Wilhelmsen Ships Service

UNITOR INSTRUCTION MANUAL

S 700 HM / S 1600 HM / S 2000 HM / S 3300 HM

Ultrasonic Cleaning Units

CE

OPERATIONAL EFFICIENCY

document ref. 104 6552

Contents

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 light injuries and 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 vapours arising from the cleaning liquid to be carried off. Keep work surface, housing and operating elements dry. For operation the unit must be fastened to the delivered support frame. For reasons of safety the support frame should be screwed to the floor.

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 authorised specialised 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!

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
During operation with high temperatures inside the cleaning bath open the unit with care: hot steam can emerge when the cover is lifted.

Move unit only when empty
Do not move the filled unit, obstacles may cause the unit to tilt over, or damage the rollers.

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

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

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 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 optimised 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 (Section 6.3).
4. Activate the operating mode pulse - if required for the intended cleaning application (Section 6.4).
5. Switch on the ultrasound (manual or automatic start-up) (Section 7.1 and Section 7.2).
6. Put the cleaning items into the cleaning bath (Section 7.4).
7. Rinse if necessary (Section 7.5).
8. Dry if necessary (Section 7.5).
9. Product description

4 Product description

4.1 Product features

- ultrasonic tank made of V2A stainless steel
- slanted tank floor to facilitate the draining of the cleaning liquid
- sandwich-type performance transducer systems
- 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)
- heating with temperature setting from 30°C – 80°C
- temperature-controlled ultrasonic operation: ultrasound starts automatically as soon as the preset 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 V2A stainless steel
- support frame for the safe and stable mounting of the unit to the ship floor
- drain duct made of V2A stainless steel, ball valve made of brass, nickel-plated
- 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 2004/108/EG, and to the low voltage directive 2006/95/EG.

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 Delivered equipment

- ultrasonic cleaning unit
- support frame
- stainless-steel cover
- stainless-steel basket
- plastic supports for basket
- Operating Instructions

4.5 Technical details

	S 700 HM	S 1600 HM	S 2000 HM	S 3300 HM
Tank max. volume (L)	76	165	208	383
Tank service volume (L)	51	100	126	257
Tank internal dimensions W/D/H (ca. mm)	550/300/470	650/500/520	820/500/520	1150/550/620
Unit external dimensions W/D/H (ca. mm)	640/540/730	740/730/730	910/740/730	1240/800/890
Weight (ca. kg)	55	78	85	97
Basket (accessory) internal dimensions W/D/H (ca. mm)	500/225/240	585/410/240	755/410/240	1075/460/360
Basket loading max. (ca. kg)	40	50	50	50
Ball valve (“)	½	¾	¾	1
Mains voltage (Vac) depending on model	115 V 230 - 240V/N/PE 50/60Hz	230 - 240V/N/PE or 3x400V/N/PE or 3x440V/PE 50/60Hz	230 - 240V/N/PE or 3x400V/N/PE or 3x440V/PE 50/60Hz	3x400V/N/PE or 3x440V/PE 50/60Hz
Ultrasonic frequency (kHz)	37	37	37	37
Power consumption total (W)	2750	3050	3250	8050
Ultrasonic power effective (W)	500	800	1000	2000
Ultrasonic peak power max.* (W)	2000	3200	4000	8000
Heating power (W)	2200	2200	2200	6000
Sound pressure level (L_{pAU}) *	87 dB	86 dB	90 dB	87 dB
Sound pressure level (L_{pAU}) **	< 70 dB			
Ultrasonic level (L_{pZ}) **	< 110 dB			

* The signal form of the waves results in a factor 4 for the ultrasonic peak maximum
** Max. sound pressure level measured in 1 m distance, without basket and cover
*** Sound pressure level measured in 1 m distance, with basket and cover

4.6 Description of unit features

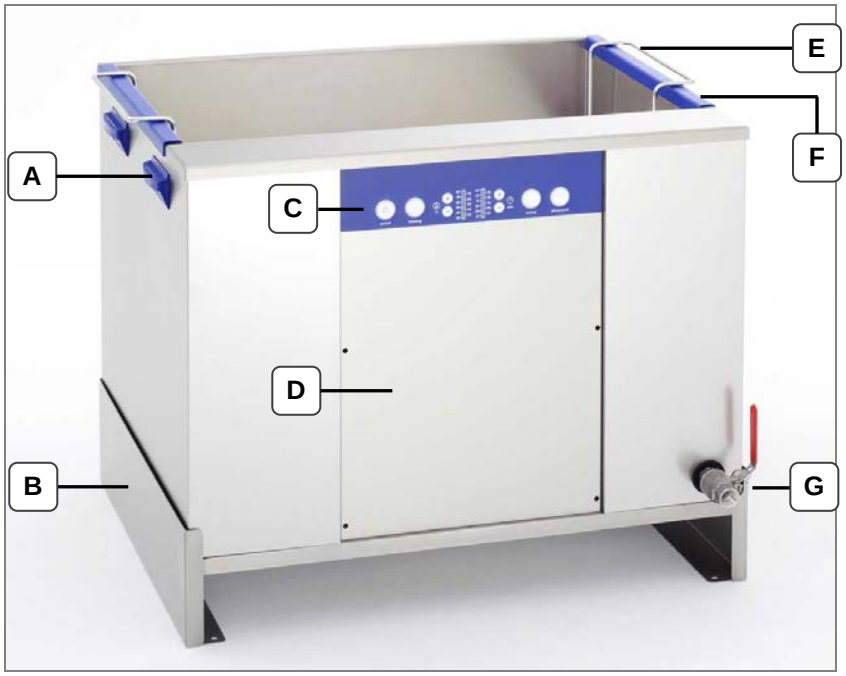

Fig. 3.8 Front and side view

A **Carrying handles**

B **Support frame** for the safe and stable fastening of the unit to the ship floor, suitable for transportation by forklift

C **Operating panel** to control all unit functions
Description please *see Section 4.8.*

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

E **Basket handles** (stainless-steel basket inserted)

F **Plastic basket support** to protect the tank surface

G **Ball valve** to drain the ultrasonic tank

4.7 Description of ultrasonic tank

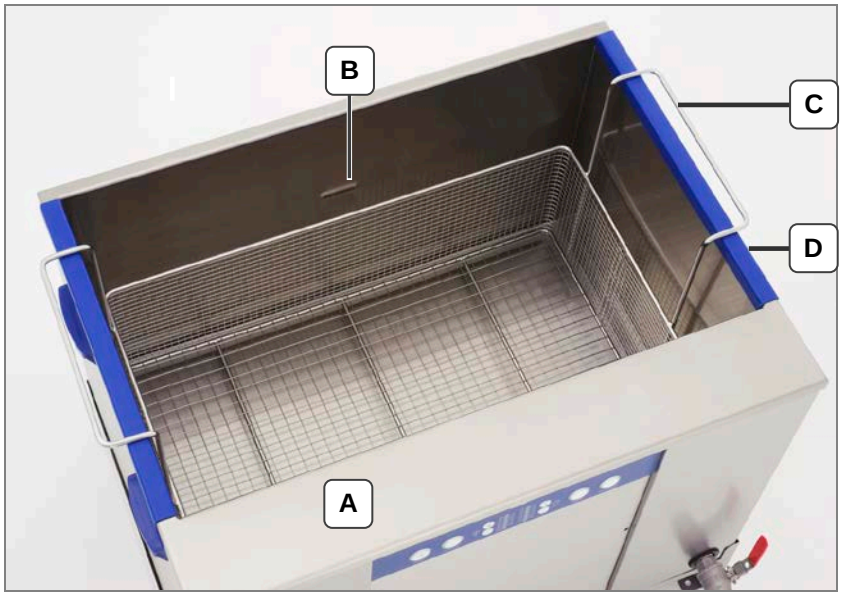

Fig. 3.9.1. Ultrasonic tank

A **Ultrasonic tank** made of stainless steel (V2A).
The transducers are mounted underneath the tank bottom. The tank bottom is inclined towards the drain.

B **Filling level marking** indicates recommended filling level

C **Stainless-steel basket** inserted

D **Plastic basket support** to protect the tank surface

E **Liquid level sensor** for filling level monitoring, must be immersed during operation

F **Protecting bar for heating element**

G **Heating element**

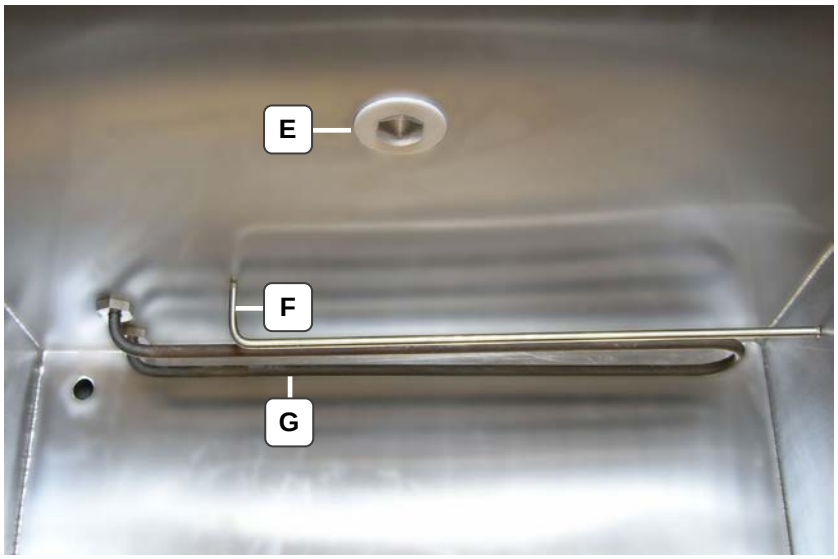

Fig. 3.9.2. Level sensor and heating element

4.7.1 Liquid level sensor

The unit is equipped with a liquid level sensor (*Fig. 3.9.1.1.E*.). The monitoring device automatically switches the unit off when the filling level is too low (below the level sensor *Fig. 3.9.1.1.*).

Please note the filling level marking (*Fig.3.9.1.B*.) to ensure that the unit is correctly filled. This protects the unit against dry running which may cause damage to the equipment (heating element, transducer system).

The filling level is monitored by measuring of the conductivity of the liquid. This means that the conductivity of the cleaning liquid must be > 15 µSiemens/cm.

Please note: The unit does not operate with pure DI-water (without cleaning agent)!

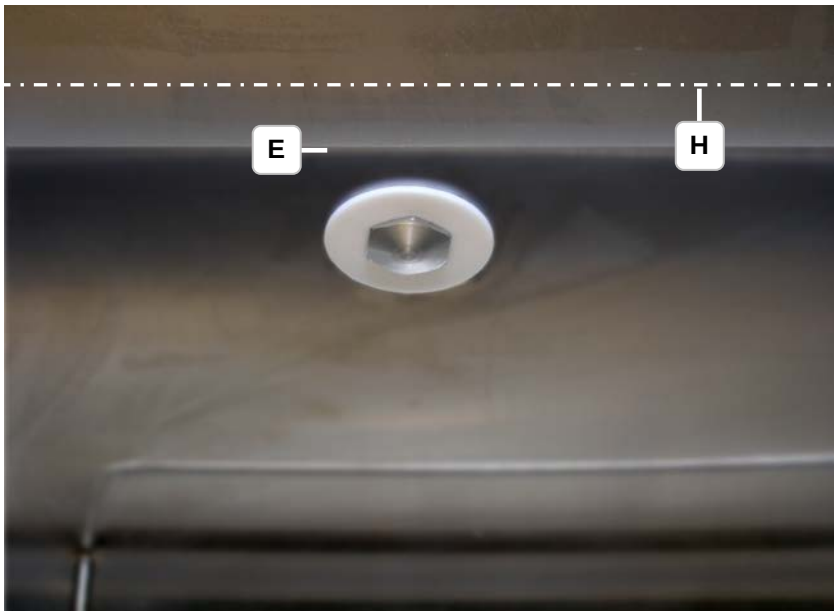

Fig. 3.9.1.1. Liquid level sensor / correct filling level line

4.8 Description of operating elements

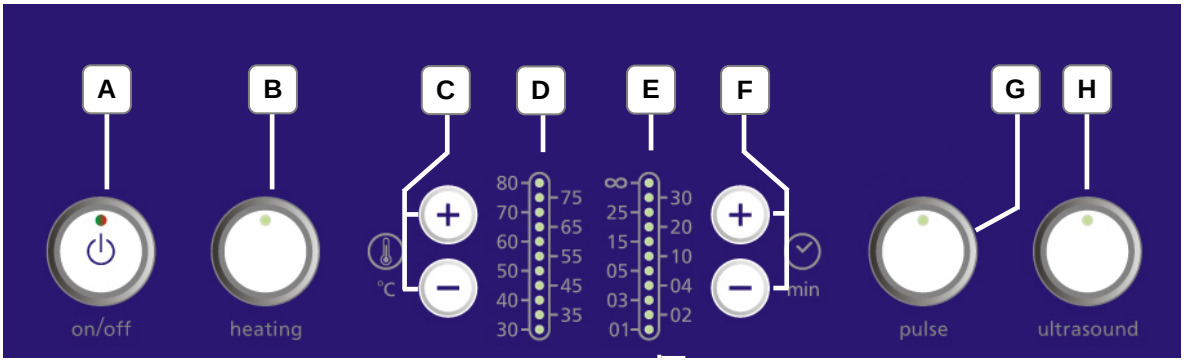

Fig. 3.10. Operating panel

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. Malfunction messages see *Section 9.4.*

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. Malfunction messages see *Section 9.4.*

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

H **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.*

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.

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.

CAUTION

Risk of damage to the unit due to insufficient ventilation!

This unit must be operated while mounted on the delivered support frame only.

For reasons of safety the support frame should be screwed to the floor.

Ambient conditions

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

- 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). Details are available from the manufacturer.
- In-door operation only

5.2 Installation of the support frame

Follow the instructions below to mount the rubber unit feet (delivered with the unit).

The rubber feet serve as vibration absorption device and reduce the force of vibrations transmitted into the unit.

There are 2 ways to mount the rubber feet:

Version A
unit is to be mounted onto the support frame

The unit is mounted onto the support frame, the support frame is **placed** onto the floor.
Use the washers and nuts (*Fig. 5.2.1.A*) delivered with the unit to fix the rubber feet to the support frame.

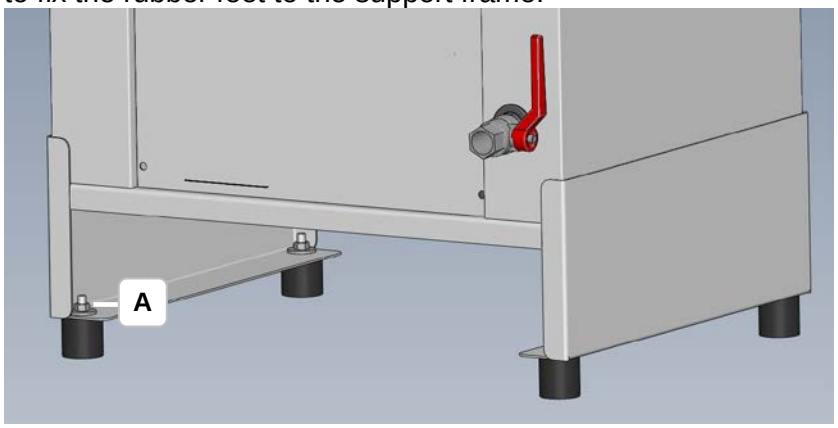

Fig. 5.2.1. Absorber feet mounted to the frame
frame is not mounted to the floor

Version B
support frame is mounted to the floor

The support frame is **screwed** to the ship floor:

1. Use the threaded bolts (*Fig. 5.2.1.A*) delivered with the unit to fix the rubber feet to the ship floor (use concerning drilling template included).
2. Use the screws and washers to fix the support frame to the rubber feet (see illustration below).

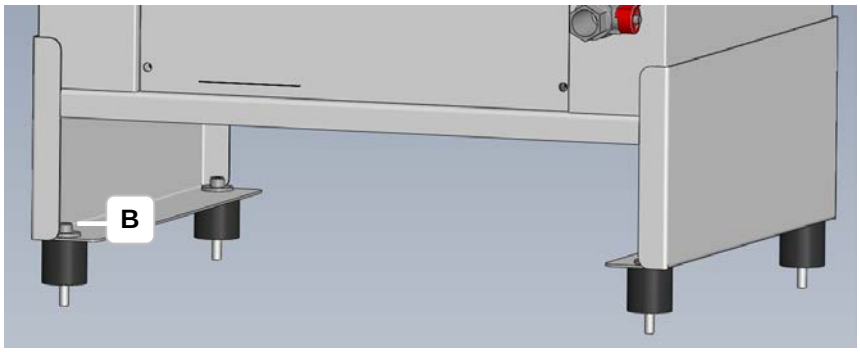

Fig. 5.2.2. frame is mounted to the floor

5.3 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 4.5.*)

Connect mains cable

Connect the unit to a grounded shockproof socket only.
The mains plug must be connected to an easily accessible socket only, as it serves as interrupted device!

6 Putting unit into operation

6.1 Filling of the unit

Pull the mains plug

Caution! For reasons of safety always pull the mains plug for filling the cleaning liquid.

Shut the drain duct

Shut the drain duct before you fill the tank.

Observe filling level

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

Observe the filling level marking inside the tank (*Fig. 3.9.1.B*).

During operatin the liquid level sensor (*see Fig. 3.9.2.E.)* must be immersed.
If the filling level is below the liquid level sensor, the unit does not operate. This protects the unit against dry running which may cause damage to the equipment.

Allowed 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.

Conductivity of the cleaning liquid

The conductivity of the cleaning liquid must be > 15 µS/cm.

Please note: The unit does not operate with pure DI-water!

Prohibited cleaning agents

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.

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.

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.

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 to use the 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 preset 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. 4.8.A*), the green LED in the key is lighted.
2. Press the key *heating* (*Fig. 4.8.B*), the green LED in the key is lighted.
3. Set the required cleaning temperature by pressing the +/- keys (*Fig. 4.8.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. 4.8.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°C or 40°C) can easily be exceeded.

6.3 Degassing of the cleaning 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. 4.8.H*). The green LED in the key is lighted.
2. Press the key *pulse* (*Fig. 4.8.G*). 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 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. 4.8.G*). 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 *pulse.* Please treat sensitive items in *pulse* mode for short periods only.

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

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.4.8.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.8.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. 4.8.H).

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. 4.8.H*).

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 preset 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

Unitor ultrasonic 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. 4.8.A*), the green LED in the key goes on.
2. Press the key *heating* (*Fig. 4.8.B*), the green LED in the key goes on.
3. Set the required cleaning temperature by pressing the keys +/- (*Fig. 4.8.C*).
4. Set the required cleaning period by pressing the keys +/- (*Fig. 4.8.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 preset cleaning period.

The present unit is equipped with 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. 4.8.B)* and *ultrasound (Fig. 4.8.H)* 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. 4.8.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. 4.8.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, unless there is a substantial reason to do so!

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.

Should you have any queries please contact your supplier.

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! Observe the safety warnings in *Section 6.1*.

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).

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: nitric acid, sulphuric acid, formic acid, hydrofluoric acid (even diluted). (We do not claim this list to be complete.)

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.

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.

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*!

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.

Maintenance of the liquid level sensor

Remove any residues from the sensor, e.g. the same cleaning agent used for your cleaning tasks.

Ventilation slots on the side

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

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 cavitational erosion.
In order to slow down the wear and tear as far as possible we make the tanks of a special highly cavitation-proof stainless steel.

To prolong the service life of your ultrasonic unit even more we recommend to 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).
- Exchange the cleaning liquid regularly. In particular 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).
- Do not operate the ultrasound unnecessarily; switch off after the cleaning process.

9.3 Repair

Opening by authorised specialised personnel only

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

DANGER

Risk of electrocution due to live parts inside the unit!

Pull the mains plug before opening the unit!

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

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

9.4 Malfunctions

Unit totally out of order

Check for correct liquid level and liquid conductivity (*see 5.1.*).

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

Malfunction indication	Malfunction	Remedy
All LEDs of the temperature indicator are flashing	Bath temperature > 90°C	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.
The LEDs of the temperature indicator light one after the other	Error of temperature sensor	Switch the device off and on again. If the malfunction persists, the device is defective. Check the connection cable between the electronic unit and the temperature sensor. If OK there is an error in the electronic unit > replace the electronic unit.
The LEDs of the indicator for the ultrasonic cleaning duration light one after the other	Internal communication error	Switch the device off and on again. If the malfunction persists there is an error in the electronic unit > replace the electronic unit
All LEDs of the timer indicator are flashing simultaneously	Liquid level error	Check liquid level: correct if necessary the liquid level until the level sensor is immersed. If error persists > clean the level sensor from e.g. oil or rust film If error persists > exchange liquid relay on inside front panel.

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. Loosen the 4 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
   B1 HF connection grey (do not confuse the connectors!)
   B2 HF connection white (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

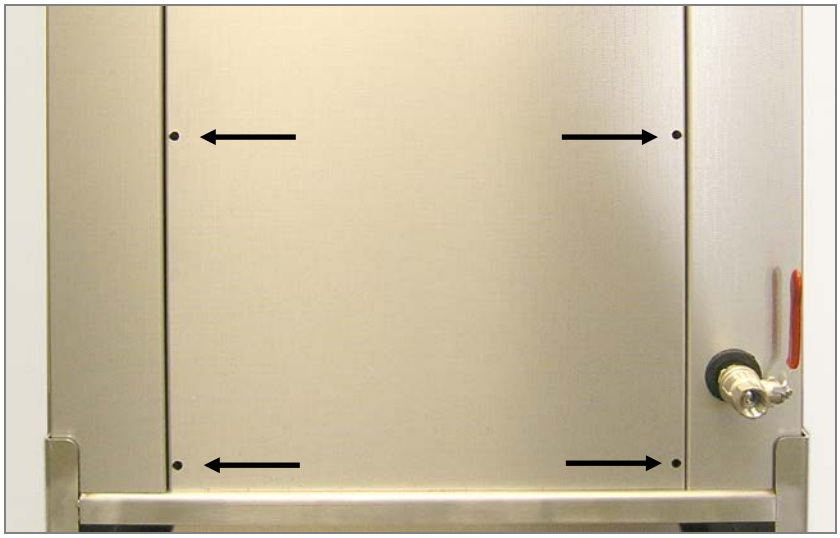

Fig. 8.5.1. Position of the 4 Allen screws

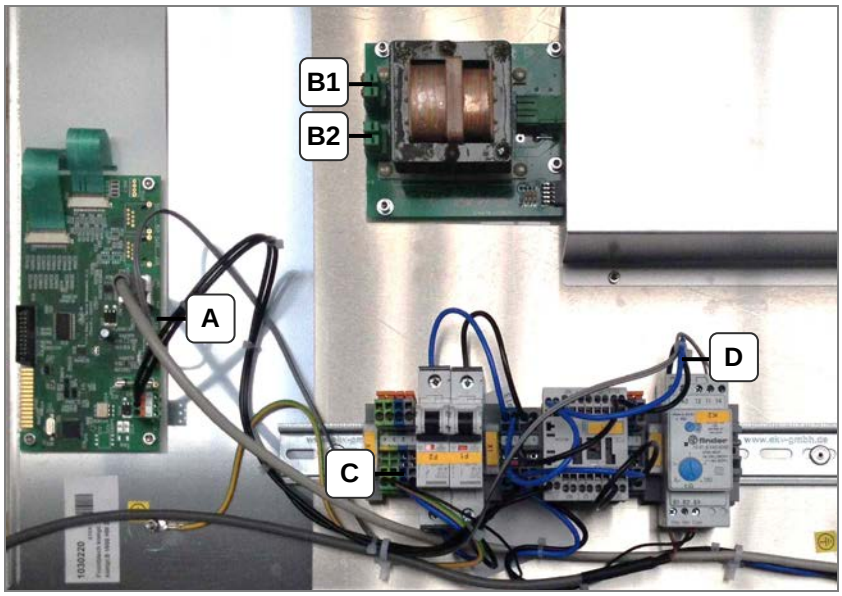

Fig. 8.5.2 Position of the connectors

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

Wilhelmsen Ships Service

Postal address
PO Box 33
N-1324 Lysaker
Norway

Visiting address
Strandveien 20
N-1366 Lysaker
Norway

T (+47) 67584550
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