# Operating Instructions

**english**

## Elmasonic xtra ST

Ultrasonic cleaning unit

Item no. 1077417

Version
11/2022

# Content

# 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

**Carefully read and observe before initial operation**

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

Please observe any additional national safety regulations that may apply.

**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.

## 2.1 Instructions for the use of the present manual

**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.

## 2.2 Safety instructions for the use of the unit

**Intended use**

The present ultrasonic cleaning unit has been designed for the treatment of **items** immersed in a cleaning liquid only.
It is not intended for the use in areas with potentially explosive atmosphere.

**User**

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

**Check for damage**

Check unit and mains cable for transport damages. Do not operate the unit in case of visible damages!

**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.

**Placement**

Place the unit on a dry surface. The work area must be sufficiently ventilated to allow any vapors arising from the cleaning liquid to be carried off. Keep work surface, housing and operating elements dry.

**Prevention of electrical accidents**

For purposes of filling, 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 authorized specialized personnel only.

**Cleaning liquid**

The unit must be operated with aqueous cleaning media only. Flammable liquids must not be treated by ultrasound directly in the cleaning tank: risk of fire and explosion!

Observe the safety data sheet when using cleaning agents. Observe the information in the section on cleaning agents and consult the manufacturer or supplier in case of doubt.

**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.

**Hot steam and aerosols**

When operating at high bath temperatures, hot steam and aerosols may initially escape at the front when the lid is opened.

**Move unit only when empty**

Do not move the unit when it is filled with cleaning liquid as there is a risk of tipping or damage to the unit itself Only transport when empty (without cleaning liquid)! The rollers are only used for final positioning of the unit at the place of use. The locking brakes of the guide rollers must be checked during operation!

Check the locking brakes before every start-up! There is a risk of electric shock if the unit moves during operation! There is a risk of scalding from hot cleaning liquid if the unit is moved during the operation!

**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.
The use of personal ear protection devices is particularly recommended for operating the unit at 25 kHz with open 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.

**Instructions for lifting and carrying**

The Elmasonic xtra ST models do not have any carrying handles or fixtures for lifting and carrying. These models can be transported with a suitable forklift. They may only be transported by persons with knowledge of transport and warehouse logistics. The forklift must have sufficient load-bearing capacity. The forks must be placed centrally with respect to the frame and moved in far enough so that the unit cannot tilt.
Basically, the recommendation is to move the units when empty using the rollers that are fitted on them or on their frames.

## 2.3 Information for particular groups of people

**Pregnant woman**

Ultrasonic energy emitted through the air is not hazardous to your health. However, high sonic emissions do arise during ultrasound operation that may, under circumstances, cause hearing damage to the foetus.

We recommend pregnant people not to spend long periods of time near an ultrasonic cleaning device.

**People with active implants**

Elma Schmidbauer products with the CE mark comply with the European EMC and Low Voltage Directive and adhere to the prescribed EMC limit values so that the electromagnetic radiation emitted by the devices is harmless to healthy people. A binding statement for people with implants, such as those with cardiac pacemakers or implanted defibrillators, can only be made at the specific occupational site and upon consulting the manufacturer of the implants.

# 3 Ultrasonic cleaning factors

## 3.1 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.

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

**Temperature**

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

**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.

## 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 pulse mode at 45 kHz (Section 6.3).
4. Select the cleaning frequency – 25kHz or 45 kHz depending on the intended cleaning application (Section 6.4).
5. Activate the operating mode pulse - if required for the intended cleaning application (Section 6.5).
6. Activate the operating mode dynamic – if required for the intended cleaning application (Section 6.6).
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 7.4.
9. Rinse if necessary (Section 7.5).
10. Dry if necessary (Section 7.5).

# 4 Product description

## 4.1 Product features

- Ultrasonic tank made of stainless steel
- Slanted tank floor to facilitate the draining of the cleaning liquid
- Fixtures to hang the basket into the tank both in cleaning and dripping-off position
- Sandwich-type performance transducer systems

- Two ultrasonic frequencies available: 25 kHz for coarse and preliminary cleaning, and 45 kHz for fine cleaning
- Integrated Sweep mode for a continuous shifting of sound field maxima, guarantees a more homogeneous sound field distribution in the bath
- Activatable Pulse mode for an intensified ultrasonic cleaning power for tenacious contaminations; also, the operational readiness of the unit (cavitational threshold reached) after an exchange of the cleaning liquid or after an exchange of baskets is optimized (through a shortening of the cleaning periods)
- Dynamic function, optionally activated; combination between *sweep* and *pulse* functions. For efficient ultrasonic cleaning power. With greater, more effective ultrasonic power
- Heating with temperature control (30 – 80 °C),
- Temperature-controlled ultrasonic operation: ultrasound starts automatically as soon as the pre-set temperature is reached
- 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
- Indication of set values and actual values on LED display
- Housing made of stainless steel
- Rollers to facilitate moving the empty unit
- Drain duct on the unit side, made of stainless steel
- Sound-protection cover with hinges (optional)
- Level monitoring device, automatic switch-off when filling level too low

## 4.2 CE conformity

The present ultrasonic cleaning unit complies with the CE marking criteria with regard to the EMC directive 2014/30/EU, and to the low voltage directive 2014/35/EU.

The declaration of conformity is available from the manufacturer.

## 4.3 RFI Statement (European Union)

This is a Class A product.

Please note:

This equipment has been approved for business purposes with regard to electromagnetic interference.

In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. For this please contact your supplier or the manufacturer of the unit.

## 4.4 RFI-compliance information (USA)

This device complies with part 18 of the FCC Rules.

## 4.5 RFI-compliance information (Canada)

Industry Canada ICES-001 Compliance: CAN ICES-1/NMB-1

## 4.6 Delivered equipment

- Ultrasonic cleaning unit
- Operating instructions

## 4.7 Optional accessories

- Stainless-steel basket
  (suitable for small-size items only to a limited degree)
- Additional fine-mesh sheet to be placed in the basket
  (for small-size bulk material)
- Stainless-steel cover
- Sound-protection cover with hinges

## 4.8 Technical details

### 4.8.1 Elmasonic xtra ST 300-800H

| Elmasonic xtra ST | 300H | 500H | 600H (1 Heating cartridge) | 600H (2 Heating cartridge) | 800H |
|---|---|---|---|---|---|
| **Mechanical data** | | | | | |
| Tank max. volume (l) | 28,8 | 48,7 | 56,3 | 56,3 | 81,0 |
| Tank service volume (l) | 22,0 | 42,0 | 45,0 | 45,0 | 70,0 |
| Tank int. dim. W/D/H (mm) | 290/265/280 | 290/265/480 | 460/295/330 | 460/295/330 | 460/295/480 |
| Max. opening dimensions W/D (mm) | 330/300 | 330/300 | 500/330 | 500/330 | 500/330 |
| Unit ext. dim. W/D/H (mm) | 595/555/935 | 595/555/935 | 760/590/935 | 760/590/935 | 765/595/935 |
| Weight (kg) | 40,0 | 45,0 | 55,0 | 55,0 | 65,0 |
| Basket loading max. (kg) | 12,0 | 12,0 | 25,0 | 25,0 | 40,0 |

| | | | | | |
|---|---|---|---|---|---|
| Ball valve (“) | 3/4 | | | | |
| **Electrical data** | | | | | |
| Mains voltage (V~) | 230–240 (50/60 Hz) | | | 3 x 400 V/N/PE-50 Hz<br>3 x 200-208 V/PE-60 Hz | |
| Ultrasonic frequency (kHz) | 25 / 45 | | | | |
| Power consumption total (W) | 2000 | 2000 | 2400 | 3800 | 5200 |
| Ultrasonic power effective *(Ultrasound/Pulse Mode)* (W) | 480 (25/45 kHz) | 540 (25 kHz)<br>600 (45 kHz) | 800 (25kHz)<br>900 (45 kHz) | 800 (25kHz)<br>900 (45 kHz) | 900 (25kHz)<br>1000 (45 kHz) |
| Ultrasonic peak power max.* *(Ultrasound/Pulse Mode)* (W) | 1920 (25/45 kHz) | 1920 (25/45 kHz) | 3200 (25 kHz)<br>3600 (45 kHz) | 3200 (25 kHz)<br>3600 (45 kHz) | 3600 (25kHz)<br>4000 (45 kHz) |
| Ultrasonic power effective *(Dynamic Mode)* (W) | 600 (25/45 kHz) | 600 (25/45 kHz) | 1000 (25/45 kHz) | 1000 (25/45 kHz | 1000 (25/45 kHz) |
| Ultrasonic peak power max.* *(Dynamic Mode)* (W) | 2400 (25/45 kHz) | 2400 (25/45 kHz) | 4000 (25/45 kHz) | 4000 (25/45 kHz) | 4000 (25/45 kHz) |
| Heating power (W) | 1400 | 1400 | 1400 | 2800 | 4200 |
| IP protection class | IP 23 | | | | |
| **Accessories** | | | | | |
| Basket int.l dim. W/D/H (mm) | 255/230/170 | 255/230/370 | 400/255/220 | 400/255/220 | 400/255/370 |
| **Acoustic level** | | | | | |
| Sound pressure level ($L_{pAU}$) * | < 80 dB | | | | |
| Ultrasonic level ($L_{pZ}$) ** | < 110 dB | | | | |

* The signal form of the waves results in a factor 4 for the ultrasonic peak maximum

** Sound pressure level measured in 1 m distance, with basket and noise protection cover

### 4.8.2 Elmasonic xtra ST 1400-2500H

| **Elmasonic xtra ST** | **1400H** | **1600H** | **2500H** |
|---|---|---|---|
| **Mechanical Data** | | | |
| Tank max. volume (l) | 120,3 | 156,3 | 245,1 |
| Tank service volume (l) | 97,0 | 133,0 | 215,0 |
| Tank internal dimensions W/D/H (ca. mm) | 260/225/165 | 250/225/365 | 410/250/215 |

| | | | |
|---|---|---|---|
| Max. opening dimensions W/D (mm) | 600/600 | 600/600 | 750/650 |
| Unit external dimensions W/D/H (ca. mm) | 875/865/935 | 870/865/935 | 1020/915/935 |
| Weight (ca. kg) | 87,0 | 93,0 | 107,0 |
| Basket loading max. (ca. kg) | 50,0 | 50,0 | 50,0 |
| Ball valve (“) | 1 | | |
| **Electrical Data** | | | |
| Mains voltage (V~) | 3 x 400 V/N/PE-50 Hz<br>3 x 200-208 V/PE-60 Hz | | |
| Ultrasonic frequency (kHz) | 25/45 | | |
| Power consumption total (W) | 6800 | 9500 | 9500 |
| Ultrasonic power effective *(Ultrasound/Pulse Mode)* (W) | 1440 (25/45 kHz) | 1600 (25kHz)<br>1800 (45 kHz) | 1800 (25kHz)<br>2000 (45 kHz) |
| Ultrasonic peak power max.* *(Ultrasound/Pulse Mode)* (W) | 5760 (25/45 kHz) | 6400 (25kHz)<br>7200 (45 kHz) | 7200 (25kHz)<br>8000 (45 kHz) |
| Ultrasonic power effective *(Dynamic Mode)* (W) | 1800 (25/45 kHz) | 2000 (25/45 kHz) | 2000 (25/45 kHz) |
| Ultrasonic peak power max.* *(Dynamic Mode)* (W) | 7200 (25/45 kHz) | 8000 (25/45 kHz) | 8000 (25/45 kHz) |
| Heating power (W) | 5000 | 7500 | 7500 |
| IP protection class | IP 23 | | |
| **Accessories** | | | |
| Basket int. dim. W/D/H (ca. mm) | 480/515/205 | 470/515/295 | 620/565/365 |
| **Acoustic level** | | | |
| Sound pressure level ($L_{pAU}$) ** | < 80 dB | | |
| Ultrasonic level ($L_{pZ}$) ** | < 100dB | | |

* The signal form of the waves results in a factor 4 for the ultrasonic peak maximum

** Sound pressure level measured in 1 m distance, with basket and noise protection cover

## 4.9 Description of unit features


Fig. 4.9 Front and side view

**A** **Stainless-steel cover** (optional accessory equipment) to be placed on the tank edge.

**B** **Sound-protection cover with hinges** (accessory equipment, cannot be retrofitted) with collecting device for condensate, perfect noise protection.

**C** **Ventilation slots** ensure adequate ventilation inside the unit

**D** **Operating panel** to control all unit functions
Description please *see Section 4.12.*

**E** **Operating unit with powerful electronics**, easy-care and simple to exchange.

**F** **Stainless-steel ball valve** to drain the ultrasonic tank.

**G** **Rollers** for an improved mobility of the unit (move unit when empty), 2 rollers are fitted with locking brake.

## 4.10 Description of ultrasonic tank

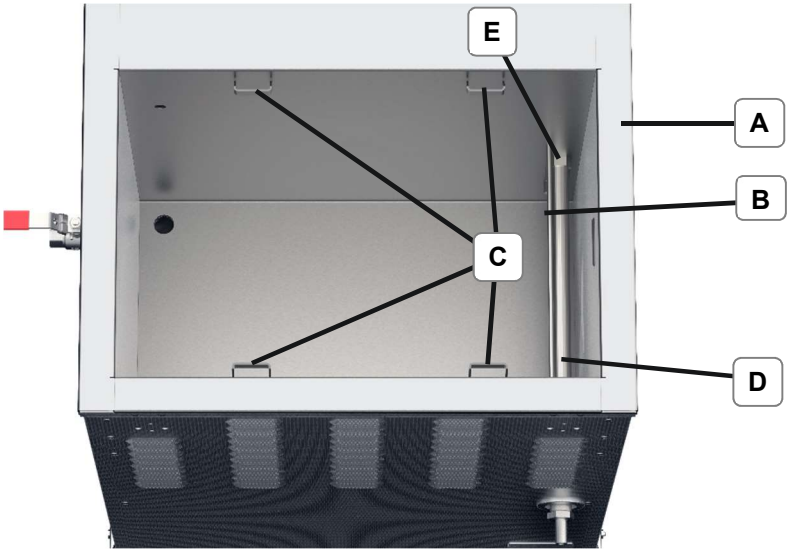


Fig. 4.10 Ultrasonic tank

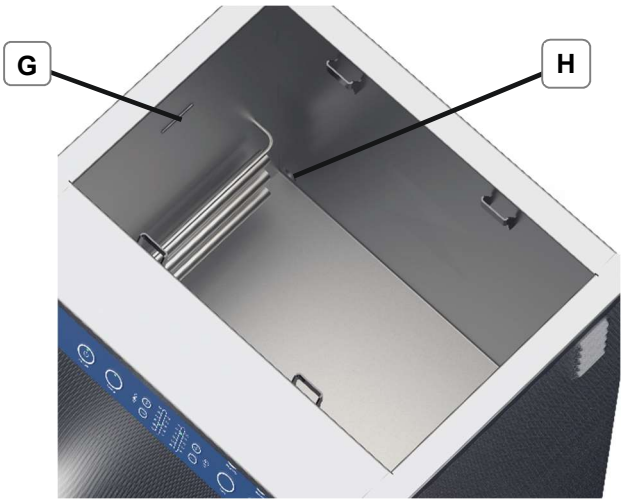


Fig. 4.10.1 Ultrasonic tank

**A** **Ultrasonic tank** made of stainless steel.
The transducers are mounted underneath the tank bottom. The tank bottom is inclined towards the drain.

**B** **Protecting bar for heating element**

**C** **Suspension elements 4x** to support the basket in cleaning / drip-off position

**D** **Heating element**

**E** **Blank plug, connection for second heating cartridge** (for model ES xtra ST 600H only)

**F** **Level sensor** for filling level monitoring, must be immersed during operation.

**G** **Filling level marking** indicates recommended filling level

**H** Inflow connection with blank plug (for optional original accessories)

## 4.11 Description of cleaning basket (optional accessory)

The special cleaning basket for this type of unit can be hooked onto the suspension elements at the tank walls in two ways.

**Cleaning position**

The cleaning basket is hooked by its bow into the two suspension elements on the front wall of the tank (*see fig. 4.11.A*). The tank floor will not be damaged by the basket feet.

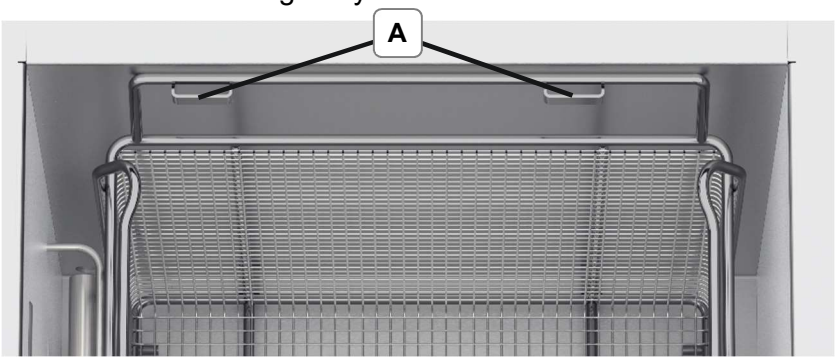


Fig. 4.11. Cleaning basket in cleaning position

**Drip-off position**

The cleaning basket is placed onto the 4 suspension elements in the tank by the 4 hooks at the bottom (*see fig. 4.11.1.A*). The bow should point to the unit front (this makes sense for units that are fitted with flip-top cover).

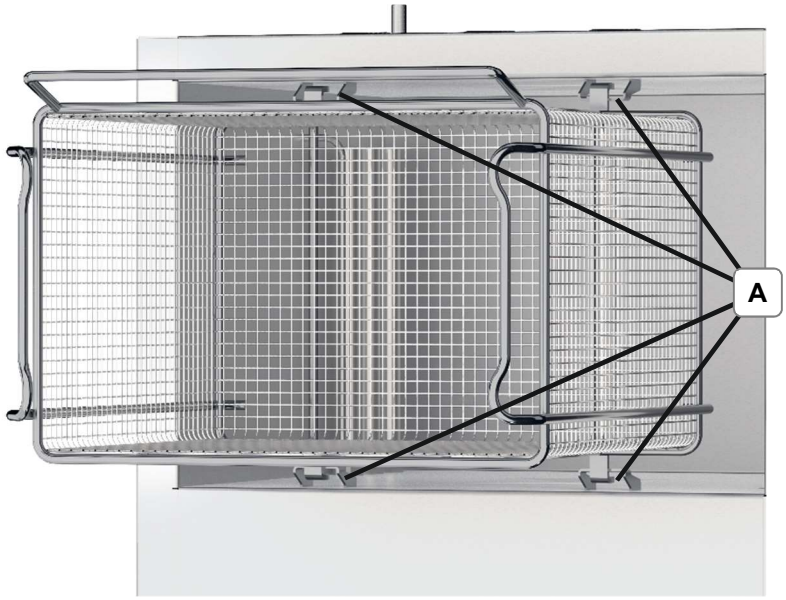


Fig. 4.11.1 Cleaning basket in drip-off position

## 4.12 Description of operating elements

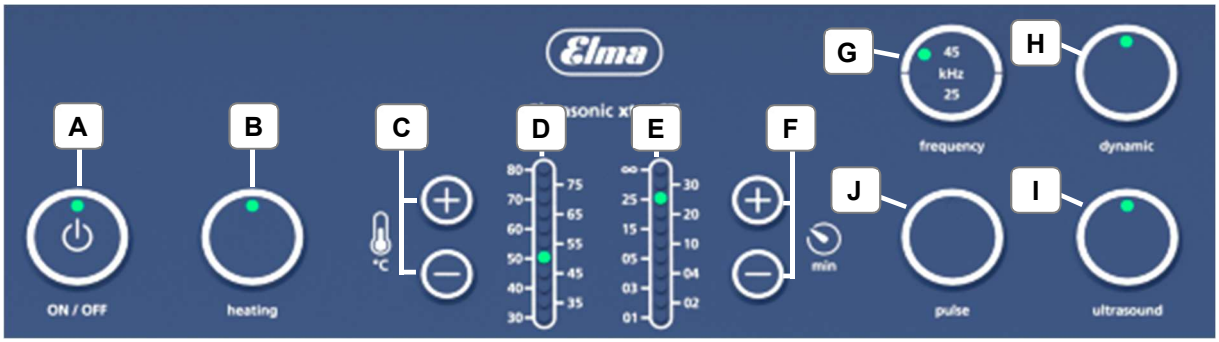


Fig. 4.12 Operating panel

**A** **Key *on/off*** switches the unit on and off.
When the unit is connected to the mains the LED in the key lights up red (standby); the red LED goes out, unless another key is activated within 1 min.
As soon as the key is activated the operating panel is ready for operation and the LED in the key lights up green.

**B** **Key *heating*** switches on the heating control. The LED in the key lights up green when the heating is operating.

**C** **Setting of temperature** is possible in 5°C steps between 30 – 80 °C.

**D** **LED display temperature** for set and actual values of the temperature in the bath. The set value is indicated by a permanent red LED, the actual value is indicated by a flashing LED.

**E** **LED display cleaning time** for set period and remaining period. The set value is indicated by a permanent red LED, the remaining cleaning period is indicated by a flashing LED.

**F** **Setting of cleaning time** Short period operation: 1; 2; 3; 4; 5; 10; 15; 20; 25; 30 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 permanent operation.

**G** **Ultrasonic frequency selector key** 25 kHz / 45 kHz. The selected frequency is indicated by a green LED in the key. *For a more detailed description see also Section 6.4.*

**H** ***dynamic* button** for effective cleaning thanks to even power distribution and amplification. The green LED lights up on the key panel when activated.

**I** **Key ultrasonic operation** starts up the ultrasonic unit either by hand (permanent green LED is on) or temperature-controlled (LED flashes). For a description *see Sections 7.1* and *7.2.*

**J** **Key *pulse*** adds ultrasonic power for difficult cleaning jobs. When activated the green LED in the key is lighted.

# 5 Before initial operation

## 5.1 Unpacking and placement

**Unpacking**

Please keep the original packing for possible later service purposes or dispose of it in compliance with the relevant waste disposal regulations. You can also return the packing to the manufacturer or to your supplier. The machine must only be sent in the original packaging for transport (e.g. in the case of service).

**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.

**Workplace**

For operation place the unit on a stable, even and dry surface. The surface must be resistant to any cleaning chemicals that might be used. Ensure that the workplace is sufficiently ventilated!

**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**

The following requirements are mandatory for the safe operation of the unit:

- Allowed ambient temperature during operation: + 5 - + 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). Details are available from the manufacturer.
- In-door operation only

## 5.2 Connecting the unit to the mains

**Required mains conditions**

Ensure that the local connection details correspond to the data indicated on the nameplate. See also Technical details (*Section 4.8.*).

**Connection to the mains**

Only connect the unit to an earthed mains socket.
Only connect the plug to an easily accessible socket, since it serves as a disconnector!

For the models for operation on one phase (230 …240 V~/N/PE), the mains plug serves as disconnector to render the unit free of electrical energy.

In the multi-phase models (3x400 V/N/PE or 3x208 V/PE), the user must ensure that:

a) There must be a switch or a circuit breaker for the unit in the building installation
b) It must be marked as the disconnector for the unit
c) It must be easily accessible for the user

The units must only be disconnected from the mains power supply when they are in standby mode.
If peripheric units from third party providers have to be supplied with power, this must be done using separate switching devices.

# 6 Putting unit into operation

## 6.1 Filling of the unit

**CAUTION**

**High temperatures! Risk of burns and scalding!**

Check the guide rollers are firmly locked before operation!

Only move the unit when it is empty of cleaning liquid!

The cleaning liquid can spill out.

Empty the unit using the ball valve provided before moving it!

Unplug the unit from the mains before moving it! Remove the media supply if necessary!

**CAUTION**

**Risk of electric shock from penetrating fluid!**

Check that the guide rollers are firmly locked!

Only move the unit when it is empty of cleaning liquid!

The cleaning liquid can spill out.

Empty the unit using the ball valve provided before moving it!

Unplug the unit from the mains before moving it! Remove the media supply if necessary!

**Shut the drain duct**
**Observe filling level**

Shut the drain duct before you fill the tank.
Fill the cleaning tank with a sufficient quantity of a suitable cleaning liquid before switch-on.
Observe the filling level marking inside the tank (*see Fig. 4.10.1.G.*).
The level sensor must be immersed (*see Fig. 4.10.F.*)

If the filling level goes down beyond a critical mark the unit is automatically switched off by the level switch. This prevents dry running of the unit which may cause damage to the equipment.

**Allowed and prohibited cleaning agents**

Fill the tank with aqueous cleaning media only:
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. The conductivity of the cleaning fluid must be at least 15 µSiemens/cm.

The unit should not be operated with pure DI water.

All flammable cleaning media are prohibited for use in an ultrasonic bath. Please observe the safety warnings in *Section 8* (Cleaning media).

**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 vaporization 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

Heat up the cleaning liquid depending on the kind and degree of contamination of the cleaning items to assist the cleaning effect. To keep the heating period as short as possible we recommend using a cover.
You may also switch on the ultrasound to further speed up the heating process.

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

In order to avoid unintended heating over the required temperature due to the additional ultrasonic energy, set the temperature at the lowest possible value for the cleaning task at hand.

**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!

**How to proceed**

1. Press the key *on/off* (*Fig. 4.12.A*), the green LED in the key is lighted.
2. Press the key *heating* (*Fig. 4.10.B*), the green LED in the key is lighted.
3. Set the required cleaning temperature by pressing the +/- keys (*Fig. 4.12.C)*, the LED indicating the set temperature is lighted. The heating process is started and the actual temperature is indicated by the flashing LED (*Fig. 4.12.D*).
4. As soon as the set temperature is reached the heating automatically switches off.

The ultrasonic energy can heat up the cleaning liquid over the set temperature. Particularly low set temperatures (e.g. 30 or 40 °C) can easily be exceeded.

## 6.3 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.

**How to proceed**

1. Activate the ultrasound at the key *ultrasound* (*Fig. 4.12.I*). The green LED in the key is lighted.
2. Set the required frequency to 45 kHz at the selector key *frequency* (*Fig. 4.12.G*). The green LED in the key is lighted.
3. Press the key *pulse* (*Fig. 4.12.J*). The green LED in the key is lighted.

After approx. 5 to 10 minutes the cleaning liquid is degassed.

You can carry out the degassing during the heating process.

## 6.4 Setting of ultrasonic frequency

The present unit can be operated at two different ultrasonic frequencies.

The ultrasonic frequency is set by means of the selector key „*frequency*“. (*Fig. 4.12.G.*). The following two frequencies are available:

**25 kHz** For the removal of coarse and tenacious contaminations, and for the precleaning of robust surfaces.

**45 kHz** For the fine cleaning, and for the removal of contaminations from sensitive surfaces.

The frequency can be changed during operation.

## 6.5 Cleaning in ultrasonic mode Pulse

Pulse is a special feature which intensifies the ultrasonic cleaning effect. This is particularly useful for the removal of tenacious contaminations.

In addition, it takes less time for the unit to be ready for operation after an exchange of the cleaning liquid or when a new basket has been inserted (the unit is ready for operation when the cavitation threshold is reached so that the ultrasonic effect within the cleaning liquid is greatest). This shortens the overall cleaning period.

There are certain operating phases with a reduced ultrasonic cleaning effect due to physical reasons.
In particular when the cleaning liquid has been exchanged or when a new basket with cleaning items has been inserted the cleaning effect is temporarily reduced. An efficient ultrasonic cleaning cannot be guaranteed during these phases.

The Pulse mode keeps these phases to a minimum, which leads to an optimum usability even with high throughput rates.

**How to activate the *pulse* mode** Press both keys *ultrasound* and *pulse* (*Fig. 4.10.H*). The green LED in the key indicates the operation in Pulse mode. Pulse can be switched on or off as required during operation.

**NOTE**

Cleaning items with sensitive surfaces may be adversely affected by a combination of Pulse and 25 kHz. Please treat sensitive items at 25 kHz plus Pulse for short periods only.

Also, the sound-giving surface of the cleaning tank is subject to a higher degree of cavitational erosion.

## 6.6 Cleaning in ultrasonic mode Dynamic

The Dynamic function ensures more efficient ultrasonic cleaning power. The constant switch between the sweep and pulse functions provides both even power distribution and amplification.

In addition, it takes less time for the unit to be ready for operation after an exchange of the cleaning liquid or when a new basket has been inserted (when the cavitation threshold is reached). This shortens the overall cleaning period.

There are certain operating phases with a reduced ultrasonic cleaning effect due to physical reasons.
In particular when the cleaning liquid has been exchanged or when a new basket with cleaning items has been inserted the cleaning effect is temporarily reduced. An efficient ultrasonic cleaning cannot be guaranteed during these phases.

The Dynamic function switches off automatically after 10 min.

**How to activate the *pulse* mode**

Press both keys *ultrasound* and *dynamic* (*Fig. 4.12.H*). The green LED in the key indicates the operation in Dynamic mode. Dynamic can be switched on or off as required during operation.

**NOTE**

Cleaning items with sensitive surfaces may be adversely affected by a combination of Dynamic and 25 kHz. Please treat sensitive items at 25 kHz plus Dynamic for short periods only.

Also, the sound-giving surface of the cleaning tank is subject to a higher degree of cavitation erosion.

# 7 Ultrasonic cleaning process

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

**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 with cover 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 activity 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.

**The operator is responsible for the inspection of the cleaning result and for the continuous inspection of the cleaning items during ultrasonic treatment to prevent damages from the cleaning items.**

## 7.1 Immediate start-up of ultrasonic cleaning process

**Set the cleaning period**

Set the required cleaning time by means of the key „+“(*Fig.4.10.F*).

**Short period operation**

For short-term operation set the cleaning period between 01 and 30 min (indicated by a permanent green LED in the LED display (*Fig.10.E*). As soon as the preset period has run down the ultrasound is automatically switched off.

**Continued operation**

For longer periods of ultrasonic treatment select the continued operation mode (∞).

In this operating mode there is no automatic switch-off.
The ultrasound must be switched off by the operator by pressing the key *ultrasound (Fig. 4.10.I)*.

Automatic safety switch-off after 12 h operation to prevent unintended permanent operation.

**How to start the ultrasound**

Start the ultrasonic activity by pressing the key *ultrasound* (*Fig. 4.10.I*).

**ATTENTION**

**Caution!** During continued operation the ultrasound may heat up the medium to temperatures exceeding the set value even when the heating is not switched on.

In order to prevent unnecessary heating of the cleaning medium by ultrasound, particularly with low pre-set temperatures, switch on

the ultrasound during the cleaning process only (exceptions are degassing and stirring of the cleaning bath during heating up).

## 7.2 Temperature-controlled cleaning (with automatic start-up of the cleaning process)

**Functioning**

Elmasonic xtra ST units are equipped with an additional temperature-controlled cleaning function. The cleaning process is automatically started as soon as the required bath temperature is reached.

**How to proceed**

1. Press the key *on/off* (*Fig. 4.10.A*), the green LED in the key goes on.
2. Press the key *heating* (*Fig. 4.10.B*), the green LED in the key goes on.
3. Set the required cleaning temperature by pressing the keys +/- (*Fig. 4.10.C*).
4. Set the required cleaning period by pressing the keys +/- (*Fig. 4.10.F*).
5. Press the key *ultrasound* and keep it pressed (> 2 sec.): The unit starts heating.

As soon as the set temperature is reached the ultrasound is switched on and keeps operating over the pre-set cleaning period.

Elmasonic xtra ST units are equipped with a permanent Sweep mode.

A continued shifting of the zones of maximum sound pressure within the cleaning liquid a more homogeneous sounding of the bath is guaranteed.

## 7.3 Cleaning with predefined standard setting

For the most common cleaning tasks you can select a standard setting programmed by the manufacturer. The cleaning process is automatically started when the temperature in the bath has reached 60 °C; the cleaning time is 15 min. If the temperature in the bath is already 60°C or higher the ultrasound is started immediately.

**How to proceed**

Keep the keys *heating (Fig. 4.10.B)* and *ultrasound (Fig. 4.10.I)* pressed for approx. 2 sec. The unit starts heating, or the ultrasound is started immediately in case that the temperature is already 60 °C or higher.

The green LED in the key *heating* lights up, the green LED in the key *ultrasound* starts blinking.

The set temperature is indicated by a permanent LED, the actual temperature is indicated by a blinking LED *(Fig. 4.10.D).*

The set cleaning time of 15 min is indicated by a permanent LED, the remaining cleaning time is indicated by a blinking LED *(Fig. 4.10.E)*.

## 7.4 Placement of the cleaning items

**Caution!** Ultrasonic units are intended for the treatment of liquids and items immersed therein. Do not treat living beings or plants in an ultrasonic unit.

**NOTE**

Do not reach inside the tank during ultrasonic operation!

Cell walls may be damaged by prolonged exposure to ultrasonic activity; this applies particularly to the cells of the skeleton and joints.

**No cleaning items on the bottom of 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 cleaning basket**

Place the cleaning items in the stainless-steel cleaning basket (accessory).

## 7.5 After the cleaning

**Follow-up treatment of cleaning items**

Generally, the cleaned items must be rinsed and dried when the cleaning process is finished.

The choice of the rinsing medium or media depends on the type of cleaning medium that used and on the cleanness requirements for the cleaned items. In certain cases, it may be recommended to rinse the items in an ultrasonic bath.

**Drain the unit**

When the cleaning liquid is contaminated to such a degree that it will no longer produce satisfying cleaning results, or when the unit is not operated over a prolonged period of time (certain residues and contaminations may damage the stainless-steel tank) drain the tank.

Use the quick-drain duct to drain the cleaning tank.
The bottom of the ultrasonic tank is inclined towards the drain duct to facilitate draining.

**Cleaning of the ultrasonic tank**

For instructions on the cleaning of the ultrasonic tank after draining please see *Section 9.1, Maintenance and care*.

# 8 Cleaning media

When selecting the cleaning medium please ensure that the selected medium is suitable for use in an ultrasonic cleaning bath; unsuitable media may cause damage to the ultrasonic tank, or may even lead to injuries to the operating staff.

Before using any cleaning agents, read the safety data sheet and product information, and observe and implement the instructions.

## 8.1 Limitations of use of cleaners containing solvents

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

**DANGER**

Observe the safety warnings in *Section 6.1*.

Ultrasound and heat increase the evaporation of liquids and form an extremely fine mist that readily ignites on contact with sources of ignition. This can result in severe burns or death.

- Do not use cleaning agents that are labelled with the pictograms GHS01 (explosive), GHS02 (flammable) or GHS03 (oxidising) in line with the CLP regulation (EC no. 1272/2008). Do not use cleaning agents that have a flashpoint.
- If necessary, clear the cleaning agent for use by consulting the manufacturer or supplier.

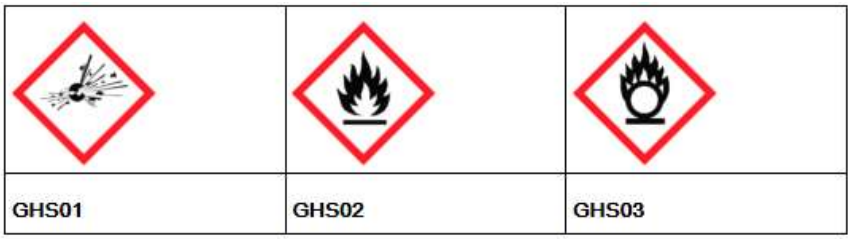


Fig. 8.1 GHS pictograms for flammable, combustible or oxidising substances

**Exception** In compliance with the general regulations on the protection of labour, certain limited volumes of flammable liquids (max. 1 liter) 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).

If in doubt and for any queries please contact the manufacturer or your supplier.

## 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**

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

Examples:

- Treatment with hydrochloric acid or hydrofluoric acid, or acid solution salts
- Removal of fluxing agents containing fluoride, chloride or tetrafluoroborate from soldered metal parts or electronic components
- Decalcification, in a solution containing citric acid, of medical systems which are contaminated by physiological saline

**Alkaline solutions**

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.

**KOH**

Potassium hydroxide solution will cause stress cracks in the ultrasonic 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.

Examples:

- Ultrasound-aided rinsing of items which have been etched by hydrofluoric acid or ammoniumbifluoride.

**Disinfectants**

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

**Acid-resistant tank**

For the ultrasonic treatment with the above mentioned media use an acid-resistant tank.
Please contact your supplier for available accessory equipment.

**Safety regulations**

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

For queries please contact the manufacturer or your supplier.

**Exclusion of liability**

No liability can be accepted for any damage caused by non-observance of the instructions and limitations stated in *Sections 8.1*and 8.2!

## 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.

Product information and safety data sheets are available from the manufacturer (www.elma-ultrasonic.com/produkte/reinigungsmittel).

# 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.

Check the ultrasonic tank for leaks:

**Check the ultrasonic tank for leaks**

Immediately separate the unit from the mains in case of visible leaks in the ultrasonic tank, e.g.

- if there are any inexplicable stains or residues of cleaning liquid under or next to the unit
- if there is a high loss of liquid from the filled unheated tank which is not due to vaporization

Inform your supplier or the manufacturer of the unit on the leak and the cleaning medium used. Return the unit to the manufacturer or to your supplier for inspection and repair.

**Maintenance of the ultrasonic tank**

Check the ultrasonic tank regularly for residues, in particular on the tank floor. Remove any residues.

**Ventilation slots on the side**

Check the ventilation slots for dirt on a regular basis.

If necessary remove any contaminations, possibly by means of a vacuum cleaner to guarantee sufficient ventilation inside the unit.

**Maintenance of the casing**

Any residues of cleaning liquids can be removed depending on the type of cleaning medium used. Wipe off the cleaning liquid with a cloth.

## 9.2 Service life of the ultrasonic cleaner

The ultrasonic 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. In order to slow down the wear and tear as far as possible we make the tanks of a special stainless steel.

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

- Regularly remove any remains of cleaning liquid, in particular from metal parts, and flash rust; wipe or rinse gently.
- Use suitable cleaning chemicals, with particular caution concerning the kind of removed contamination (see instructions *Section 8.2* Note on *Risk of damage to the ultrasonic tank!* and information thereon).
- 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 liquid regularly.
- Do not operate the ultrasound unnecessarily; switch off after the cleaning process.

## 9.3 Repair and return shipment

**Opening by authorized specialized personnel only**

Repair and maintenance works which require the unit to be connected and opened must be carried out by authorized and specialized 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 unauthorized maintenance or repair works on the unit.

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

If a unit requires to be returned for repair, please include a detailed description of the fault(s). In case of damage on the transducer tank, e.g. cavitation erosion or a leak, please indicate also which cleaning agents you use and what substances are removed from the cleaning items.

## 9.4 Malfunctions

The following malfunctions are displayed as error messages on the LED display:

| Malfunction | Malfunction indication | Remedy |
|---|---|---|
| Bath temperature > 90°C | All LEDs of the temperature indicator are flashing | Let the cleaning liquid cool down to a temperature below 80°C; if necessary take out some of the liquid and replace by cold liquid. As soon as the temperature is below 80°C the ultrasound can be restarted. |
| Error of temperature sensor | The LEDs of the temperature indicator light one after the other | Switch the device off and on again. If the malfunction persists, the device is defective.<br>Check the connection cable between the electronic unit and the temperature sensor.<br>If OK there is an error in the electronic unit > replace the electronic unit. |
| Communication error with generator | The LEDs of the indicator for the ultrasonic cleaning duration light one after the other | Switch the device off and on again. If the malfunction persists there is an error in the electronic unit > replace the electronic unit |
| Low liquid level | All LEDs of the timer indicator are flashing | Correct the liquid level until the level sensor is immersed |

If one of these errors occurs, all buttons, except the On/Off button, are deactivated.

Heating and the ultrasonic are switched off in each of the error conditions.

## 9.5 Replacing the electronic unit

In the case of a malfunction of the electronic unit, the electronic unit can be replaced completely (plug & play component).

The electronic unit can be easily replaced as follows:

**How to proceed**

You need a 3 mm Allen key. All electrical connection cables are fitted with connectors.

1. Undo the 2 Allen screws (see Fig. 9.5.1).
2. Remove the electronic unit out of the device.
3. Disconnect the connectors from the defective electronic unit:
   **A** Temperature sensor
   **B** HF connection (do not confuse the connectors!)
   **C** Mains connection
   **D** Heater connection
4. Plug the connectors in the new electronic unit
5. Fit the electronic unit into the device

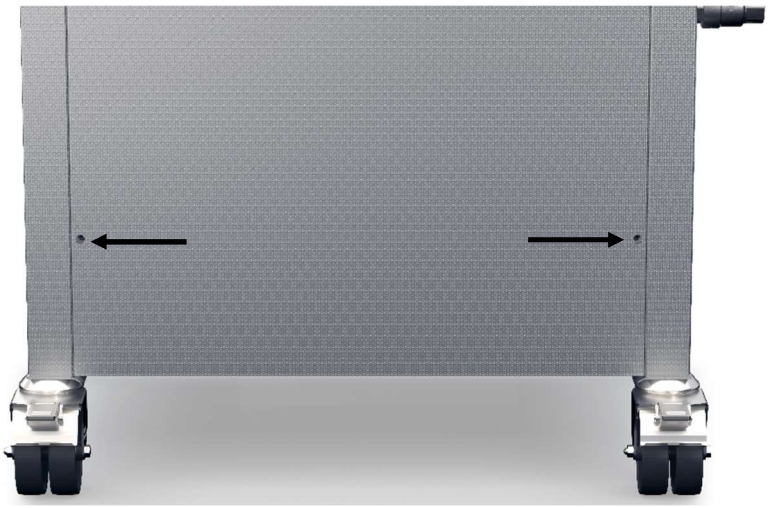

Fig. 9.5.1. Position of the 2 Allen screws

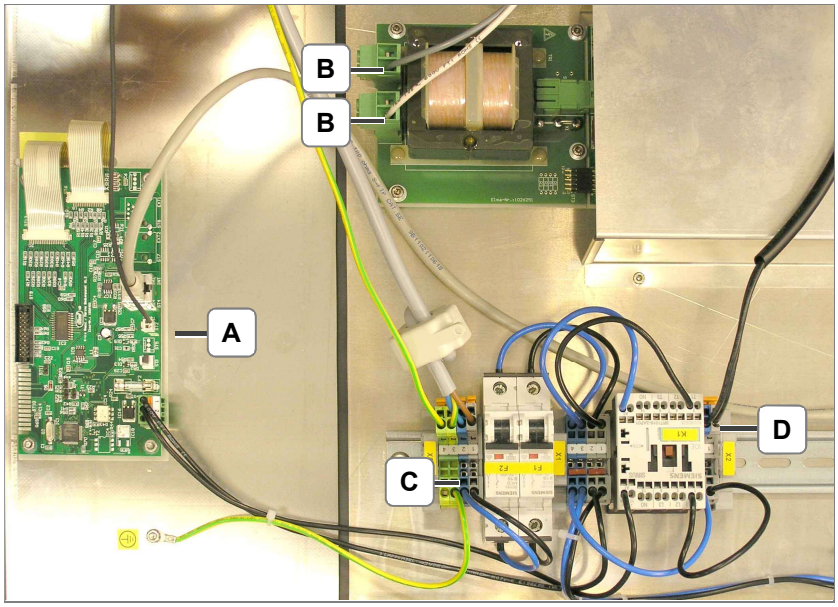


Fig. 9.5.2 Position of the connectors

# 10 Putting out of action and waste disposal

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

# 11 Manufacturer's contact address

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