order number

Plastic cover with orifice for glass beaker: 1049787

How to use the cover with orifice and the glass beaker

The glass beaker (*Illustration 4.9.4.B.*) is used together with the cover with orifice (*Illustration 4.9.4.A.*).

Put the rubber ring (*Illustration 4.9.4.C.*) onto the glass beaker at approx. 2/3 of the height (new rubber rings can be hard to put onto the glass beaker). In order to find the best position of the rubber ring, put the cover with orifice onto the unit and check by inserting the glass beaker through the orifice into the tank. The distance between the bottom of the glass beaker and the tank floor should be at least 2 cm.

The glass beaker must be immersed at least 1 cm into the liquid in the tank.

Fill the tank with water up to the required filling level marking and add some surface-active agent. This is necessary to obtain an optimized ultrasonic performance in the bath. Standard household washing-up liquid can be used.

Now insert the the filled glass beaker through the orifice in the cover into the bath.

Switch on the ultrasound. The ultrasonic energy is transmitted through the glass into the beaker with hardly any energy losses.

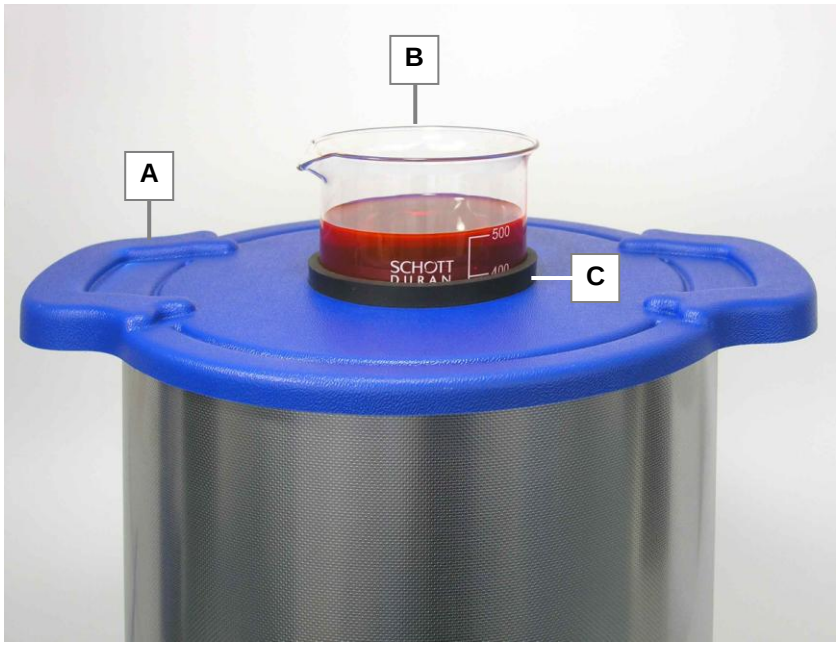

Illustration 4.9.4. Plastic cover with orifice and glass beaker

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4.9 Operating and display functions

Action	Setting	Result	Display
switch unit on	turn turning button (*Illustration 4.7.B.*) to the right (clockwise)	unit is ready for operation	the LED (*Illustration 4.7.B.*) lights up according to value set by means of the turning knob
switch unit off	turn turning button (*Illustration 4.7.B.*) to the left (anticlockwise) into position „OFF“	unit is switched off	all LED dark
start ultrasonic operation	set cleaning time by means of turning knob (*Illustration 4.7.B.*) press key ►■ (ultrasound)	ultrasound starts operating	LED ultrasound lights up (*Illustration 4.7.F.*) LED set time lights up (*Illustration 4.7.A.*) LED remaining time flashes (*Illustration 4.7.A.*) (only in timer operating mode)
stop ultrasonic operation manually	turn turning knob (*Illustration 4.7.B.*) to the left (anticlockwise) into position “OFF” or press key ►■	ultrasonic operation stops	all LED dark
switch on sieve cleaning mode* * sieve cleaning, degas and sample preparation modes cannot be operated simultaneously	set required time at turning knob press key ►■ press key *sieve clean*.	ultrasound starts operating in sieve cleaning mode	LED ultrasound lights up LED *sieve clean.* lights up LED set time lights up LED remaining time flashes
switch on degas mode* * degas, sieve cleaning and sample preparation modes cannot be operated simultaneously	set required time press key ►■ press key *degas*	ultrasound starts operating in degas mode	LED ultrasound lights up LED degas lights up LED set time lights up LED remaining time flashes

Action	Setting	Result	Display
switch on sample preparation mode* *sample preparation, degas and sieve cleaning modes cannot be operated simultaneously	set required time press key ►■ pres key *sample prep.*	ultrasound starts operating in sample preparation mode	LED ultrasound lights up LED sample preparation lights up LED set time lights up LED remaining time flashes
switch off sieve cleaning or degas or sample preparation mode	press relevant key	relevant mode stops operating unit continues operation in standard ultrasonic mode	relevant LED dark LED ultrasound lights up LED set time lights up LED remaining time flashes
switch on Auto-Degas mode*	turn turning knob (*Illustration 4.7.B.*) to the right (clockwise) press key ►■ press key *degas* for more than 2 sec	unit operates in Auto-Degas mode for 10 minutes, then switches off	LED ultrasound lights up LED degas flashes

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5 Initial operation

Packing

Please keep the original packing or dispose of it according to the relevant waste disposal regulations. You can also return the packing to the manufacturer free destination (to your account).

Check for transport damages

Check the unit for possible transport damages before initial operation. In case of visible damage do not connect the unit to the mains. Contact your supplier and forwarding agent.

Placement

For operation, place the unit on a dry and solid surface. Ensure that the workplace is sufficiently ventilated!

Do not use a soft surface (e.g. a carpet) as this may impede the ventilation of the unit.

DANGER

Risk of electrocution due to humidity inside the unit!
Protect the unit from entering humidity.

The unit inside is splash-water-proof. Keep workplace and casing dry in order to prevent electrical accidents and damages on the unit.

Ambient conditions

- Allowed ambient temperature during operation: +5°C - +40°C
- Allowed relative humidity of air during operation: max. 80%
- In-door operation only

5.1 Connecting the unit to the mains

Required mains conditions

Earth grounded socket:
1 phase (220-240 V); 1 N; 1 PE protective earth.

The power supply must be protected by an earth leakage circuit breaker.

Connect mains cable

Use the plug-in mains cable delivered with the unit. Connect the unit to a grounded shockproof socket only. Ensure that the values indicated on the nameplate of the unit correspond with the available connecting conditions.
The mains plug must be connected to an easily accessible socket only, as it serves as interrupted device!

6 Putting unit into operation

6.1 Filling of the unit

Observe filling level

Fill the stainless-steel tank with a sufficient quantity of a suitable liquid before switch-on.

Observe the filling level markings (*Illustration 4.6.*) and make sure that the filling level is between the 3 L and the 5 L marking.

ATTENTION

Risk of damage to the unit!

Ensure that the filling level does not go below the minimum of 3 L.

Suitable cleaning agents

Ensure that the chosen cleaning agent is suitable for treatment in an ultrasonic bath and observe the instructions on dosage and the compatibility of the material.
We recommend the use of the cleaning agents listed in *section 8.3*.

Prohibited cleaning agents

Flammable products are generally not allowed for use in an ultrasonic bath. Observe the safety warnings given in section 8.1.

DANGER

Risk of fire and explosion!

Never use flammable liquids or solvents directly in an ultrasonic cleaning bath.

Use the cleaning chemicals listed in *section 8.3*.

Ultrasonic activity increases the vaporisation of liquids and creates a very fine mist which can catch fire on any ignition source.
Observe the instructions on limitations of use given in *section 8.1.*

ATTENTION

Risk of damage to the transducer tank!

Do not use any acid cleaning agents (pH value < 7) directly in the stainless steel tank if the cleaning items or the contamination of the cleaning items contain halogenides (fluorides, chlorides or bromides). The same applies to NaCl solutions.

Use the cleaning chemicals listed in *section 8.3*.

The stainless steel tank can be destroyed by crevice corrosion in a very short time. Substances that cause crevice corrosion can be contained in household cleaners.
Observe the instructions on limitations of use given in *section 8.2.*
For queries please contact the manufacturer or your supplier.

ATTENTION

Danger of damage to the transducer system!

Fill no liquid > 60°C and < 10°C in the ultrasonic tank.

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6.2 Placement of cleaning items or laboratory vessels

Attention! Es dürfen nur Gegenstände oder Flüssigkeiten beschallt werden. Keine Lebewesen oder Pflanzen reinigen!

CAUTION

Do not reach inside the tank during ultrasonic operation!

Cell walls can be damaged by prolonged exposure to ultrasonic activity.

For placing and taking out the items or vessels always switch off the unit.

ATTENTION

Risk of damage to the unit and/or to the items placed in the tank!

Do not place the cleaning items directly onto the bottom of the cleaning tank, as this might lead to damages to the unit.

Use stainless-steel basket

Place the items into the stainless-steel basket (optional accessory equipment).

Use of glass beakers, laboratory flasks, etc.

Do not place laboratory flasks and other vessels on the floor of the ultrasonic tank. Fasten flask or vessel to the holder for glass flasks (Elma accessory) or place them into the stainless-steel basket (Elma accessory).

Sieve holder

Put laboratory sieves into the sieve holder (Elma accessory).

6.3 Degassing of liquid

Newly mixed cleaning liquid is saturated with air which lessens the cleaning effect of the ultrasonic activity. By sonification of the liquid over a period of several minutes before the actual ultrasonic process the tiny air bubbles in the liquid are eliminated.

Key degas

Degas any new cleaning liquid for approx. 5 – 10 minutes. For switch-on and switch-off press the degas key.

Auto degas

The Elmasonic S50R is equipped with an optional auto degas mode.

The operation in degas mode is automatically switched off when the programmed time (10 min) has run down.

How to proceed

Turn the turning knob (*Illustration 4.7.B*.) to the right (clockwise) to switch the unit on.

Press the key ►■ to start the ultrasonic operation.

Press the key degas > 2 sec. to start the auto degas operating mode.

The LED degas flashes during auto degas operation.

The LED ultrasound is lighted.

7 Ultrasonic cleaning process

Please observe the following instructions before starting the ultrasonic cleaning process.

It is the user's responsibility to check the cleaning results.

CAUTION

Risk of scalding by hot surfaces and hot liquid!

Ultrasonic energy is physically transformed into heat.

Both unit and liquid heat up during ultrasonic operation. During continued operation with cover temperatures exceeding 60 °C can be reached.

Do not reach into the liquid.

Wear protective gloves when handling basket and unit!

CAUTION

Ultrasonic units can produce annoying sounds.

Wear personal ear protection devices when working close to an ultrasonic unit which is operated without cover.

ATTENTION

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 acitivity for a suitable period only.

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

ATTENTION

Ultrasonic energy is physically transformed into heat.

Both unit and liquid heat up during ultrasonic operation. During continued operation with cover temperatures exceeding 60 °C can be reached.

For the treatment of temperature-sensitive items please take the heating-up of the liquid into consideration.

Please ensure that the temperature of the liquid remains below 42 °C for the removal of fresh protein or blood particles.

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7.1 Starting the cleaning process manually

Switch unit on

Turn the turning knob (*Illustration 4.7.B*.) to the right (clockwise) to switch the unit on.

Short period operation

For short period operation set the required cleaning period at the turning knob.

The LED indicates the set time.

Press the key ►■ to start the ultrasonic operation.
The unit starts the ultrasonic (cleaning) process.

In addition to the set time the remaining time is indicated by the flashing LED.

The ultrasound is automatically switched off when the set period has run down.

Continued operation

For continued operation turn the turning knob clockwise into ∞ position. In this operating mode there is no automatic switch-off. The ultrasonic activity must be switched off by hand after the ultrasonic process has been finished. For this press the key ►■ or turn the turning knob back into „OFF“ position.

Attention: Turn the turning knob into „OFF“ position only clockwise!

In order to avoid unintended continued operation, the unit is equipped with an automatic safety switch-off. The unit switches off completely after 12 h continued operation. In case you wish to continue operation start the unit again.

7.2 Sieve cleaning mode

The Elmasonic S50R can be operated in a special sieve cleaning mode.

The sieve cleaning mode is a special ultrasonic mode that has been designed for the cleaning of analysis sieves. Two different ultrasonic operating modes (Pulse and Sweep) are operated alternatingly in a pre-defined programme which guarantees the perfect cleaning of the sieves.

How to proceed

Turn the turning knob (*Illustration 4.7.B*.) to the right (clockwise) to switch the unit on.

Set cleaning time

Set the required cleaning time (short period operation or continued operation) as described in *section 7.4*.

Start ultrasonic operation

Press the key ►■ to start the ultrasonic operation.

Start sieve cleaning

Press the key *sieve clean*. to activate the sieve cleaning mode.

Sieve cleaning, degas and sample preparation modes cannot be operated simultaneously.

7.3 Degas mode (degassing of HPLC solvents)

The Elmasonic S50R can be operated in a special degas mode.

The degas mode provides an efficient degassing of the filled liquid within approx. 30 minutes. The gas contained in the liquid is „collected“ to form macroscopically large bubbles and then taken out of the liquid in short ultrasonic breaks. The degas mode is also good for the degassing of samples, e.g. for the degassing of carbon dioxide in the food sector.

How to proceed Turn the turning knob (*Illustration 4.7.B*.) to the right (clockwise) to switch the unit on.

Set time Set the required operation time (short period operation or continued operation) as described in *section 7.4*.

Start ultrasonic operation Press the key ►■ to start the ultrasonic operation.

Start degas Press the key *degas* to activate the degas operating mode.

Sieve cleaning, degas and sample preparation modes cannot be operated simultaneously.

7.4 Sample preparation mode

The Elmasonic S50R can be operated in a special sample preparation mode.

In this mode the unit operates in a stronger ultrasonic mode (Pulse).

The sample preparation mode is ideal for standard laboratory applications, such as mixing, dissolving, dispersing, cleaning, etc.

How to proceed Turn the turning knob (*Illustration 4.7.B*.) to the right (clockwise) to switch the unit on.

Set time Set the required operation time (short period operation or continued operation) as described in *section 7.4*.

Ustart ultrasonic operation Press the key ►■ to start the ultrasonic operation.

Start sample preparation Press the key *sample prep*. to activate the sample preparation mode.

Sieve cleaning, degas and sample preparation modes cannot be operated simultaneously.

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7.5 Verification of results

The different applications for which an ultrasonic unit is used cannot be defined in a validated process. The applications will always be or include manual processes.

Therefore, the responsibility for verifying and monitoring the results and for inspecting items regularly for potential damage during the treatment lies with the operator.

7.6 After the ultrasonic treatment

Follow-up treatment of cleaned items

If you have cleaned items in the ultrasonic unit rinse them in water, e.g. under the tap.

Drain the unit

Drain the liquid as soon as it is dirty or when the unit is not operated over a prolonged period of time. Certain residues and types of contamination may destroy or damage the stainless steel tank.

8 Cleaning media

WARNING

The cleaning chemical to be used must be suitable for the use in an ultrasonic bath to prevent damage to the tank or injuries to the user. Use the recommended cleaners mentioned in *section 8.3*. Observe the restrictions to cleaners containing solvents and aqueous cleaners mentioned *in sections 8.1 and 8.2.*

For queries please contact the manufacturer or your supplier.

Exclusion of liability

Damages caused by non-compliance with the instructions given in *sections 8.1 and 8.2* will not be covered by the manufacturer's warranty!

8.1 Limitations of use of cleaners containing solvents

DANGER

Never use flammable liquids or solvents directly in an ultrasonic cleaning tank. Risk of fire and explosion!

Ultrasound increases the volume of vaporisation of liquids and creates a very fine mist that can catch fire on any ignition source at any time.

Do **not** fill potentially explosive substances and flammable solvents

- marked in compliance with the EEC directives by symbols and safety warnings R 1 to R 9
- or E, F+, F, O or R 10, R 11 or R 12 for flammable substances

into the stainless steel tank for ultrasonic treatment.

Exception

In compliance with the general regulations on the protection of labour, certain limited volumes of flammable liquids (max. 1 litre) can be used in an ultrasonic cleaning unit under the following conditions: these liquids must be filled into a suitable separate vessel (e.g. beaker) with sufficient ventilation; this vessel (beaker) can then be put into the stainless steel tank which is filled with non-flammable liquid (water with a few drops of interlacing agent).

8.2 Limitations on aqueous cleaners

ATTENTION

Do not use aqueous cleaning media with pH values in the acid range (pH < 7) directly in the ultrasonic tank if fluoride (F^-), chloride (Cl^-) or bromide (Br^-) ions can be taken in by the removed dirt or through the cleaning chemical. These can destroy the stainless-steel tank by crevice corrosion within a very short period of ultrasonic operation.

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Acids and alkaline solutions

Other media which can destroy the stainless-steel tanks when used in high concentrations or with high temperatures during ultrasonic operation are: nitric acid, sulphuric acid, formic acid, hydrofluoric acid (even diluted). (Completeness of list not guaranteed.)

Risk of damage to the unit: do not use cleaning solutions containing more than 0.5 mass % alkali (KOH and/or NaOH) in an ultrasonic cleaning tank.

Entrainment of chemical substances

The above limitations for the use of chemicals in an ultrasonic bath also apply for the aforementioned chemicals when these are brought into an aqueous (particularly distilled water) bath through entrainment or from the removed dirt.

Acid-resistant tank

For the ultrasonic treatment with the above mentioned media use an acid-resistant tank (available as accessory equipment).

Disinfectants

The limitations of use also apply to the standard cleaners and disinfectants if these contain the above mentioned compounds.

Safety regulations

Observe the safety warnings indicated by the manufacturer of the chemicals (e.g. goggles, gloves, R and S phrases).

For queries please contact the manufacturer or your supplier.

8.3 List of recommended cleaning media

Elma has a large range of suitable cleaning products on offer developed by chemical engineers in the Elma laboratory. Please contact your supplier to find the most suitable cleaning chemical for your application.

Environment – friendly products	The organic detergents contained in the elma clean cleaning concentrates are biodegradable. Product informations and safety data sheets are available from the manufacturer.
elma lab clean S10	Acid cleaning concentrate for glass, ceramics, metal incl. light and non-ferrous heavy metals, plastic. Removes mineral deposits, lime, lime soap and non-ferrous heavy metal oxides, mineral grease and oil.
elma lab clean S20	Strong acid cleaning concentrate for stainless steel, glass and plastic. Removes tenacious contaminations such as rust, organic residues, inorganic compounds and mineral grease and oil. Not suitable for aluminum and light metal alloys.
elma lab clean N10	Neutral universal and laboratory cleaning concentrate for sensitive materials such as aluminum and light metals. Removes lime soap, light oil and grease and finger marks.
elma lab clean A10	Alkaline cleaning concentrate for glass, porcellain, metal and plastic. Removes grease, glass grease, gumming, remains of lables and calcification. Also suitable for the laboratory rinsing machine.
elma lab clean A20sf	Special cleaning concentrate for pipettes, does not contain any tensides. Mildly alkaline, suitable for use in an ultrasonic cleaning unit and in the laboratory rinsing machine. Also suitable for use in pipette rinsing machines that require active cleaning agents (soaking).

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9 Maintenance

9.1 Maintenance / Care

ATTENTION

Pull the mains plug before carrying out any maintenance works!

Electrical safety Check the casing and the mains cable for damage regularly in order to prevent electrical accidents.

Care of transducer tank Lime deposits on the stainless-steel tank can be cleaned gently e.g. with elma clean 40 or elma clean 115C (operate the unit with concentrate + water).

Care of casing Residues of cleaning media can be wiped away with a household cleaner or decalcifier depending on the kind of contamination. Do not put the unit in or under water**!**

Disinfection If the unit is used for medical and sanitary purposes it is necessary to disinfect the transducer tank and the surfaces regularly (standard surface disinfectants).

9.2 Service life of the transducer tank

The transducer tank and particularly the ultrasound transmitting surfaces are wear parts. The changes on the surfaces that occur after a certain operating period are visible first as grey areas and later on as material abrasions, the so-called cavitation erosion.

To prolong the service life of your ultrasonic unit even more we recommend to observe the following instructions:

- Regularly remove any cleaning residues, in particular metal particles and rust films.
- Use suitable cleaning chemicals, with particular caution concerning the kind of removed contamination (see instructions *section 8.2*).
- Exchange the cleaning medium before it is too heavily contaminated.
- Do not operate the ultrasound unnecessarily; switch off after the cleaning process.

9.3 Repair

Opening by authorised specialised personnel only

Repair and maintenance works which require the unit to be connected and opened must be carried out by authorised and specialised personnel only.

DANGER

Risk of electrocution due to live parts inside the unit!

Pull the mains plug before opening the unit!

The manufacturer cannot be held responsible for any damage caused by unauthorised maintenance or repair works on the unit.

In case of a break-down of the unit please contact the manufacturer or your supplier.

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10 Technical details

Tank max. capacity (ca. litre)	Tank service capacity (ca. litre)	Tank internal dimensions Dia x H (ca. mm)	Unit external dimensions Dia x H (ca. mm)	Basket internal dimensions Dia x H (ca. mm)	Weight (ca. kg)
6	3 - 5	240 x 30	260 x 350	220 x 70	5.0

Mains voltage versions (Vac)	Ultrasonic frequency (kHz)	Power consumption total (W)	Ultrasonic power effective (W)	Ultrasonic maximum peak power* (W)	Noise level
100-120 220-240	37	150	150	600	0 60

* The choice of the waveform has been matched to the tank geometry. The signal form of the wave results in a factor 4 for the ultrasonic peak max.

11 Troubleshooting

Fault	Possible cause	Remedy
Mains cable damaged	• damage caused by third party, transport damage	• obtain original spare mains cable from manufacturer or supplier
No operating functions; all LEDs dark	• mains cable not plugged in	• plug in mains cable
	• socket dead	• check socket/fuse
	• mains cable damaged/interrupted	• replace mains cable
	• fault of electronics	• return unit to supplier or manufacturer
No ultrasonic operation; LED ultrasound dark	• turning knob for ultrasonic operation in „0“ position	• switch on ultrasonic operation by turning the knob
	• key ►■ (ultrasound) not pressed	• press key ►■
	• fault of electronics	• return unit to supplier or manufacturer
No ultrasonic operation; timer LEDs flash alternatingly (“running light”) = fault indication ultrasound	• fault of electronics	• switch unit off and on; if fault is indicated again return unit to supplier or manufacturer
Unsatisfactory cleaning results	• no or unsuitable cleaning medium used	• use suitable cleaning medium
	• cleaning period too short	• repeat cleaning interval
	• ultrasonic energy heats up liquid (physical process)	• switch on ultrasound for short period only

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12 Putting out of action and waste disposal

The unit can be taken to metal and electronics recycling stations or returned to the manufacturer.

13 Manufacturer's contact address

Elma Hans Schmidbauer GmbH & Co. KG

Kolpingstr. 1-7, D-78224 Singen
Phone +49 (0) 7731 / 882-0
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e-mail: info@elma-ultrasonic.com

Please visit our homepage. You will find helpful information and descriptions on our large product range:

www.elma-ultrasonic.com

Do you have any queries or suggestions concerning the present unit, its operation or the Operating Instructions?
Please contact us, we will be glad to assist:

Technical Support

Phone +49 (0) 7731 / 882-280
Fax +49 (0) 7731 / 882-253
e-mail: support@elma-ultrasonic.com

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