



The KS/UCR MK3 Range



Operation & Maintenance Manual

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Manual content disclaimer

Guyson International Ltd. Operation & Maintenance Manuals are frequently updated and improved.

It is our company policy to make on-going improvements and/or changes in the products and/or the programs described in this information at any time without notice.

Although our intent is to provide complete and accurate information, Guyson International Ltd. does not warrant the accuracy or completeness of the materials and content contained in this manual and reserves the right to correct any errors or omissions to the manual content at any time.



1. Introduction

This manual contains the information required to operate and maintain:

The KS MK3 Range of Ultrasonic Cleaning Tanks:

Models: KS MK3 300
 KS MK3 450
 KS MK3 525
 KS MK3 1500
 KS MK3 3000
 KS MK3 4000

The UCR MK3 Range of Ultrasonic Clean and Rinse Tanks:

Models: UCR MK3 300
 UCR MK3 450
 UCR MK3 525
 UCR MK3 1500

KPF 60 Optional Pumping and Filtration Unit

The Primewave ultrasonic generator.

To provide a better understanding of operation, and to facilitate the rapid diagnosis and rectification of any malfunction, detailed mechanical and electrical descriptions are also included.

Many systems are supplied with a number of optional features, which allow the system to be tailored exactly to your requirements.

Since this manual covers most available options, some of the detail contained may not relate to the model you have purchased.

2. Safety

2.1 Hazards

In normal operation, the main hazard to users of this equipment arises from possible exposure to excessive noise levels. There are subsidiary hazards associated with the handling of some of the cleaning products and also from skin contact with hot cleaning liquids.

Further significant hazards exist in respect of electrical failures, and maintenance where there is a risk of contact with live electrical circuits. The equipment is protected by MCBs and fuses. In failure situations it is important that the causes are established, and the malfunction rectified by a competent, qualified electrician. If such personnel are not available, reference must be made to the service department of Guyson International Limited for assistance.

2.2 Precautions

Observance of the following points is essential for the safe operation of the equipment:

- Ensure that the operating and maintenance instructions (see sections [4](#) and [8](#)) are thoroughly understood before using the unit.
- The unit must be correctly wired and earthed; preferably using a residual current circuit breaker (RCB) rated at 30mA trip. It must be set up for the correct supply voltage at its place of use.
- The cleaning bath must not be operated with very low liquid levels and on no account must it be operated without liquid in the system.
- The unit must be disconnected from the mains before filling and emptying.
- The unit must be sited so that there is no restriction of air flow to the cooling fan for the generator.
- Ensure the PUWER (Provision and Use of Work Equipment Regulations) is implemented before the equipment is used for the first time.

2.3 Cleaning solutions

2.3.1 Type

It is to be emphasised that KS MK3 & UCR MK3 units are only designed for use with neutral or mildly alkaline aqueous cleaning solutions. The Sales Department of Guyson International will readily advise on the cleaning solution to be used for any particular application.

The normal types of cleaners do not incorporate any recognised dangerous substances, but some of the more alkaline or acidic liquids require careful handling. Users must avail themselves of the manufacturers' technical and safety data sheets and ensure that the necessary precautions are taken in using the products.

For certain cleaning applications, the use of strongly alkaline or acidic solutions may be considered. Such cleaning media are compatible with the equipment, but where they are used the hazards to operatives are significantly increased since they can cause severe skin burns and eye contact with these chemicals can have very serious consequences. Therefore, if strongly alkaline or acidic products are used, it is extremely important that the precautions detailed in the manufacturer's Material Safety Data Sheets are followed.

In circumstances where rust or other corrosive deposits have to be removed from metal surfaces, the use of acidic cleaning solutions may be considered. If such cleaning is contemplated, it is essential to refer the matter to Guyson International, since there is a real need to confirm the compatibility of the product with the equipment, so that corrosion is avoided.

KS MK3 & UCR MK3 units must not be used with organic solvents of the fluorocarbon or chlorinated hydrocarbon type, e.g. trichloroethylene. These solvents volatilise in air to give atmospheres that are harmful to operators. Where use of such solvents is contemplated, reference must be made to Guyson International regarding system modification to enable vapour retention.

Do not use strong acids in the tank.

Do not use flammable liquids.

2.3.2 Use of cleaning solutions

When filling, topping up or using an ultrasonic system, contact of the cleaning solution with the eyes and skin must be avoided. Impervious gloves (please refer to the chemical manufacturer's Material Safety Data Sheets) should be worn routinely. Goggles (to BS EN 1731:2006) should be worn when handling liquid concentrates and at all times when there is a risk of splashing with the working solution.

Suitable protective clothing must be worn; if contaminated; clothing should be removed immediately and cleaned before re-use. The cleaning solutions tend to have a degreasing effect on the skin leaving it in a dry condition.

2.4 Safe practices

Experience has shown that observance of the following simple rules will assist in securing the safer operation of a cleaning unit.

DO NOT place unprotected hands in the cleaning solution, since the skin degreasing effect is enhanced by ultrasonic cavitation. Use Guyson baskets for cleaning components.

DO NOT drop heavy objects into a cleaning tank. There is a serious risk from splashing liquid of it entering the eyes. Where such a risk is perceived goggles must be worn.

DO wear protective clothing, goggles and gloves. Eye wash bottles must be readily available.

DO make sure the liquid level is maintained above the minimum level mark.

DO take care when removing the lid, from splashing and escaping fumes.

Users must establish safe operating procedures for the running of ultrasonic baths, so that in their individual routine schedules, operations are conducted safely, without undue risk to personnel.

This can be achieved from a thorough understanding of the equipment and cleaning solutions and a disciplined application of the knowledge by managers, supervisors and operators to the particular cleaning situations. It is to be noted that despite the increasingly stringent standards imposed by safety legislation, there are many hundreds of Guyson International cleaning units in safe use every day.

2.5 Noise emission

Use of the ultrasonic cleaning system is attended by the emission of characteristic, high pitched noise consisting largely of harmonics and sub-harmonics of the basic working frequency (38 kHz). Many individual tests have shown that the total noise emitted from Guyson International baths is below the first action level of 85dB(A) (Leq) (reference The Noise at Work Regulations 1989).

Before leaving the Guyson factory, each unit is checked to ensure that the noise from the equipment is below the statutory level under typical operating conditions. There is a need for users to ensure that the noise intensity does not increase with time during routine use. In some circumstances, the provision of ear defenders for operators may be necessary. To combat excessive noise, much can be achieved by the sensible use of a tank lid, since a good deal of noise is emitted through the liquid surface.

Particular care should be taken to avoid siting ultrasonic cleaning equipment near other noisy machinery, since the combined noise intensity could exceed the required safe limit. Where such a combination is unavoidable, it is strongly recommended that noise level measurements should be made.



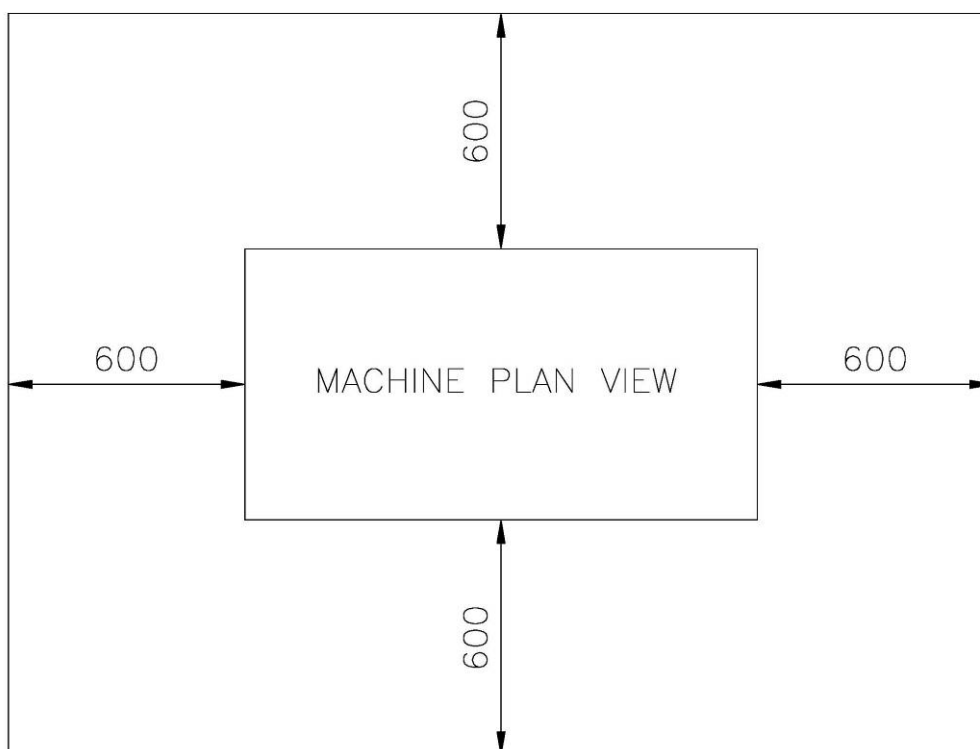
2.6 Environmental

To ensure minimum environmental impact the KS MK3 & UCR MK3 cleaning systems are specifically designed for aqueous based cleaning solutions, i.e. they do not use chemicals which may directly deplete the ozone layer. However, in order to prevent possible contamination of water supplies, sewers etc, ***all waste solutions should be disposed of in accordance with Local Water Authority regulations.*** The method of disposal will be dependent upon the cleaning solution type, contaminant composition and stringency of local regulations. Waste mains water rinse may be recycled through absorption filters.

3. Installation and siting

In order to ensure efficient operation of the system and to maintain a safe working environment for associated personnel, it is imperative that the following conditions are met:

- The unit must be sited in a dry, draught-free well ventilated area, with a clearance of 600mm on all sides, see diagram below.



- It must be placed on a level and secure base.
- Services required may include mains town water supply and drainage pipework which could be plumbed to the tank (this could depend upon whether you have the optional extra fill inlet pipework). The drain outlet on the KS range matches a 3/4" BSP fitting, and on the UCR range it is a 22mm diameter pipe outlet.
- If a KPF 60 filtration unit is supplied, ensure it is switched 'OFF', then connect to the ultrasonic tank - (refer to Pipe Schematic drawing).
- See voltage label for the correct operating supply voltage.
- If you have a single phase unit it will be supplied with either a British 230V moulded plug (or European plug if specified). On a single phase unit plug the mains plug into to a mains supply socket. The fuse ratings for the mains protection fuses are specified in section [6.4](#).

3.1 Isolation and switching devices (3 phase units)

IMPORTANT NOTE: The large electrical on/off switch on the plant is not considered as an isolator as there is still full load current going into one side of the unit to the switch through the power cable; and the unit may be moved around on the end of this cable.

It is imperative that a proper fixed wall mounted isolator or removable plug and socket (with the supply protected by a Residual Current Device (RCD)) is provided for the unit for cutting off the full load current of the installation. Connection must only be carried out by qualified electrical personnel.

Any isolating and switching devices fitted shall comply with the appropriate requirements of Regulations 537-02 to 537-05 of the 'IEE Wiring Regulations - Sixteenth Edition' (BS 7671).

If using a fixed wall mounted isolator, connect input lead(s) to mains supply terminating in the appropriate wall mounted isolator as below, noting that the supply must be rated correctly for this equipment.

Input cables must be connected as follows:

Live phases to mains isolator

Neutral to neutral link (marked N)

Green or green/yellow to the main earth terminal

It is very important that a good earth connection is made to a recognised earthing point.

3.1.1 3 phase units with flexible armoured cable

For 3 phase units with flexible armoured cable connected, the cable colours are as per the following standard:

Standard: BS7671 (IEE Wiring Regulations 16th Edition)

Location: Table 51B Page 77

Section Title: Colour Identification of Flexible Cables and Cords

This states that:

the LIVE PHASES are coloured BROWN, BLACK and GREY

the NEUTRAL is coloured BLUE

the PROTECTIVE EARTH is coloured GREEN/YELLOW

3.2 Further installation for units with an external ultrasonic generator

If your unit has an external Ultrasonic Generator:

- Air flow into and from the generator must be unimpeded by nearby walls, other equipment or personnel. A minimum distance of 600mm (2 feet) unimpeded space, for air movement, must be available around the appropriate sides of the machine. Simultaneously operating generators must not be positioned so that one unit exhausts into another.
- Ensure that the generator is switched 'OFF' by means of the front panel button.
- Connect the transducer lead(s) into the generator output socket(s) from the tank.
- Connect the remote start lead(s) into the Remote Start socket(s) from the tank
- Insert the mains lead into the 'Power In' socket at the rear of the generator.

When all these conditions are satisfied, the unit is ready for filling.

As major suppliers of cleaning systems, Guyson International Limited have wide experience in solving problems and will be pleased to give assistance to any purchaser of their equipment requiring help in any matter concerning installation.

4. Operating instructions

4.1 Filling of the unit

The appropriate safety precautions must be taken when filling the bath with cleaning solution (see section [2](#) - Safety).

As previously stated, the KS MK3 & UCR MK3 units are designed for use with neutral or mildly alkaline aqueous cleaning solutions. These must be diluted with water to the concentrations recommended by the manufacturer. Occasional topping-up is necessary to replace losses due to 'drag-out'.

To avoid thermal shock to the transducers, never pour hot liquids into a cold tank or vice versa. When filling a hot or cold tank, fill it approximately $\frac{1}{4}$ full with liquid of a similar temperature to that of the tank and complete the filling using either hot or cold liquid as required.

Begin to fill the tank with cleaning solution.

There are two liquid level lines marked in the tank. The lower level line is the minimum liquid level that the tank should be filled. The upper level line is the maximum liquid level that the tank should be filled.

The correct liquid level is that which falls between these two liquid level lines, but such that when the objects being cleaned are placed in the liquid, their displacement is not sufficient to provide an excessive overflow.

IMPORTANT: The correct liquid level should be maintained to protect any heating, ultrasonics and filtration circuits that may be fitted. Usage of the system with a low liquid level in the tank can result in system damage.

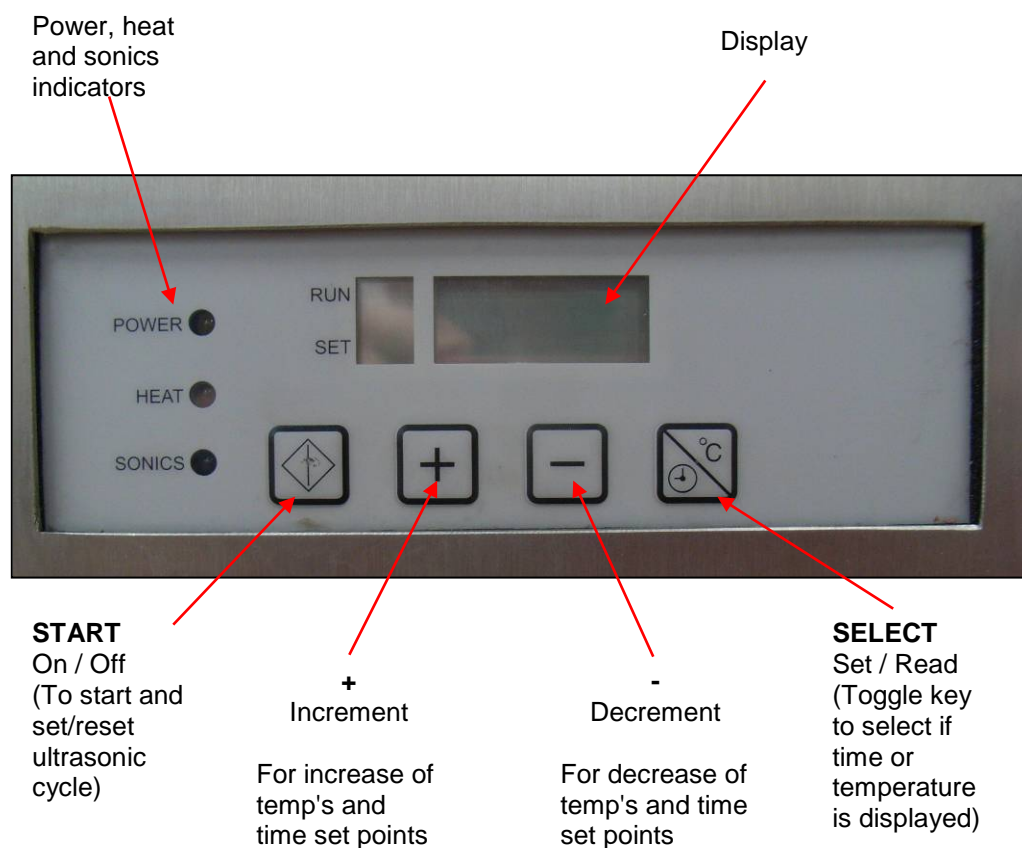
IMPORTANT: The pump on the KPF60 should be primed every time the tank is filled.

4.2 Control system

The control system on the unit allows adjustment of the times and temperatures via the membrane control panel.

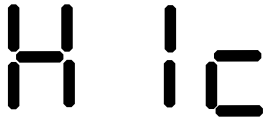

4.2.1 Layout of the membrane panel display

All settings and readings are made via the membrane control panel. The layout of the membrane panel is shown below with each of the main areas labelled.



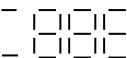
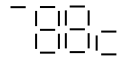
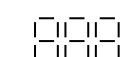

4.2.2 LED status and fault indication

The LED's on the control panel illuminate in different formats to show the status of the unit as follows:


Colour of LED	Type of illumination	Meaning
YELLOW	solid	Mains power is applied to the unit.
RED	flashing	The heaters are enabled and the temperature is below the set point.
RED	solid	When the heating set point is reached and the temperature remains within the 1°C hysteresis band.
GREEN	solid	Ultrasonics in operation.
RED & GREEN	flashing alternately with  message on LCD display	An over-temperature condition is reached. The +10 deg C over-temperature function recovers automatically when the condition returns to normality. (The heater and sonics should then be restarted.)
RED & GREEN	flashing alternately with  message on LCD display	The temperature sensor is disconnected or has failed. (Can only be cancelled by turning the unit OFF and correcting the sensor fault.)

4.2.3 LCD display screens


The operator can progress through the various LCD screens by pressing the select button to go to each next screen as follows:

Screen Reference	Example of digits	What is shown?
Screen 1 (press SELECT for next screen)		Sonics cycle time countdown
Screen 2 (press SELECT for next screen)		Actual tank temperature
Screen 3 (press SELECT for next screen)		Sonics cycle time that has been set
Screen 4 (press SELECT to go to back to the initial screen)		Tank temperature that has been set

As you can see in the table above, the upper and lower horizontal segments of the left digit of the display, indicates whether the reading is:

a run time/temperature (upper left segment) ie. 

or

a set time/temperature (lower left segment) ie. 

Each screen will hold for five seconds before reverting to the initial screen.

If the sonics are ON, the + and - keys are disabled to avoid inadvertent setting.

If the sonics are OFF, the + and - keys are active after the second press of the SELECT button. This means that the settings cannot be changed in the normal idle mode when the display shows the last set time upon completion of or start of a sonics cycle.

4.2.4 Control panel push buttons and indications

If tank 1 or tank 2 has a low level sensor/s fitted and if either of the tanks levels drops below the level sensor, the relevant 'low level reset' button will illuminate and the tank will require topping up with solution. Once the level is above the sensor the relevant low level push button/s can be reset (the light should extinguish) and then the heating and sonics can be operated.



Please note:

The red (heating) and green (sonics) LED's on the membrane will still illuminate if pressed when there is a low level condition activated. This due to the low level control for both circuits being independent from the membrane signalling.

4.3 Start up

Ensure that all the conditions detailed in sections [3](#) and [4.1](#) are met.

Switch the power on.

When Mains power is first applied, the sonics and heaters will not be energised. The PWR LED will illuminate. In order to enable the heaters, a single press of the <START> key is required. At all times, the HEAT LED will flash when the heaters are enabled and the temperature is below the set point. The HEAT LED will go solid on when the set point is reached and the temperature remains within the 1°C hysteresis band.

Raise the liquid temperature to the advised working temperature of 60°C in order to degas the liquid (see section [9.3](#)) and then reduce it to its operating temperature by resetting the temperature.

NOTE: Advised operating temperature 60°C

Maximum safe operating temperature - with care - 80°C.

When the sonics are off, the heater may be disabled without powering off the machine by depressing the <START> key for three seconds continuously. At this point, the HEAT LED will extinguish.

It should be noted that further heat input will be present during ultrasonic cleaning. In order to prevent this only put the sonics on when needed.

If a KPF60 filtration unit is fitted, switch it on, and check that solution displacement is observed in the tank. Check that the pressure gauge on the KPF60 indicates less than 0.5 bar. A greater reading indicates the need for filter replacement - (see section [8](#) - Maintenance).

4.4 Operation

Where the items to be cleaned are extremely soiled, they should be pre-washed or sprayed in a separate tank to remove bulk soil. An aqueous cleaning solution should be used and this may be the same as that used in the ultrasonic cleaning tank.

4.4.1 Using baskets

All parts should be cleaned in Guyson International Limited baskets.

The correct baskets are available from Guyson International Limited Service Dept.

NOTE: Use of the incorrect basket or component carrier may cause damage to the tank.

All items to be cleaned MUST NOT touch the bottom of the tank and must always be immersed using baskets.

The baskets must have perforated sides to allow the free movement of the cleaning liquid. An excessively deep load of items can cause masking in the ultrasonic tank and result in a slow or poor cleaning action. A shallow load will clean more rapidly and effectively.

Ensure parts are correctly oriented to prevent excessive 'drag-out' of liquid. The basket must also be withdrawn slowly to prevent excessive 'drag-out' of liquid. Failure to allow adequate time for drainage, or removal of the basket at too great a speed, will result in excessive consumption of cleaning liquid.

4.4.2 Starting the ultrasonics

The sonics cleaning time will depend on the load and degree of soiling etc.

The sonics are initiated by depressing the <START> key momentarily.

If provided, place a tank lid over the tank to reduce noise emission, evaporation and heat losses.

The ultrasonic generator will switch off and the sonics will stop when the count-down timer on the LCD display reaches 0 or when the <START> key is pressed a second time.

On no account must the liquid level be allowed to fall below the minimum level line or serious damage may be caused to the generator and transducers.

Take care of liquid displacement effects, when moving the workload IN and OUT of the tank.

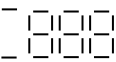
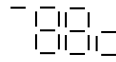
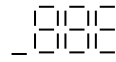

The second tank of the UCR MK3 system is designed to rinse the cleaning liquid off the newly cleaned items using town water. The rate of weiring of the rinsing water may be adjusted using the fill valve and will vary according to the amount of cleaning liquid carried over. A rinse period of 30 seconds to one minutes' duration will normally be sufficient. When the basket is withdrawn from the tank a hand held spray is available in cases where total removal of all cleaning liquid is essential.

4.5 Setting the heating temperature

The temperature may be set in the range 20°C to 80°C in 1 degree increments.

An over-temperature condition for shutdown in the event of any failure is maintained at the current set point plus 10°C.

The tank temperature may be set while the sonics are off by using **Screen 4** of the LCD display (see below table).

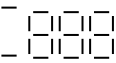
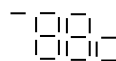
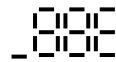
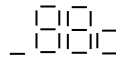
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Screen 4 (press SELECT to go to back to the initial screen)		Tank temperature that has been set

When the display shows the set temperature, pressing <+> or <-> will adjust the set temperature up or down respectively. When a setting is changed in this way, no extra key presses are required to store the new value.

The set temperature variable is stored in non-volatile memory so that, on the application of power, the last used setting will return.

4.6 Setting the sonics time

The sonic cycle time may be set while the sonics are off by using **Screen 3** of the LCD display (see below table).

Screen Reference	Example of digits	What is shown?
Screen 1 (press SELECT for next screen)		Sonics cycle time countdown
Screen 2 (press SELECT for next screen)		Actual tank temperature
Screen 3 (press SELECT for next screen)		Sonics cycle time that has been set
Screen 4 (press SELECT to go to back to the initial screen)		Tank temperature that has been set

When the display shows the set time, pressing <+> or <-> will adjust the set time up or down respectively. When a setting is changed in this way, no extra key presses are required to store the new value.

The set time is stored in non-volatile memory so that, on the application of power, the last used setting will return.

The time may be set in the range 0.1 minute to 99.9 minutes in 0.1 minute increments. If the set time is increased beyond 99.9 minutes, the sonics will then run continuously under control of the <START> key.

4.7 Shutdown

On completion of a work period (eg at the end of the day or shift), or when no further cleaning is necessary, the unit must be shut down.

On single phase units, remove the plug from the mains socket.

On 3 phase units, switch the isolator to the off position.

If an external Ultrasonic Generator is fitted, also switch off the generator and unplug from the mains socket.

Where a lid is supplied it should be left in position. (Lids and baskets are available from Guyson International Limited Service Dept. - see next section.)

4.8 Ancillary parts

Description	Guyson part no.
KS 300 MK3 Lid	E1AA6775
KS 300 MK3 Basket	E1AA6787
KS 300 MK3 Stand	E1AA6781
KS 450 MK3 Lid	E1AA6776
KS 450 MK3 Basket	E1AA6788
KS 450 MK3 Stand	E1AA6782
KS 525 MK3 Lid	E1AA6777
KS 525 MK3 Basket	E1AA6789
KS 525 MK3 Stand	E1AA6783
KS 1500 MK3 Lid	E1AA6778
KS 1500 MK3 Basket	E1AA6790
KS 1500 MK3 Stand	E1AA6784
KS 3000 MK3 Lid	E1AA6779
KS 3000 MK3 Basket	E1AA6791
KS 3000 MK3 Stand	E1AA6785
KS 4000 MK3 Lid	E1AA6780
KS 4000 MK3 Basket	E1AA6792
KS 4000 MK3 Stand	E1AA6786

5. Description

5.1 General

The KS MK3 & UCR MK3 tanks are a range of high power industrial cleaning tanks designed for efficiency and reliability.

The tanks are manufactured from 2mm thick AISI 316L stainless steel.

The tanks are housed in an AISI 304 brushed stainless skirt.

Each tank has a digital membrane controller for sonics and temperature:

- Temperature settable between 20°C and 80°C
- Sonics time settable between 0.1 minutes and 99.9 minutes or continuous operation.

The controller remembers previous settings when switched off.

All tanks are fitted with Micro-processor controlled mat heating, drain connections and ultrasonic generators.

Over temperature protection will operate at 10°C above set temperature.

Thermal protection is built into each heater mat so that it will self protect if the water level is low. (The self protect switch is set at 140°C).

The tanks contain varying numbers of the 300W generator.

Each 300W generator is built onto a single board and is designed to operate 6 transducers.

The ultrasonic configuration is selected to give the optimum efficiency for the individual tank/transducer combination.

The ultrasonic generator is coupled with a series of transducers bonded onto the bottom of the Ultrasonic Cleaning Tank.

NOTE: For information on the generator please see the generator manual (located at the back of this manual).

In addition, a system could include a pump and filtration unit (KPF60), Guyson component carrier or baskets and a Guyson tank lid.

5.2 The KS MK3 range of ultrasonic cleaning tanks

The KS MK3 tanks are fabricated integral in AISI 316 stainless steel. Some tanks may be provided with top mounted basket hangers and polypropylene lids.

Mat heaters provide the heating (see specification overleaf).

A socket at base level provides a drain facility and a further socket at 50mm (KS MK3 300, KS MK3 450, KS MK3 525) or 100mm (KS MK3 1500 and above) below nominal liquid level allows the fitment of an optional KPF60 filtration module.

The tank lower socket is $\frac{3}{4}$ " BSP and is fitted with a manual ball valve mounted outside the metal skirt. The upper socket is $\frac{3}{4}$ " BSP and is plugged unless optional filtration is fitted.

A fill inlet can be fitted as an option on KS MK3 tanks.

These sockets are located on the left hand end of the tank.

The ultrasonic base is fabricated from stainless steel. The transducers are directly bonded to the base.

The transducer/generator configurations can be seen overleaf on the KS MK3 Range Technical Specification



5.2.1 KS MK3 range technical specification

KS MK3 TYPE	KS MK3 300	KS MK3 450	KS MK3 525	KS MK3 1500	KS MK3 3000	KS MK3 4000
TANK SIZES						
Width (mm)	350	450	525	650	750	1000
Front to Rear (mm)	250	325	415	450	550	550
Effective Depth (mm)	200	250	250	400	500	450
Tank Effective Capacity (litres)	17.5	36.5	54.5	117	165	248
OVERALL EQUIPMENT SIZES						
Width	655	755	845	975	950	1300
Front to Rear	410	465	555	635	690	690
Height	500	550	675	775	915	1010
ULTRASONICS / HEATING						
No. of Ultrasonic Transducers	6	12	18	24	40	60
Ultrasonic Generator Type	1 x M300	2 x M300	3 x M300	4 x M300	Primewave 2kW	Primewave 3kW
Heating Power	2 x 480W	4 x 480W	6 x 480W	12 x 480W	16 x 480W	20 x 480W

5.3 The UCR MK3 range of ultrasonic clean and rinse tanks

The 2-stage tank is fabricated integral in AISI 316 stainless steel.

Heating is supplied by mat heaters.

Stage 1 is an ultrasonic tank with a polished base and directly bonded transducers.

Stage 2 is a water rinse tank.

(See specification overleaf for heating power and transducer configurations).

On the UCR MK3 tanks the liquid from the rinse stage weirs into the middle panel which has a handy cover plate over the top of the weir to allow cleaning or to remove debris from the weir panel.

Sockets at base level in both stages provide a drain facility and a third socket at base level provides a drain for the rinse tank weir.

Additional sockets are provided above liquid level for filling with water and on the left hand wall of the ultrasonic tank to allow optional fitment of a KPF60 filtration unit. The fill sockets are provided with deflectors to direct incoming solution down into the tank.

The tank drain outlet is 22mm. The mains fill inlet is 15mm and the spray inlet is 1/2" BSP.

Manual valves are provided for filling and draining and the handles are accessible through the skirt wall.

All valves and pipework are stainless steel.

A hand held spray wand is supplied and will be located in the top surround at the rear and to the right of the rinse tank. This may have an optional connection for a DI water supply.

Provision is made for top hanging baskets - (the baskets must be ordered separately from Guyson International).

Stainless steel lids too, are also available. These will come in two parts for the UCR MK3 525 and UCR MK3 1500.



5.3.1 UCR MK3 range technical specification

UCR MK3 TYPE	UCR MK3 300	UCR MK3 450	UCR MK3 525	UCR MK3 1500
TANK SIZES				
Width	250	325	415	450
Front to Rear	350	446	525	650
Effective Depth	200	250	275	400
Tank Effective Capacity (litres)	17.5	36.5	59.9	117
OVERALL EQUIPMENT SIZES				
Width	910	1060	1260	1340
Front to Rear	560	656	735	860
Height	630	675	675	875
ULTRASONICS/ HEATING				
No. of Ultrasonic Transducers	6	12	18	24
Ultrasonic Generator Type	1 x M300	2 x M300	3 x M300	4 x M300
Heating Power	2 x 480W	4 x 480W	6 x 480W	10 x 480W

5.4 Optional pumping and filtration unit

The KPF60 pumping and filtration unit is available as an option for the UCR and KS MK3 Range of Ultrasonic cleaning Tanks.

The pumping action is provided by a March May TE5i-PMD pump and the filtration components consist of a polypropylene coarse strainer and polypropylene removable cartridge fine filter with filter quality pressure monitor gauge.

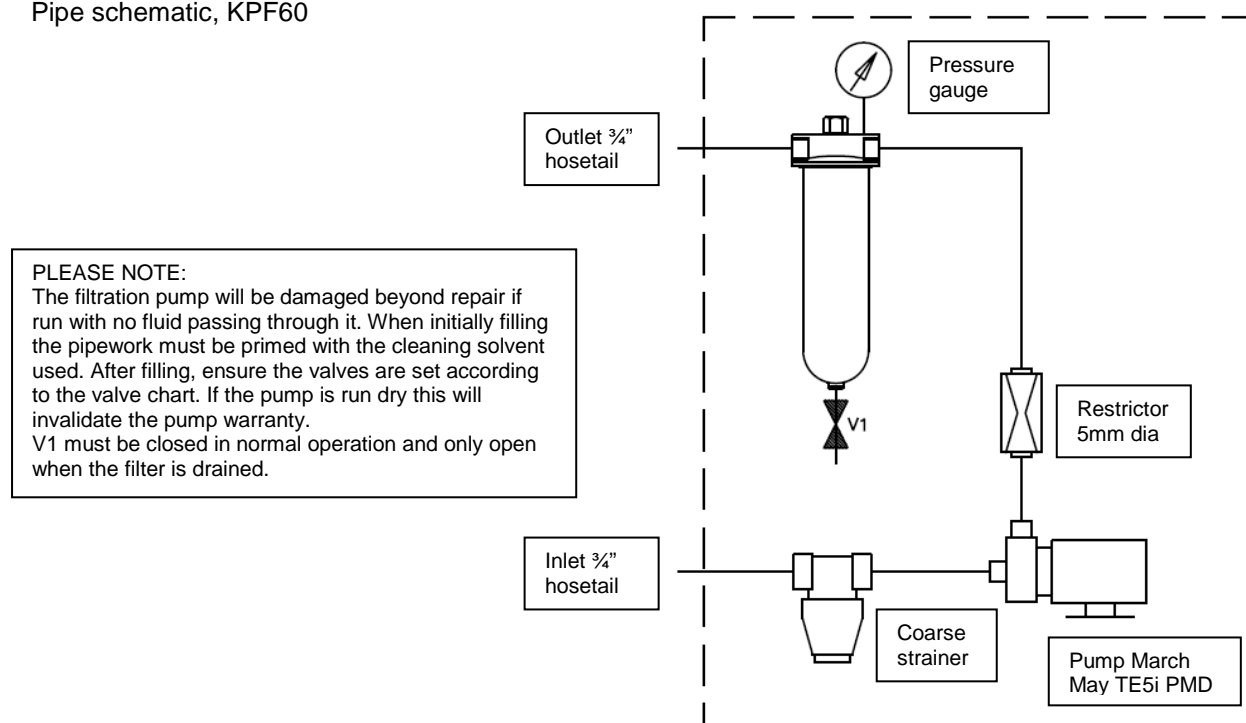
The fine filter should be replaced when the gauge reading exceeds 0.5 bar.

At no time must the pump be allowed to run in a dry condition, as this will result in a rapid wear of the mechanical type seal, with possible damage to the pump body.

To ensure that the pump is flooded, the KPF60 must not be positioned at a base height greater than the cleaning unit, and all valves (on the KPF60) must be fully open.

It is recommended that the strainer should be removed and cleaned on a weekly basis or earlier, dependant on the degree of contamination. All valves must be fully closed prior to removing either the strainer or fine filter cartridge (refer to section [8.2.1](#), for further details on filter removal).

Pipe schematic, KPF60





5.5 Baskets

New baskets are compatible with this design and are backwards compatible with the existing range.

Existing old baskets are not forwards compatible. If you have old baskets you can contact Guyson International Limited Service Department for a simple minor modification of the basket.

6. Electrical circuit and control systems

6.1 Power requirements table

In general the systems described in this manual are designed to work at 230V ac single phase + neutral and earth. However, some larger systems may have a 3 phase supply and some special systems may be configured at a different voltage specific to their place of use.

Some systems may have a single supply for both the tank and the generator.

In all cases, a suitably rated supply is required for the equipment.

The table below outlines the correct requirements:

KS/UCR MK3 model	Supply Voltage	Max. Current	Phase	Frequency	Max. VA	Supply Current	Protection
300	230 +/- 5%	5.1A	I	50Hz	1725 VA	13A	13A Fuse
450	230 +/- 5%	11.7A	I	50Hz	3335 VA	13A	13A Fuse
525	230 +/- 5%	12.5A	I	50Hz	4025 VA	13A	13A Fuse
1500	400 +/- 5%	12A/phase	III	50Hz	6440 VA	16A/phase	3 x 10A MCB
3000*	400 +/- 5%	10A/phase	III	50Hz	5980 VA	16A/phase	3 x 10A MCB
4000*	400 +/- 5%	16A/phase	III	50Hz	7360 VA	16A/phase	1 x 16A/2 x 10A MCB

* not available for UCR

6.2 Transducers

The generators produce alternating current and this is converted into acoustic energy by the transducers. The transducers are of a sandwich type construction, with lead zirconate- titanate ceramics clamped between aluminium coupling and steel backing blocks.

The transducers are mounted by means of a special bonding process which ensures long life and maximum energy transfer to the cleaning fluid.



6.3 Thermal shock

To avoid thermal shock to the transducers, never pour hot liquids into a cold tank or vice versa. When filling a hot or cold tank, fill it approximately $\frac{1}{4}$ full with liquid of a similar temperature to that of the tank and complete the filling using either hot or cold liquid as required.

On no account must the liquid be allowed to fall below the level at which the degassing heaters are mounted.

6.4 Fuse replacement (on single phase units)

On single phase units, a fuse is fitted next to the mains lead on each tank. This fuse is for protection against mains surges.

In order to replace the fuse:

1. Isolate unit from power supply (remove mains plug from mains socket on single phase units).
2. Unscrew the fuse holders.
3. Replace with correct fuses:

1 1/4" ceramic quick acting fuses (rating 220-240V) as follows:

Model	Fuse/MCB
KS MK3 300	10A
KS MK3 450	12.5A
KS MK3 525	12.5A
KS MK3 1500	MCB
KS MK3 3000	MCB
KS MK3 4000	MCB
UCR MK3 300	10A
UCR MK3 450	12.5A
UCR MK3 525	12.5A
UCR MK3 1500	MCB

4. Screw fuse holder back into place, restore power supply (plug mains plug back into mains socket).

6.5 Resetting of MCB's (on 3 phase units)

Tanks of sizes from 1500 upwards are 3 phase units. KS MK3 & UCR MK3 3 phase units have 3 MCB's (for the main power).

In order to reset the MCB's:

1. Isolate the unit by switching the tank isolator to the OFF position and also turn OFF the wall mounted 3 phase isolator that the tank is wired into.
2. The MCB's are located in the electrical panel.
3. Once the panel is opened, the MCB's can then be reset.

WARNING:

Do not operate with electrical panel door open.

Do not force close the MCB's in the circuit.



7. Cleaning solutions

The KS MK3 & UCR MK3 Cleaning Systems are specifically designed for use with alkaline or neutral aqueous degreasing solutions.

Fluorocarbon and chlorinated solvents must not be used.

Do not use strong acids in the tank.

Do not use flammable liquids.

Strict compliance with the manufacturer's recommendations in respect of the use of the specified cleaning solution is necessary at all times.

Guyson International Ltd should be contacted for advice if any change to the original cleaning solution specified is contemplated.

8. Maintenance

Maintenance is essential to keep the equipment operating efficiently. Basically it falls into two categories:

- routine, preventative operations that are performed by operators, and
- one-off operations to correct plant failures; these are usually beyond the scope of the normal operators and require the services of a qualified electrician or a technician from Guyson International.

In all cases where the cause of failure is uncertain, reference should be made to Guyson International Limited.

The following schedules list the tasks that must be carried out, but the frequency of their implementation will be determined by the working environment of the machine, e.g. the type of components being cleaned, the nature of the cleaning liquid, the amount and type of contamination etc. A suggested initial maintenance frequency is annotated by each item.

If an optional KPF60 filtration unit is supplied with your system, please note the following:

The pump is protected against potential ingress by a coarse 'pot' type pre-filter.

It is essential that this pump protection device be stripped and cleaned in order that the flow of liquid to the pump is not unduly restricted.

Note: Blockage of the pump protection pre-filter will result in pump failure.

Pump and/or failures related to lack of advised proper maintenance procedures will not be covered by the company warranty.

8.1 Safety precautions

When any maintenance work is carried out on the machine, strict compliance with the following safety precautions must be enforced.

- Only qualified electrical personnel are permitted to remove any panels from the machine that will expose live terminals.
- Before any electrical connections are disturbed that will expose live terminals, the supply must be removed from the machine.
- Whenever the ultrasonic bath contains cleaning liquid, care must be taken to prevent contact with the skin and eyes. The wearing of impervious gloves and, if necessary, eye protection is recommended.

8.2 Routine preventative maintenance

In addition to the tasks listed, the operator should be constantly aware of the running conditions of the machine. Any deterioration in performance should be investigated immediately and, where possible, the cause identified and the fault rectified.

8.2.1 Daily

- Check that the air inlet and outlet grilles of any external generators (KS 3000 and 4000) are free from obstruction.
- Check liquid level is above the minimum liquid level line and, if required, add further cleaning solution.
- If the MCB regularly trips out, this should be investigated by a qualified electrician or Guyson Service Engineer.
- If the generator board is not responding contact Guyson Service Dept.
- When replacing fuses make sure the fuses are of the same rating. Also refer to section [6.4](#).
- Check condition of the cleaning fluid. As a general rule, the level of solid contamination should not be allowed to rise above about 10% of the capacity of the tank. Evidence of a liquid approaching the end of its use is manifested by the visible presence of solid debris in the liquid and/or dark discoloration. Contaminated solution must be drained and replaced. Check that the tank is fully cleaned out and there is no debris remaining in the tank. Do not allow debris to accumulate.
- If a KPF60 filtration system is fitted, check the pressure gauge reading. Replace fine filter element when pressure reading exceeds 0.5 bar.

To change filter element:

1. Turn system off by depressing 'OFF' buttons and allow solution to cool.
2. Isolate each filter by closing its respective inlet and outlet valves.
3. Drain the filter bowl by opening the drain tap.
4. Undo the large retaining nut and carefully remove the fine filter bowl which will be full of cleaning solution.
5. Replace the filter element ensuring that the new element has the same mounting method as the old one.

Examine filter seals/'O' rings for damage or deterioration - if in doubt replace.

6. Replace the filter bowl and secure with the large nut ensuring that the sealing 'O' ring is correctly sealing. Do not use excessive force.
7. Check that the coarse strainer bowl is clear of debris (see below). Again, ensure the 'O' ring is correctly sealed when replacing the lid.
8. Fully open the isolating valves and check for leaks. The system is now ready for use.

8.2.2 Weekly

- Coarse filter: Close the isolation valves then unscrew and remove bowl and filter assembly. Pour solution into correct tank then clean bowl and filter. Re-assemble in reverse order ensuring that the 'O' ring seal is suitable for re-use (if in doubt replace) and is correctly located. Re-tighten bowl and open isolation valves. Check for leaks.

8.2.3 Monthly

- Check the security of the earth connection. Visually examine electrical connections and supply leads particularly for fraying, looseness or signs of damage.
- Ensure that the tank mains plug is correctly mated in its socket.
- Ensure that the generator mains and output connectors are correctly mated in their respective sockets.
- On the generator remove the fan cover and examine the element. Replace if significant contamination is evident.

8.2.4 Six monthly

Disconnect the mains supply and open the electrical cabinet. Vacuum any accumulated dust, particularly from the heatsinks, taking care not to damage any electrical components.

Before replacing the covers, inspect the assemblies for any obvious signs of damage.

8.2.5 General

In the event of liquid being spilt over the external generators (KS 3000 and 4000), switch off the mains supply, disconnect the mains socket, remove the cover, inspect the damage and dry the affected components.

This work must be carried out by a competent electrician.

NOTE: When new CARBON CYLINDERS are fitted to the system they will discharge an amount of carbon residue, it is therefore advisable to flush the cylinder before connecting to the plant. If this is not done then rapid blocking of the fine filter will ensue.

8.3 Draining and cleaning the plant

As work is being processed, cleaning results may begin to deteriorate because of the progressive build up of solid contamination. Once this stage is reached the plant will need to be drained and cleaned. The frequency of cleaning will depend upon the work throughput and with experience can become a routine in particular applications.

As with filling the unit, great care should be taken when draining the plant to avoid eye and skin contact with liquid through splashing, spillage etc. During draining, observe all safety features described in section [2](#).

To drain the plant, proceed as follows.

1. Switch off the system, and allow solution to cool.
2. Drain each tank, one at a time, by opening the manual drain valves.

Contaminated solutions should be disposed of in accordance with *local Water Authority regulations*. A suitable barrel pump may be used for directly discharging the cleaning solution to waste/container as appropriate.

3. Thoroughly rinse the tank(s) with water and empty the washings.
4. Clean out the tank(s), paying particular attention to the base and corners. Any deposit or surface dullness will appreciably decrease the ultrasonic activity. If a cleaning agent is used, ensure that all traces are removed.
5. Examine the tank(s) for signs of severe corrosion. Heavy contamination, if left unchecked, can cause pitting in the metal and this can lead to leaks in the tank.
6. Remove coarse filter canisters, and clean. Replace 'micron' fine filters.
7. The unit may now be refilled and brought back into operation (see section [4.1](#)).

The normal range of neutral and alkaline cleaners used are readily biodegradable and may, if local Water Authority regulations permit, be disposed of with simultaneous dilution to the public sewer. However, strongly alkaline solutions (e.g. containing caustic soda) or strongly acidic solutions should be *disposed of through an approved contractor to a licensed site*. These liquids should be stored in labelled plastic containers although metal containers are suitable for caustic soda solutions.

8.4 Trouble-shooting guide

This section is intended to be an aid in dealing with problems that can arise when using this equipment.

Effect	Cause	Action
High cleaning liquid consumption	Excessive 'drag out'	a)Use alternative basket design b)Realign components in basket c)Withdraw basket more slowly
	Plumbing leaks	Check integrity of pipe joints and valves.
Overheating	Low liquid level	Replenish tank with cleaning liquid to maintain suitable liquid level.
Localised pitting corrosion	Heavy build up of solid contamination including deposits	Drain and clean tank.
Unsatisfactory cleaning	Solution very contaminated	Check filtration (if fitted) and change cleaning liquid.
	Masking by too many components	Reduce number of components in the basket.
Unit not working	Power failure	Check mains supply and all associated fuses.
Sonics do not come on	Generator board failure Failure of relay for membrane panel	Return unit to Guyson International Ltd. for repair.
Generator(s) not working	Generator fuse blown	Replace fuse
	Power failure	Check mains supply and all associated fuses.

Also refer to section [4.2.2](#) which shows how the LED's on the control panel illuminate in different formats to show the status of the unit.

9. Principles & advantages of ultrasonic cleaning

9.1 Basic principles of ultrasonic cleaning

The key operation associated with this equipment is ultrasonic cleaning, so to give an understanding of the machine's operation, the principles of this technique are now described.

Ultrasonic cleaning depends upon the phenomena associated with acoustic cavitation. This is generated in a liquid medium as a direct result of subjecting it to continuous alternating pressure from piezo-electric transducers. These generate acoustic vibrations in the frequency range 25 to 80 kHz.

Acoustic cavitation exists in two forms, stable and transient.

Stable cavities are bubbles of more or less uniform size that are relatively permanent and will continue to oscillate for many cycles of applied pressure.

On the other hand transient cavities will generally exist for less than one cycle of pressure.

During this cycle they will expand to many times their original size before collapsing violently.

Both cavities will contain either air, or more probably vapour of the cleaning medium. Cleaning is effected by the gentle scrubbing action of the stable cavitation bubbles as well as the violent collapse of the transient cavitation bubbles.

Transient cavity pressure is dependent upon the frequency of the applied alternating pressure and hence, by selecting the ultrasonic transducer frequency, contamination, ranging from the very heavy contamination found for example on engine components, to the very light as found on semi-conductors or jewellery, can be removed.

The cavitation cleaning action occurs wherever the immersed parts come in contact with the cleaning medium, in an operating ultrasonic tank.

9.2 Advantages of ultrasonic cleaning

Ultrasonic cleaning systems achieve extremely high standards of cleanliness in a fraction of the time required to obtain the same results by conventional methods such as hand cleaning, spray washing or similar mechanical means. It efficiently removes contaminants including polishing and lapping components, grinding abrasives, cutting oils and associated swarf, fluxes and general environmental contaminants from a wide range of components and sub-assemblies. Although the cavitation produced by ultrasonic waves is thorough, it will not damage delicate or intricate mechanisms.

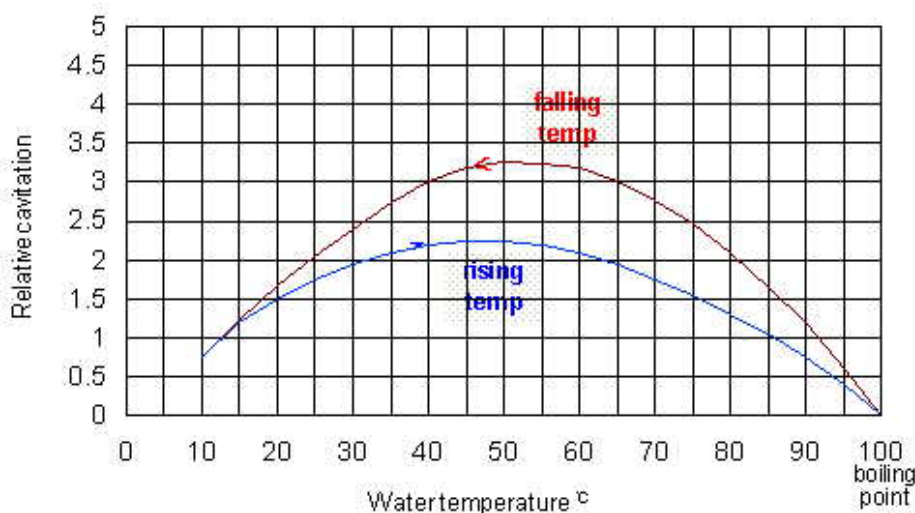
Operation of an ultrasonic cleaning process requires a minimum of supervisory labour, and this may be unskilled. Multi-stage ultrasonic cleaning systems, designed for use with either organic solvents or aqueous solutions, may be readily incorporated into mass production lines. The development of automatic handling facilities for specific cleaning cycles is now well advanced.

9.3 Solution de-gassing

In order to raise the level of acoustic cavitation in ultrasonic cleaning fluids it is sometimes necessary to raise the temperature of the cleaning liquid and then reduce the temperature back to the recommended operational value. A study of the graph shows what occurs.

As a simple explanation, the effect of the short heating cycle is to expel a proportion of the permanent gas that is air, from the solution. This gas would normally act as a cushion for the collapsing vapour containing transient cavities, thereby reducing the cleaning/scrubbing effect. The release of the gas during the boiling cycle allows the transient cavities to reach their full cleaning potential at the operating temperature.

Air is absorbed (dissolved and entrained) by cleaning fluids as they cool and, therefore, a liquid bath that is left standing overnight will acquire a significant gas content. Therefore, de-gassing is recommended after a period of inactivity and certainly each morning before start-up.



Graph showing, for water, the cavitation variation with respect to temperature



10. Primewave Ultrasonic Generator Manual (KS 3000 & KS 4000 only)

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DI Cylinder & Conductivity Meter Installation Guidance for a UCR (Purite & Elga Cyclinders)

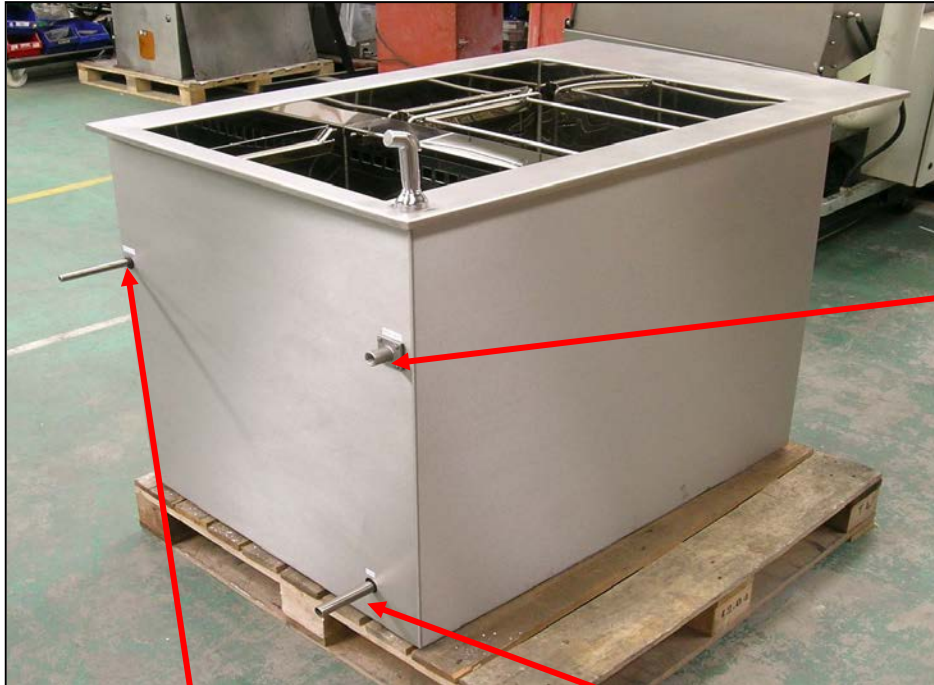




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1. Water supplies and Drainage Connections on a UCR



Spray
lance
water
supply
from
Purite
bottles.

Mains water supply,
town's water

Gravity Drain

2. Water treatment (Purite bottles) connections on a UCR machine



Pipe Locate pin.

Pull out to release pipe connections.

Bleed nipple.

Press to
release the
trapped air.

Top = Inlet
Bottom = Outlet



The outlet
of the
water
treatment
bottle is
connected
to the
spray
lance.

Carbon cylinder

Mains water supply.

Deionising cylinder

For installation of the Elga cylinders for a UCR tank, see below:

Connect the small section of hose from the outlet of the De-ionised cylinder to the outlet on the Veoliate conductivity metre.

Connect the last section of hose from the inlet of the conductivity metre to the spray lance inlet on the UCR tank.



Connect the outlet on the Carbon cylinder to the inlet on the De-ionised cylinder.

Connect the inlet to the Carbon cylinder to the mains water.

3. Conductivity Meter Connections



The conductivity meter connections.



The conductivity meter
test push button.

4. Manual fill and drain valves on a UCR machine

Manual fill valves



If 'weir to drain' is necessary, the stage 2 drain valve must be fully open and the stage 2 fill valve must be slightly open.

Drain valves