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Operating Instructions

Elmasonic P

Ultrasonic Cleaning Units

CE

• english •

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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.

An operating manual cannot take account of every conceivable use. An operating manual cannot take account of every possible use. Contact your dealer or the manufacturer for further information or in the event of problems which are not covered or not sufficiently covered in this operating manual.

2 Important safety warnings

Please observe any national safety regulations that may apply in addition to the present instructions.

2.1 Instructions for the use of the present manual

Carefully read the present operating instructions and operate the electric unit in compliance with the instructions only.

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 Safety 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. Do not clean any living beings or plants!

User

Operation of the unit by authorized and instructed staff only. Observe the instructions given in the manual. Children are not allowed to operate the unit.

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

Risk of fire and explosion! Do not fill flammable liquids into the cleaning tank.

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. We recommend to operate the unit with the suitable cover (accessory equipment) to reduce the noise level.
Wear personal ear protection devices when working close to an ultrasonic unit which is operated without cover. A special noise production box is available for units up to P 120.

Sound transmission through 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 any damages on persons, equipment or cleaning items caused by improper use against the instructions given in the present manual.
The operator is responsible for the correct instruction of the operating staff.

Storage and transport conditions

Temperature during storage: +5 C (+ 41 F) to + 40 C (+ 104 F)

Temperature during transport: -15 C (+ 5 F) to +60 C (+ 140 F)

Humidity and air pressure during storage and transport:

10% - 80 % relative humidity; non-condensing

Pressure range 500 hPa – 1060 hPa absolute

3 Ultrasonic cleaning

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 which remove dirt particles from surfaces and even from the smallest grooves and bores.

3.1 Interesting facts on cleaning by ultrasound

Basically, the cleaning result depends on four factors:

Physical 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 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. We have a large range of cleaning media on offer.

In addition, the use of cleaning media is required to reduce the surface tension of the liquid. This increases the efficiency of the ultrasonic activity considerably.

Temperature

The effect of the cleaning medium is improved by the optimised temperature of the cleaning liquid.

Cleaning period

The cleaning period depends on the degree and the kind of contamination, the cleaning agent used, the set temperature and the cleaning process.

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3.2 Ultrasonic cleaning process

1. Fill the ultrasonic tank with water and cleaning concentrate (*Section 6.1*).
2. Heat up the cleaning liquid, if required for the intended cleaning application (*Section 6.2*).
3. Degas the cleaning liquid – operation in *degas* mode (*Section 6.4*).
4. Select the required ultrasonic frequency depending on the cleaning task - 37 kHz or 80 kHz (*Section 7.6*).
5. Activate the ultrasonic sweep mode – if required for the intended cleaning application, e.g. for large cleaning items (*Section 7.4.*).
6. Activate the ultrasonic pulse mode – if required for the intended cleaning application, e.g. for coarse contaminations (*Section 7.5*).
7. Switch on the ultrasound (manual or automatic start-up) (*Section 7.1* and *Section 7.2*).
8. Put the cleaning items into the cleaning bath (*Section 7.8*).
9. Rinse the cleaned items if necessary.
10. Dry the cleaned and rinsed items if necessary.

4 Product description

4.1 Product features

- ultrasonic tank made of cavitation-proof stainless steel
- casing made of stainless steel, hygienic and easy to clean
- sandwich-type performance transducer systems
- two ultrasonic frequencies, switchable in one unit:
  37 kHz und 80 kHz
  37 kHz: for the removal of coarse contaminations and for mixing, dissolving, dispersing and degassing
  80 kHz: perfect for the cleaning of capillaries and fort he use in quiet work areas, prolonged cleaning period
- automatic frequency switch-over for simultaneous coarse and fine cleaning
- activatable Sweep mode for an optimised sound field distribution within the cleaning bath
- activatable Pulse mode for an intensified ultrasonic cleaning power, additional ultrasonic power up to 20%
- activatable Degas mode for the quick degassing of HPLC samples or solvents, and of fresh cleaning liquids
- Auto Degas mode for an automatic degassing cycle, e.g. for fresh cleaning liquids
- ultrasonic power variable for sensitive surfaces
- temperature-controlled ultrasonic operation: ultrasound starts automatically as soon as the preset temperature is reached
- indication of unit settings (e.g. set and actual values) by alphanumerical display
- saving of the last unit settings at switch-off
- electronic turning knobs
- drain duct mounted to the unit rear, operation of the drain duct on the unit side (not on Elmasonic P30SE)
- automatic stirring during heating-up process
- pluggable mains cable
- plastic carrying handles
- automatic safety switch-off after 12 h operation to prevent unintended permanent operation
- automatic safety switch-off at 90 °C to protect the cleaning items against excess temperatures

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4.2 CE conformity

The present ultrasonic cleaning unit complies with the CE marking criteria.
The declaration of conformity is available from the manufacturer.

4.3 Delivered equipment

- Ultrasonic cleaning unit
- Mains cable
- Hose nozzle complete with hose clamp (not on Elmasonic P30SE)
- Operating Instructions

4.4 Description of unit front features

Fig 4.4 Front view / side view

A **Maximum filling level marking** marks the recommended upper filling level. This filling level should not be exceeded even with immersed cleaning items.

B **Plastic carrying handles** for the safe transportation of the unit even with heated casing.

C **Turning knob for the draining of the tank** For a description please see *Section 4.6.* (not on Elmasonic P30SE)

D **Display** indicates the set and actual values. For a description please see *Section 4.78.*

E **Operating elements** for the control and operation of the unit functions.
For a description please see *Section 4.7.*

4.5 Description of unit rear features

Fig 4.5 View unit rear when delivered

A **Drain duct** to drain the tank (blind plug when delivered) (not on Elmasonic P30SE)

B **Mains input socket** quick and easy unplugging of the mains cable, e.g. for transportation purposes

4.6 Turning knob for the draining of the tank

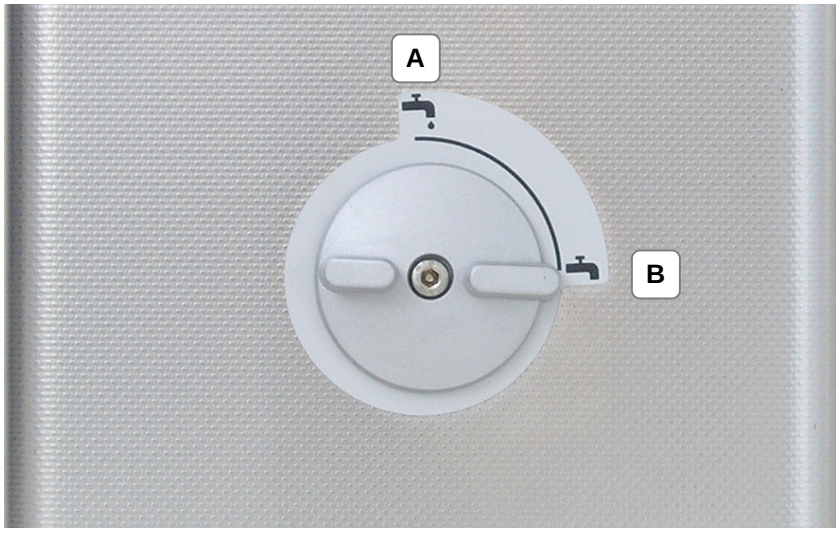

Fig 4.6 View turning knob for the draining of the tank

A **Vertical position**: drain duct open (not on Elmasonic P30SE)

B **Horizontal position**: drain duct closed (not on Elmasonic P30SE)

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4.7 Description of operating elements

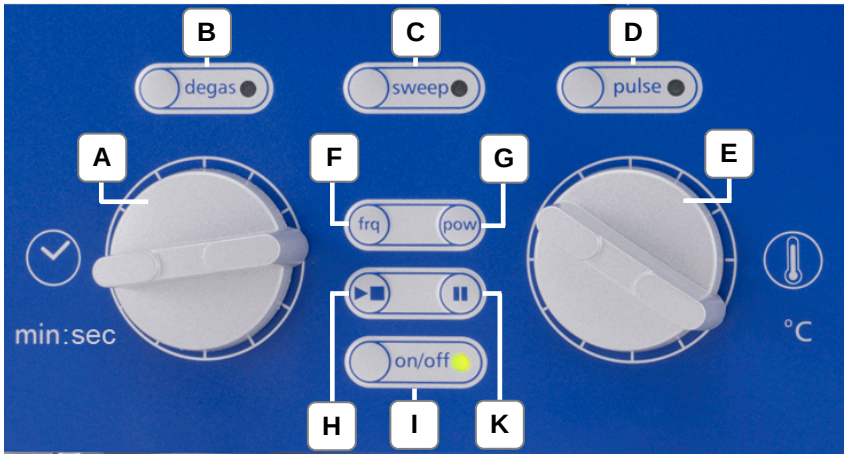

Fig 4.7 View operating panel (unit with heating)

A **Turning knob ultrasonic period (*min*)** Possible settings for short-term operation: 1; 2; 3;…10; 10; 15; 20;…50; 60 min (automatic switch-off).
Permanent operation (**--:--**) for continued operation. Switch-off by hand. For reasons of safety the unit is automatically switched off after 12 h continued operation.

B **Key Degas mode (*degas*) with LED** by hand or by Auto Degas (*see Section 7.3*) for the efficient degassing of fresh cleaning liquids and HPLC applications

C **Key Sweep mode (*sweep*) with LED** for the perfect sound field distribution within the cleaning bath

D **Key Pulse mode (*pulse*) with LED** for an increase of the ultrasonic power by 20%

E **Turning knob temperature (°C)** temperature range between 30° – 80°C, variable by 5°C steps. The heating is switched on as soon as the set temperature exceeds the actual temperature.

F **Key *frq*** to change the ultrasonic frequency

G **Key *pow*** for the setting of the ultrasonic power between 30% – 100%, variable by steps of 10%

H **Key ultrasonic operation ►■** and temperature-controlled ultrasonic operation

I **Key *on/off* with LED** to switch the unit on and off

K **Key Pause II** for a temporary operating top

4.8 Description of display

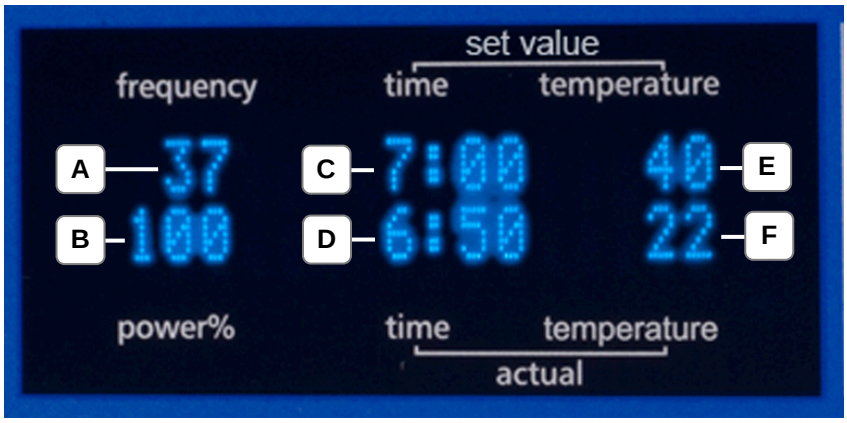

Fig 4.8 View display (example)

A **Ultrasonic frequency** set value

B **Ultrasonic power** set value

C Indication of the set ultrasonic period in minutes **(set value)**
In case of permanent operation, the display shows **--:--**

D Indication of the remaining operating period in minutes **(remaining time**)
In case of permanent operation, the display shows **--:--**

E Indication of the set cleaning temperature (**set value**)
In case of switched off heating, the display shows **– –**

F Indication of the actual cleaning temperature by steps of 1 degree (**actual temperature**)

4.9 Short overview of operating and display functions

Intended action	What to do	Result	Display
switch on unit	press on/off key	unit is ready for operation	on/off LED is lighted
switch off unit	press on/off key	unit is switched off	display is dark
start ultrasonic operation – now –	set time at turning knob for operating period press key ►■ (ultrasound)	ultrasound starts operating	set period is indicated (*set value time*) remaining time is indicated (*actual value time*)

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Intended action	What to do	Result	Display
start ultrasonic operation – temperature-controlled*; with stirring of cleaning bath – * as soon as set temperature > actual temperature	select set time select set temperature at the turning knob for temperature press key ►■ and keep pressed (> 2 sec.)	heating is operating ultrasound starts automatically as soon as the set temperature is reached set ultrasonic period starts running	set period is indicated by flashing light until set temperature is reached set temperature (*set value temperature*) and actual temperature (*set value temperature*) are indicated as soon as set temperature is reached, the remaining period is indicated, too (*actual value time*)
stop ultrasonic operation by hand	turn set period to „0“ or press key ►■	ultrasonic operation stops	remaining period is no longer indicated set period and all other values remain indicated
interrupt the ultrasonic operation (pause)	press key **II**	ultrasonic operation stops heating remains activated, if switched on all set parameters are saved; by pressing key **II** again the ultrasonic operation starts again, the remaining operating time continues running	remaining operating time indication flashes (*actual value time*)

Intended action	What to do	Result	Display
switch on heating	set temperature	heating starts operating when set temperature > actual temperature	set temperature is indicated (*set value temperature*) actual temperature is indicated (*actual value temperature*)
switch off heating by hand	turn set temperature to „0“	heating is switched off	actual temperature is indicated (*actual value temperature*)
switch on Sweep mode* * Sweep – Degas – Pulse cannot be operated simultaneously	set time press key ►■ press key *sweep*	ultrasound starts operating in Sweep mode	LED in key sweep is lighted set time is indicated (*set value time*) remaining time is indicated (*actual value time*)
switch off Sweep mode	press key *sweep*	Sweep mode stops ultrasound continues by standard operation	LED inkey *sweep* turns off
switch on Degas mode* * Sweep – Degas – Pulse cannot be operated simultaneously	set time press key ►■ press key *degas*	ultrasound starts operating in Degas mode	LED in key *degas* is lighted set time is indicated (*set value time*) remaining time is indicated (*actual value time*)
switch off Degas mode	press key *degas*	Degas mode stops ultrasound continues by standard operation	LED inkey *degas* turns off
switch on Auto Degas mode* * Sweep – Degas – Pulse cannot be operated simultaneously	press key ►■ press key *degas* and keep pressed (> 2 sec.)	ultrasound operates in Auto Degas mode for 10 minutes, then switches off	LED in key *degas* flashes

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Intended action	What to do	Result	Display
select ultrasonic frequency (the ultrasonic frequency can be switched between 37 kHz and 80 kHz)	switch on ultrasound press key *freq*	ultrasound starts operating at set ultrasonic frequency	selected ultrasonic frequency is indicated in the display field *frequency*
set ultrasonic power (the ultrasonic power can be set by steps of 10% between 30% and 100%)	switch on ultrasound press key *pow*	ultrasound starts operating at set ultrasonic power	set ultrasonic power is indicated in the display field *power*
switch on automatic frequency change mode	switch on ultrasound press key *freq* and keep pressed (>2 sec)	ultrasonic frequency changes between 37 kHz and 80 kHz at 30 second intervals	asterisk before frequency value in display field *frequency* indicates automatic frequency change mode
switch off automatic frequency change mode	press key *freq*	ultrasound continues operation at indicated frequency (if necessary, press key again to select the other ultrasonic frequency)	asterisk before frequency indication turns off

5 Initial operation

Packing

Please keep the original packing for possible later service purposes or dispose of it in compliance with the relevant local waste disposal regulations. You can also return the packing to the manufacturer or to your supplier (cost of shipment to be paid by the customer).

Check for transport damages

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

Placement

For operation place the unit on a stable and dry surface. Ensure that the workplace is sufficiently ventilated! Soft surfaces, such as carpets, are not suitable as the ventilation of the unit may be insufficient.

DANGER

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

The unit inside is splash-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%
- Admissible ambient temperature change for the unit and the bath liquid: non-condensing (no formation of condensation water at the unit surfaces). A table containing the dew points in relation to the ambience and humidity of air is available from the manufacturer. Dew point: temperature threshold below which condensation starts.
- In-door operation only

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5.1 Prepare the drain duct

(not on Elmasonic P30SE)

On the delivered unit the drain duct is closed off with a plastic screw cap. For initial operation of the drain duct fix the hose nozzle delivered with the unit to the drain duct.

How to proceed

1. Unscrew the plastic screw cap anti-clockwise (*see Fig 5.1.1).*
2. Screw the hose nozzle (included in delivery) onto the inside thread of the drain duct (clockwise).
3. Turn the hose nozzle into the required drain position *(see Fig 5.2.2)*.
   The plastic thread is self-sealing when the socket has been screwed in by hand as far as possible.
   Note: Unscrewing the hose nozzle (anti-clockwise) may cause a leak in the thread connection.
4. The drain duct is now ready for connection to a customer-provided discharge system. Use a standard hose (dia 1/2”). Push the hose onto the hose nozzle and fix it with the hose clamp included in the delivery.

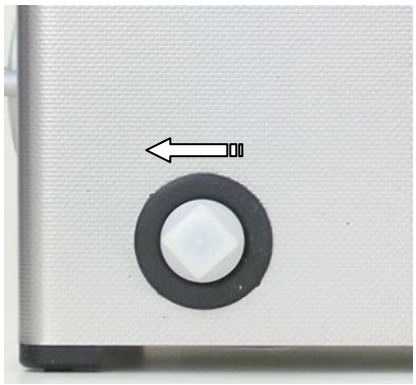

Fig 5.1.1 Drain duct with blind screw cap (on delivered unit)

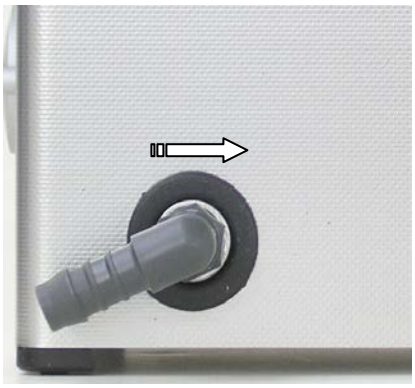

Fig 5.2.2 Drain fitted with hose nozzle

5.2 Connecting the unit to the mains

Required mains conditions

Grounded shockproof socket:
1 phase (220-240 V); 1 N; 1 PE
The power supply must be protected by an earth leakage circuit breaker.

Connect mains cable

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

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6 Putting into operation

6.1 Filling of the unit

Shut the drain duct

Shut the drain duct before you fill the tank (horizontal position of the turning knob for draining the tank – *see Section 4.6*) (not on Elmasonic P30SE).

Observe filling level

Fill the cleaning tank with a sufficient quantity of a suitable cleaning liquid before switch-on.
The recommended optimum filling level is approx. 2/3 of the tank.
Caution! A filling level below 6 cm may lead to a permanent loss of heating performance.
The marked maximum filling level indicates the recommended maximum filling level with immersed cleaning items (*see also Section 4.4. Fig 4.4*).

Suitable cleaning media

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 to use the cleaning media listed in *Section 8.3*.

Prohibited cleaning agents

Flammable cleaning media are generally prohibited for use in an ultrasonic bath. Please observe the safety warnings in *Section 8.1* (Solvents).

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 ultrasonic 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.

6.2 Heating up of the cleaning liquid (if required for the intended application)

Heat up the cleaning liquid to assist the cleaning effect of the cleaning chemical used. To keep the heating period as short as possible and to reduce energy losses to a minimum we recommend to use the cover (optional accessory equipment).

The ultrasonic energy is transformed physically into heat. Therefore, low preset temperatures may be exceeded during ultrasonic operation.

The cleaning effect of the ultrasonic cavitation is reduced by high temperatures. Therefore, we recommend not to operate the unit at temperatures exceeding 80°C.

For the recommended cleaning temperatures please see the product information on the elma clean chemicals.

CAUTION

High temperatures! Risk of burning and scalding!

Cleaning liquid, ultrasonic tank, housing, cover, basket and cleaning items may heat up considerably depending on the temperature inside the bath.

Do not reach inside the bath!
Wear protective gloves to handle the unit and basket!

ATTENTION

Cleaning temperature recommendations in the medical sector:

Please observe that the temperature of the cleaning media remains below 42°C when cleaning parts contaminated with fresh protein or blood.

Please observe the temperature even when using low or no heating.

How to proceed

Switch on the unit at the on/off key.

Heating control by turning knob temperature

Set the required cleaning temperature by means of the turning knob temperature.

The cleaning temperature (set temperature) is variable between 30°C and 80°C and can be changed by 10° steps. When the set temperature exceeds (>) the actual temperature, the heating starts operating.

The display indicates the set temperature (*set value temperature*) and the actual temperature (*actual value temperature*).

The heating keeps operating until the set temperature is reached.

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6.3 Automatic stirring during heating

The present unit is equipped with an activatable stirring mode which guarantees a thorough mixing of the cleaning liquid during heating up (only as long as set temperature > actual temperature).

Without stirring of the liquid, the generated heat rises to the surface, creating considerable temperature differences within the bath. In order to achieve an even heating of the cleaning liquid, it is recommended to stir the liquid from time to time, e.g. by ultrasound.

Functioning

The ultrasound is activated for approx. 5 seconds at intervals of 1 minute.

How to proceed

1. Switch on the unit at the on/off key.
2. Set the required ultrasonic time (set value).
3. Set the required temperature.
4. To start press the key ►■ and keep it pressed (> 2 sec.).

6.4 Degassing of liquid

Freshly mixed cleaning liquids are saturated with air which reduces the cleaning effect of the ultrasonic activity. Operating the ultrasound over a period of several minutes before the cleaning process will eliminate the tiny air bubbles in the liquid.

By hand

Degas the fresh cleaning liquid for approx. 5 – 10 minutes, depending on the unit size.

How to proceed

Press the key ►■ plus the key *degas.*

Auto Degas

The present unit is equipped with an activatable Auto Degas mode. As soon as a predefined period (10 min.) has run down, the Auto Degas mode is automatically switched off.

How to proceed

1. Switch on the unit at the key *on/off*.
2. Set the required ultrasonic time (set time).
3. To start press the key ►■ and keep pressed (> 2 sec.).

The Degas mode cannot be operated simultaneously with Sweep and Pulse.

7 Ultrasonic cleaning process

Please observe the following instructions before starting the ultrasonic cleaning process. The operator is responsible for the inspection of the cleaning result.

CAUTION

Risk of scalding by hot surfaces and cleaning liquid!

Ultrasonic energy is physically transformed into heat.

The unit and the cleaning liquid in the tank heat up during ultrasonic operation even with the heating switched off.
During permanent operation temperatures exceeding 60°C can be reached.

During permanent operation with cover and heating temperatures exceeding 80°C can be reached.

Do not reach inside the bath.
If necessary touch unit and basket with protecting gloves!

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 may be adversely affected by ultrasound during prolonged periods of ultrasonic treatment, in particular at lower ultrasonic 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.

The unit and the cleaning medium in the tank heat up during ultrasonic operation even with the heating switched off.
During permanent operation with cover temperatures exceeding 60°C can be reached.

For the cleaning of temperature-sensitive items please take into consideration the heating-up of the cleaning medium.

For the removal of fresh protein and blood particles ensure that the temperature of the cleaning liquid remains below 42 °C.

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7.1 Starting the cleaning process manually

Press the on/off key to start the unit.

Set the cleaning period

Set the required cleaning period with the turning knob.

Short period operation

For short period operation set the required cleaning period at the turning knob (turn clockwise). The display shows the set time (*set value time*).

Press the key ►■ to start the ultrasonic operation. The unit starts the ultrasonic cleaning process.
The display also shows the remaining time (*actual value time*).

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

Permanent operation

For permanent 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 cleaning process has been finished; press the ►■ key to switch off. Alternatively, turn the turning knob back into “0” position.

Caution: Turn the turning knob only anti-clockwise into “0” position!

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

If required, Degas, Sweep or Pulse mode can be activated, and ultrasonic frequency and ultrasonic power can be set. These settings can be activated or changed at any time during operation.

7.2 Temperature-controlled cleaning start (if heating is required)

This start-up procedure applies only if the intended application requires the cleaning bath to be heated.

Functioning

The present unit is equipped with an additional temperature-controlled cleaning function. The cleaning process is automatically started as soon as the required bath temperature is reached (possible only if set temperature > actual temperature).

How to proceed

1. Press the on/off key to start the unit.
2. Select the required temperature.
3. Set the required ultrasonic cleaning period.
4. Activate Degas, Sweep or Pulse mode and select ultrasonic frequency and ultrasonic power if required for the intended application.
5. Keep the key ►■ pressed (> 2 sec.):
   The unit starts heating up.
   During the heating-up process the ultrasound is regularly activated to mix the liquid.
   The display shows the set cleaning time (flashing).
   When the set temperature is reached the ultrasound is switched on for the duration of the set cleaning period.

When the set cleaning period has run down, the ultrasonic activity is automatically switched off. The heating continues operating at the set temperature.

7.3 Degas mode

Special operating mode for the quick degassing of HPLC samples or solvents

Functioning

The oxygen bubbles contained in the liquids are carried into the atmosphere quickly and efficiently by means of a specialized modulation and clocking of the ultrasonic waves.

How to proceed

Press the key ►■ plus the key *degas*. The LED in the *degas* key indicates that the Degas mode is activated.

The Degas mode can be switched on at any time during operation.

Degas, Sweep and Pulse cannot be operated simultaneously.

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7.4 Sweep mode

During standard ultrasonic operation, zones of increased ultrasonic intensity form directly above the transducer systems, and zones of lower ultrasonic intensity can be found along the edge zone of the tank. This is a positive effect which can be used for the sounding of glass beakers, Erlenmeyer flasks etc. by positioning them directly into these zones.

For large cleaning items, however, it may be useful to switch on the Sweep mode.

Functioning

A more homogeneous sounding of the cleaning bath is achieved by the continued displacement of the sound pressure maxima in the cleaning liquid. This leads to a more uniform ultrasonic intensity throughout the ultrasonic tank.

How to proceed

Press the key ►■ plus the key *sweep*. The LED in the key indicates that the Sweep mode is activated.

The Sweep mode can be switched on at any time during operation.

Degas, Sweep and Pulse cannot be operated simultaneously.

7.5 Pulse mode

Special operating mode to intensify the ultrasonic cleaning effect. Advantageous for the removal of tenacious contaminations.

Functioning

The ultrasonic effect is increased by 20 % through an increase of the amplitude of the ultrasonic signal.

How to proceed

Press the key ►■ plus the key *pulse*. The LED in the key indicates that the pulse mode is activated.

The Pulse mode can be switched on at any time during operation.

Degas, Sweep and Pulse cannot be operated simultaneously.

7.6 Setting of the ultrasonic frequency

Different ultrasonic cleaning applications require different ultrasonic frequencies. The present unit can be operated at two different ultrasonic frequencies:

37 kHz For coarse contaminations, for dissolving, mixing, dispersing and degassing.

80 kHz Noise-reduced, perfect for quiet work areas; prolonged cleaning time, ideal fort he cleaning of hollow items, such as capillaries.

How to proceed The display indicates the set ultrasonic frequency (*frequency*). To change the ultrasonic frequency press the key *freq*.

The setting can be changed at any time during operation.

7.7 Setting of the ultrasonic power

The ultrasonic power can be reduced by predefined steps to save sensitive surfaces.

The ultrasonic power can be set between 30% and 100% by steps of 10%.

How to proceed To set the ultrasonic power press the key *pow*. The display indicates the set ultrasonic power (*power*).

The setting can be changed at any time during operation.

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7.8 Placement of cleaning items

Caution! The ultrasonic bath has been designed for the ultrasonic treatment of items and liquids only.
Do not clean living beings or plants!

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 cleaning items always switch off the unit.

No cleaning items on tank bottom

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

Use cleaning basket

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

Acid tank

For the use of cleaning chemicals which might destroy or damage the stainless steel tank use a separate container. For the special plastic cleaner tank for acid chemicals please contact your supplier.

Cooling of the cleaning liquid

For certain applications it may be required to keep the temperature of the cleaning liquid below a predefined maximum temperature. As the liquid in the tank is heated by the ultrasonic activity, it may be necessary to cool the liquid by means of an external laboratory cooling device (cryostat). The manufacturer of the present ultrasonic unit offers a special cooling coil which can be clipped onto the tank wall and connected to a cryostat.

Caution! When you operate the ultrasonic unit with cooled cleaning liquid ensure that the temperature of the cleaning liquid remains above room temperature. Otherwise there is a risk of condensation which may cause damage to the electronics.

7.9 After the cleaning

Follow-up treatment of cleaning items

When the cleaning process is finished rinse the cleaning items, 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.

Use the quick-drain duct to drain the cleaning tank (*see section 4.6*).

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 operator. 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 surfactant).

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8.2 Limitations on aqueous cleaners

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.

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 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.

8.3.1 Dental

elma clean 10 Universal cleaning concentrate for the cleaning of instruments and laboratory equipment made of plastic, ceramic, stainless steel, rubber and glass.

elma clean 25 Ready-for-use cleaner for impression spoons: removes dental plaster and alginates. Ready-for-use cleaning bath.

elma clean 35 Cleaning concentrate for prostheses with activated oxygen for the cleaning of dental prostheses made of metal, ceramcis and plastic. The released oxygen refreshes the prosthesis hygienically.

elma clean 40 Chemical cleaning concentrate for the removal of cement and carbonate (lime). For the cleaning of precious metals, ceramics, plastics, glass and rubber. Removes metal oxide, cement, fluxing media, etc.

elma clean 55d Aldehyde-free drill cleaner concentrate for instruments made of stainless steel. For the hygienical removal of amalgam remains, blood, tissue, etc.; with anti-corrosion effect.

elma clean 60 Acid cleaning concentrate for instruments made of stainless steel, glass and plastic. Removes corrosion, rust films and mineral deposits.

8.3.2 Medical

elma clean 10 Universal cleaning concentrate for the cleaning of instruments and laboratory equipment made of plastic, ceramic, stainless steel, rubber and glass.

elma clean 60 Acid cleaning concentrate for instruments made of stainless steel, glass and plastic. Removes corrosion, rust films and mineral deposits.

8.3.3 Optics

elma opto clean Cleaning concentrate for glasses, frames, optical lenses and components. Also suitable for plastics.

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8.3.4 Laboratory

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).

9 Maintenance

9.1 Maintenance and care

ATTENTION

Pull the mains plug before carrying out any maintenance works!

Electrical security

The present unit is maintenance-free.
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).

Grid of air fan

Check regularly the grid of the air fan at the bottom of the unit (not existent in all units).

Remove dirt if necessary to allow sufficient ventilation inside the unit.

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).

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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*).
- Abrasive particles from removed contaminations (e.g. polishing pastes) must be drained and removed from the cleaning tank as frequently as possible (exchange the cleaning bath).
- 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 electric shock 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.

10 Technical details

	P 30 H	P 60 H	P 70 H	P 120 H	P 180 H	P 300 H
Tank max. capacity (L)	2.75	5.75	6.9	12.75	18.0	28.0
Tank service capacity (L)	1.9	4.3	5.2	9.0	12.9	20.6
Tank internal dimensions W/D/H (approx. mm)	240x137x100	300x151x150	505x137x100	300x240x200	327x300x200	505x300x200
Unit external dimensions W/D/H (approx. mm)	300x179x221	365x186x271	568x179x221	365x278x321	390x340x321	568x340x321
Weight (approx. kg)	3.3	5.1	5.6	7.5	8.5	11.0
Basket (accessory) internal dimensions W/D/H (approx. mm)	198x106x50	255x115x75	465x106x50	250x190x115	280x250x115	455x250x115
Basket loading max. (approx. kg)	1	5	5	7	8	10
Ball valve (“)	3/8	3/8	3/8	3/8	3/8	3/8
Mains voltage (Vac)	115-120 220-240	115-120 220-240	115-120 220-240	115-120 220-240	115-120 220-240	115-120 220-240
Ultrasonic frequency (kHz)	37 / 80 switchable	37 / 80 switchable	37 / 80 switchable	37 / 80 switchable	37 / 80 switchable	37 / 80 switchable
Power consumption total (W)	370/320	680/650	970	1330	1330	1630
Ultrasonic power effective (W)	120/100	180/150	220	330	330	380

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	P 30 H	P 60 H	P 70 H	P 120 H	P 180 H	P 300 H
Ultrasonic peak performance max. (W)	480/400	720/600	880	1320	1320	1520
Heating power (W)	250	500	750	1000	1000	1250
Sound pressure level (L_{pAU}) * (dB) 37 / 80 kHz	< 70					
Ultrasonic sound level (L_{pZ}) * * (dB) 37 / 80 kHz	< 105					

* Sound pressure level measured with basket and cover at a distance of 1 m
** Ultrasonic sound level measured with basket and cover at a distance of 1 m

11 Trouble shooting

Problem	Possible cause	Trouble shooting
casing damaged	• external cause, transport damage	• return unit to supplier or manufacturer
mains cable damaged	• external cause, transport damage	• provide original replacement mains cable from supplier or manufacturer
Error: 1	• mains voltage too low	• check mains voltage
unit out of service; LED display dark	• mains cable is not connected	• plug in mains cable
	• mains socket dead	• check mains socket/fuse
	• mains cable damaged / interrupted	• replace mains cable
	• electronic error	• return unit to supplier / manufacturer
ultrasound not operating; LED display ultrasound dark	• turn knob for ultrasonic operation to „0“ position	• switch on turning knob vor ultrasonic operation
	• unit is switched off	• switch on unit by on/off key
	• key ►■ (ultrasound) has not been pressed	• press key ►■
	• electronic fault	• return unit to supplier / manufacturer
ultrasound not operating; Error: 3	• unfavourable filling level	• change filling level
	• electronic fault	• switch unit off and on again; if error occurs again, return unit to supplier / manufacturer
	• ultrasonic power too low or not transmitted into cleaning bath	
insufficient cleaning result	• no cleaning chemical or unsuitable cleaning chemical used	• use suitable cleaning chemical
	• unfavourable cleaning temperature	• heat up cleaning liquid
	• cleaning time too short	• repeat cleaning cycle

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Problem	Possible cause	Trouble shooting
unit does not heat	• turn knob for temperature to „0“ position	• switch on turning knob for temperature
	• unit is switched off	• press key on/off to switch on unit
	• electronic error	• return unit to supplier / manufacturer
heating not operating; Error: 2	• electronic error	• switch unit off and on again; if error occurs again, return unit to supplier / manufacturer
	• temperature sensor faulty/damaged or wire interrupted	
unsatisfactory heating time	• heating energy loss	• use cover (optional accessory equipment)
	• cleaning liquid is not stirred	• e.g. switch on ultrasound (see *Section 7.2*)
unit makes boiling noises during heating	• no stirring of cleaning liquid	• e.g. switch on ultrasound (see *Section 7.2*)
set temperature is exceeded	• temperature sensor does not measure the average temperature (no stirring)	• stir the liquid by hand or by ultrasound
	• set temperature too low	• for low set temperatures do not switch on heating
	• ultrasonic energy heats up cleaning liquid (physical process)	• switch on ultrasound for a short period
unit out of service; Error: 4	• electronic error	• switch unit off and on again; if error occurs again, return unit to supplier / manufacturer

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 Schmidbauer GmbH

Gottlieb-Daimler-Str. 17, D-78224 Singen
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Fax +49 (0) 7731 / 882-266
info@elma-ultrasonic.com

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
support@elma-ultrasonic.com

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