



CRD Range of Cleaning Systems



Operation & Maintenance Manual

Serial No.	
Customer	
A/C No.	

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Table of contents

Manual content disclaimer	3
1. Introduction	4
2. Safety	5
2.1 Hazards	5
2.2 Precautions	5
2.3 Cleaning solutions.....	6
2.3.1 Type	6
2.3.2 Use of cleaning solutions	6
2.4 Safe practices	7
2.5 Noise emission	7
2.6 Hot surfaces	8
2.7 Environmental	8
3. Installation and siting.....	9
4. Operating instructions	10
4.1 Filling of plant	10
4.2 Control system	11
4.2.1 Layout of the membrane panel display	11
4.2.2 LED status and fault indication	12
4.2.3 LCD display screens	13
4.3 Start up.....	14
4.4 Operation	15
4.4.1 Using baskets.....	15
4.4.2 Starting the ultrasonics.....	15
4.5 Setting the sonics heating temperature	17
4.6 Setting the sonics time	18
4.7 Setting the dryer heating temperature	19
4.8 Setting the dryer time	20
4.9 Shutdown	21
4.10 Solution de-gassing.....	21
5. Description	22
5.1 General.....	22
5.2 Process tank features	23
5.3 Hot air dryer	24
6. Electrical circuit and control systems	25
6.1 Three phase fan motor	25
6.2 Transducers	25
6.3 Thermal shock.....	25
7. Cleaning solutions	26
8. Maintenance.....	27
8.1 Safety precautions	27
8.2 Routine preventative maintenance	28
8.2.1 Daily	28
8.2.2 Monthly.....	28
8.2.4 Six monthly.....	28
8.3 Draining and cleaning the plant	29
8.4 Trouble-shooting guide	30
9. Spare parts.....	31



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 Value Range of Clean, Rinse and Dry systems both efficiently and safely.

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.

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 an earth leakage circuit breaker (ELCB) 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 liquid below the minimum level mark and on no account must it be operated without liquid in the system.

2.3 Cleaning solutions

2.3.1 Type

It is to be emphasised that this plant is only designed for use with aqueous or diluted semi 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 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 Ltd, since there is a real need to confirm the compatibility of the product with the equipment, so that corrosion is avoided.

This plant 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 Ltd. regarding system modification to enable vapour retention.

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 Health and Safety Data Sheets) should be worn routinely. Goggles (to BS 2092) 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.

Users must give some forethought as to where medical attention will be obtained, and, where treatment or examination is necessary, the medical authority should be presented with the manufacturer's literature pertaining to the product.

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 immerse any part of your body in the tank whilst the ultrasonics are in operation.

There may be adverse effects both from the action of the ultrasonics and from the cleaning solution. Use 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 NOT let items touch the bottom of the ultrasonic tank. Again, use workload baskets.

DO disconnect the power supply before moving, filling or emptying the tank.

DO take care when removing the lid.

Users must establish safe operating procedures for the running of the ultrasonic system, 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 solvents 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 80dB(A) (Leq) (reference The Noise at Work Regulations 2005).

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. Despite this, 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 when the equipment is on stand-by, since a good deal of noise is emitted through the liquid surface.

Particular care should be taken to avoid installing 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 Hot surfaces

Hot surfaces are to be found in and on this equipment in the following areas:

Mat heater(s)

Dryer heater box and manifolds

Top surround/drain board

2.7 Environmental

To ensure minimum environmental impact the Value Range of CRD cleaning systems is 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 good accessibility on all sides
- It must be placed on a level and secure base.
- Connect fill and drain pipework as required (refer to Pipe Schematic drawing).

The hot air dryer on this system is fitted with a 3 phase fan motor. Therefore rotation must be verified when connecting the power supply. Lift dryer lid, then press and hold the dryer continuous button. Air should now be drawn towards the base of the dryer, if unsure place a piece of paper inside the dryer and if rotation is correct the paper will stick the dryer floor.

This will not be covered under warranty.

- Connect input leads to mains supply terminating in a wall mounted isolator. Connection must only be carried out by qualified electrical personnel. Note that the supply must be rated correctly for this equipment (see section [6](#))

A 380/415V, 50Hz three phase + neutral + earth, supply, rated at 16A/Phase, is required for this equipment.

Input cables must be connected as follows:

Live phases to mains isolating contactor

Neutral to neutral pole (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.

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

As major suppliers of cleaning systems, Guyson International Ltd. 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 plant

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

- See pipe schematic drawing fitted inside door
- Make sure power supply is disconnected

Manual valves are provided for filling and draining, and the valve handles are accessible when the equipment front door is opened.

NOTE: On no account must the liquid be allowed to fall below the minimum level mark.

Filling Stage 1:

Refer to the pipe schematic and open the Stage 1 water inlet valve. Add the correct concentration of cleaning solution (by carefully pouring direct from the container) and continue to fill with water until the liquid is a fair distance above the minimum level mark but not sufficient as to cause an overflow (especially when workload is immersed).

Filling Stage 2:

Refer to the pipe schematic and open the Stage 2 fill valve. Fill with town water until the water begins to flow over the weir. Turn off the water supply or regulate valve to achieve a suitable weiring rate as required.

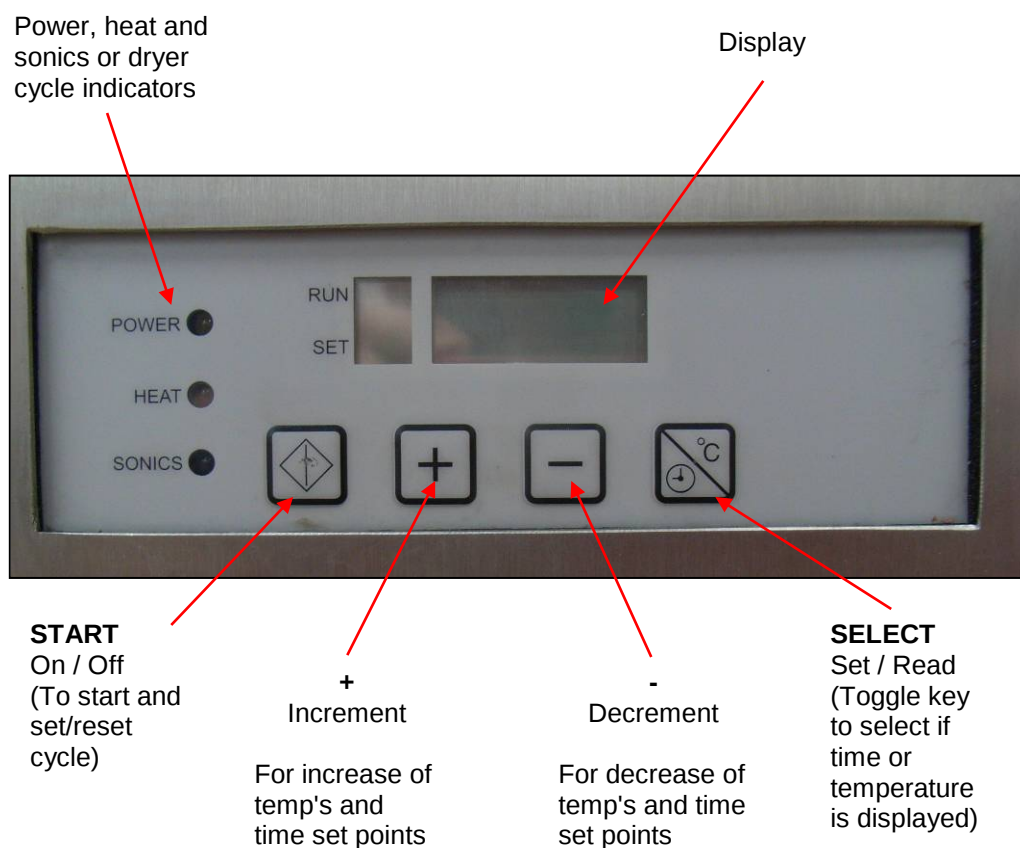
The tanks are now filled to correct levels and the start procedure can commence.

4.2 Control system

The control system on the units allows adjustment of the times and temperatures via the membrane control panel. There is a separate panel for the ultrasonic cleaning stage, and for the dryer, but not the intermediate rinse stage. The Cycle LED on the dryer panel is only an indication that the timed dryer cycle is in operation.

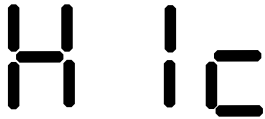
4.2.1 Layout of the membrane panel display

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

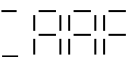
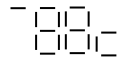
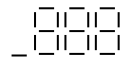
The LED's on the control panel illuminate in different formats to show the status of the unit as follows:

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	Cycle 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:

NOTE: Screen 1 is missed out if the cycle is turned off.

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

As can be seen 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) i.e. 

or

a set time/temperature (lower left segment) i.e. 

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

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

If the cycle is 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 cycle.

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 cycles and heaters will not be operational. The PWR LEDs will illuminate. In order to enable the heaters, a single press of the <START> key on each display panel 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 [4.10](#)) 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. For instance, 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).

The dryer temperature can be set in the same way, up to a maximum of 99°C.

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 on the sonics control panel 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 CRD 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.

After final rinsing, the lid to the hot air dryer tank is opened and the basket is transferred to the hot air drying stage. Note that the dryer will only operate when the lid is fully closed. The maximum dryer temperature is 99°C.

The dryer cycle is initiated by pressing the <START> key on the dryer control panel, after the lid is closed.



When the dryer count down timer on the display reaches 0, the dryer cycle is complete, and the basket can be withdrawn. CAUTION the basket will be hot!



4.5 Setting the sonics 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).

NOTE: Screen 1 is missed out if the sonics are turned off.

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 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.

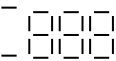
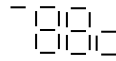
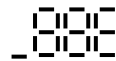
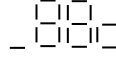
The set temperature variable is stored in non-volatile memory so that, on the application of power, the last used setting will return.



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).

NOTE: Screen 1 is missed out if the sonics are turned off.

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.

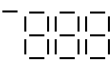
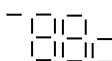
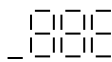
4.7 Setting the dryer heating temperature

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

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

The dryer temperature may be set while the cycle is off by using Screen 4 of the LCD display (see below table).

NOTE: Screen 1 is missed out if the cycle is off.

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



4.8 Setting the dryer time

The dryer cycle time may be set while the dryer cycle is not running, by using Screen 3 of the LCD display (see below table).

NOTE: Screen 1 is missed out if the dryer cycle is not running.

Screen Reference	Example of digits	What is shown?
Screen 1 (press SELECT for next screen)		Dryer cycle time countdown
Screen 2 (press SELECT for next screen)		Actual dryer temperature
Screen 3 (press SELECT for next screen)		Dryer cycle time that has been set
Screen 4 (press SELECT to go to back to the initial screen)		Dryer 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 dryer cycle will then run continuously under control of the <START> key.

4.9 Shutdown

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

Switch the isolator to the off position.

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.)

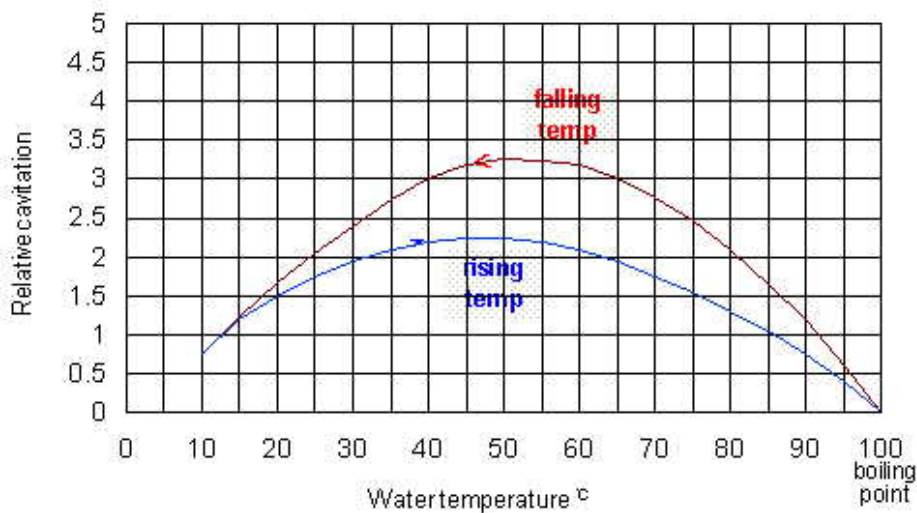
The dryer lid should also remain closed.

4.10 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

5. Description

5.1 General

The plant frame is constructed from mild steel box section painted with 'eggshell fine spatter' or 'stove enamel' paint finish, and is clad with removable screwed on panels to ends and rear and a hinged lockable door at front. The sound insulated panels are fabricated from painted mild steel. The 300W ultrasonic generators are mounted within the frame.

The drain board top surround is fabricated from AISI 304 stainless steel sheet, with a bead blast finish.

The plant electrical isolator is front mounted and the electrical enclosure is located behind the control fascia door.

The cleaning and rinsing system comprises two aqueous tanks with associated ultrasonic generator and integral control panel.

The effective tank sizes and overall depths for the CRD 450 process tank (stage 1) are as follows:

Width	Front to Rear Depth	Min. effective Tank Depth	Max. effective Tank Depth	Min. capacity	Max. capacity
325 mm	450 mm	250 mm	300 mm	36.56 litres	43.88 litres

Basket hangers are provided for each immersion stage to allow the workload to be positioned at the optimum working height.

Polypropylene lids are provided to cover these stages.

The drying system comprises a single compartment hot air drying tank. Dryer operation is controlled from the dryer control panel. A stainless steel hinged lid provides access to the drying tank.

5.2 Process tank features

Stages 1 & 2 are fabricated in 2mm AISI 316 stainless steel with a bead blasted finish.

Stage 1 is an ultrasonic tank with a hard chromed base. The ultrasonic transducers are directly bonded to the tank and configured with the relevant generators as follows:

	Transducers	Generators
CRD 450	2 x 6 (=12)	2 x Pulsatron 300W

Stage 2 is a rinse tank which has a weir plate to allow a constant weir to drain action.

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 on the front wall of each tank above liquid level for filling with water.

The ultrasonic tank has minimum and maximum fill level indication marks on the inside wall. The tank is a bead blasted AISI 316 stainless steel heated, ultrasonic spray under immersion cleaning tank, which contains the specified cleaning solution.

Heating is provided by four electronically controlled self adhesive mat style heaters, of 480W each. The tank operating temperature may be observed on the control panel temperature display.

A hand-held spray wand is located in the top surround at the rear and to the right of the rinse tank. This is plumbed to the rear with a separate pipe for optional connection to a de-ionised water supply.

The pipework and valves are made from stainless steel.

5.3 Hot air dryer

The hot air dryer is a single chamber AISI 316 bead blasted stainless steel tank fitted with a manual hinged lid.

Air is taken from a hole in the centre base of the tank and is circulated back through two slots in the rear tank wall via a coarse filter and electrical heating element.

A fan is used with a direct coupled motor. The fan is suspended with the shaft vertical immediately below the tank outlet. A fine gauge mesh prevents small parts from entering the fan.

A moist air bleed tube is incorporated in the circulation system prevent excess build up of moisture laden air.

The temperature is controlled and displayed by the dryer control panel.

6. Electrical circuit and control systems

The system is designed to work at 380/415V 3 phase + neutral and earth. A suitably rated 16A per phase supply is required for this equipment.

The controls for the system are as follows:

Ultrasonics control panel*

Dryer control panel*

*See sections [4.5](#) to [4.8](#) for more information on setting the control panels.

Mains isolator mounted to electrical enclosure.

When working on the system reference should be made to the electrical circuit schematics supplied with the system.

See electrical drawings in the appendix.

6.1 Three phase fan motor

The hot air dryer fan on this system is fitted with a three phase motor. Therefore, rotation direction must be confirmed when connecting the main power. Direction of rotation should be CLOCKWISE when viewed from above. Damage will be caused if rotation is not correct.

This will not be covered by warranty.

6.2 Transducers

The generators produce alternating power at a frequency of 38 kHz (+/- 10%) 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 half 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.



7. Cleaning solutions

This equipment is specifically designed for use with aqueous based cleaning solutions, i.e. Platinax, Safewash S or similar.

Fluorocarbon and chlorinated solvents must not be used.
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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. 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 Ltd.

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

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.

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 (see section [2](#)).

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 liquid levels on Stages 1 and 2. Top up Stages 1 and 2 and add cleaning solution to Stage 1 as required. The liquid level must be maintained above the minimum level mark.
- Check condition of the cleaning fluid. As a general rule, 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.

8.2.2 Monthly

- Check the security of the earth connection. Visually examine electrical connections and supply leads particularly for fraying, looseness or signs of damage.

8.2.4 Six monthly

- Check the condition of the dry glass pad air filters mounted in the air dryer inlet duct. Replace as necessary. Ensure the filter pad is mounted green side down.
- Disconnect the mains supply and remove the generator covers. 'Blow out' any accumulated dust, particularly from the heatsinks, by using compressed air, taking care not to damage any electrical components.

NB The airline must be free from all moisture.

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

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 the plant.

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, disconnect the power supply and allow solution to cool.
2. Drain each tank, one at a time, by setting the valves as shown in pipe schematic diagram for draining each particular stage

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 tanks with water and empty the washings.
4. Clean out the tanks, 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 tanks for signs of severe corrosion. Heavy contamination, if left unchecked, can cause pitting in the metal and this can lead to leaks in the tanks.
6. 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
Evidence of corrosion in tanks	Plumbing leaks	Check integrity of pipe joints and valves
Localised pitting corrosion	Thermostat failure	Check that the heating is cutting out
Unsatisfactory cleaning	Heavy build up of solid contamination including deposits	Drain and clean tank
	Solution very contaminated	Change cleaning liquid
	Masking by too many components	Reduce number of components in the basket
Ultrasonic generators not working	Generator fuse blown	Replace fuse
	Power failure	Check mains supply and all associated fuses/circuit breakers

9. Spare parts

Item	Item code
3 phase overload, 1.6 - 2.5A	P3EI0202
3 phase overload aux contact	P3EI0203
Power supply	P3TF0041
Contacteur 20A	P3EI0198
Control Panel	E1AA6752
Thermistor mounting pad	E1AA6753
Fan - VBW6 3 phase	P3MS0077
Generator - Pulsatron 300 Watt	P3GN0001
Heater, mat, 480W	P4HT0019
Heater element 4.5kW	P3HT0026
Isolator	P3MI0208
Relay	P3EI0230
MCB - 2A, D characteristic	P3MI0216
MCB - 10A, D characteristic	P3MI0210
MCB - 16A, D characteristic	P3MI0224
MCB - 16A, B characteristic	P3MI0211
Switch - limit	P3MI0207
Thermostat - N/C - 125°C	P3HT0027
Door handle	P2HD0086