795-92650
GM 9-11

Instruction Manual

SonicMax Ultrasonic Cleaning Systems

GRAYMILLS
PARTS WASHERS

Graymills

Safety

Disclaimer

Care has been taken to ensure the accuracy of the information. No liability can be accepted for any errors or omissions found in this manual. The publisher of this manual reserves the right to revise this publication and make changes from time to time in its content without notice.

Explanation of Safety Symbols

⚠DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
CAUTION	CAUTION, without the safety alert symbol, is used to address practices not related to personal injury.
NOTE	Note messages provide additional information or helpful tips.

Operator Training

This equipment should only be operated by personnel trained for its use. This training should include electrical safety, machine operation, familiarity with the cleaning solutions, and emergency procedures.

Important Safety Notifications

⚠DANGER	***DO NOT USE*** cleaning liquids classified as ***FLAMMABLE*** or ***COMBUSTIBLE*** in this cleaning unit. It is not equipped with the safeguards necessary for cleaning with combustible chemicals.
⚠DANGER	Be sure the work area is well-ventilated. DO NOT INHALE VAPORS. Do not allow vapors to exceed maximum allowable MSDS concentrations.
⚠WARNING	High voltages exist when the unit is plugged in. Always disconnect power before servicing machine. When operating the system, observe all operating precautions in this manual and applicable electrical codes.
⚠WARNING	For every cleaning fluid used, a Material Safety Data Sheet (MSDS) should be maintained nearby. Before using, read all manufacturer and MSDS instructions and refer to them whenever there is a use question.
⚠WARNING	Before working, tightly secure loose hair, jewelry, clothing, and personal effects that could be drawn into moving machinery. Failure to do this may result in serious personal injury. Avoid pinch injuries to fingers when working near moving parts.
⚠WARNING	Never place your hands, arms, or any body part in the cleaning or rinse liquids when ultrasonic cleaning is in operation. Always use racks, baskets, or tongs for inserting and removing objects from the cleaning tank.
NOTE	Consult Graymills before selecting or changing detergents to confirm compatibility. **Never use a flammable or combustible liquid in an ultrasonic unit.**

Hazards Overview

Several hazards may be present when operating or servicing the system and extreme caution must be exercised at all times.

The hazards that may be encountered include:

- Burn and Scald hazards
- Electrical hazards
- Mechanical and Lifting hazards

NOTE Use of controls, replacement parts, adjustments or procedures other than those specified within this manual may result in increased exposure to any of these hazards.

Burn and Scald Hazards

	**Hot Surface Hazard** This system can operate at high liquid temperatures. Washed parts will be HOT. Use appropriate protective equipment. When performing maintenance operations, use appropriate protective equipment. For safety reasons it is best to wait until all components and fluids have cooled sufficiently.	
	**Hot Liquid Splash Hazard** Unit can operate at high temperatures. There is potential of splashing when immersing and removing basket and parts. Appropriate safety equipment is recommended.	

Electrical Hazards

	**High Voltage Hazards:** Generator is producing high output voltage through the **HV-BNC** connectors at the back of the generator. The **maximum values at output are: V_{peak} up to 1250V and V_{rms} up to 530V**. Disconnect and lockout/tagout system prior to servicing.
	Power to this system is provided by **115VAC / Single phase/ 60 Hz on model CTU2012-A** **230VAC / Single phase/ 60 Hz on all models except those noted.** **230VAC/ Three phase/ 60 Hz on model CTU4723-J** Disconnect power and initiate lockout/tagout prior to servicing.

Electrical Safety Precautions

- Read the operating instructions of the system before commencing any service.
- Only trained personnel should remove electrical access covers.
- Follow requirements of local electrical safety codes.Never wear rings, bracelets or other jewelry when working around electrical circuits.
- Never work on electrical equipment alone. Always have a colleague nearby.
- Always verify that electrical connections and components are correct before installing.
- Never operate the system if any power cable is frayed or damaged.
- Never operate the system with safety and/or electrical access covers removed.

Ultrasonic Generators

⚠WARNING	Generators are installed to the cleaning system and should not be removed from its casing except for service purposes. Only trained personnel should remove the generator from the casing.

Mechanical and Lifting Hazards

- Secure loose hair that could become entangled. Do not wear loose fitting clothing, neckties or jewelry that could become entangled in moving machinery.
- Identify the working envelope of the system with floor marking, signs and barriers.
- Provide sufficient room to permit safe teaching and maintenance procedures.
- Always adhere to local or company safety regulations.
- Use appropriate safe lifting procedures when handling heavy parts/loads.
- On models with lids having two handles, lift tank lids with both hands.

System Overview

The cleaning system is equipped with single and/or dual point connections for electricity. Configurations for connections to the system are cabled plugs located at the rear-side of the console for interconnection to facility. Required facilities connections will include power, water and drain.

The tank is fabricated from 316L stainless steel and direct bonded ultrasonic transducers to tank bottoms. All tanks are fitted with strip heaters located on side and/or rear walls.

The system features generators that are uniquely designed to provide the operator with consistent performance and process control. The result is that the same parameters used to perform a cleaning process can be repeated.

Each generator features constant high output power control to ensure consistent output despite fluctuations in line voltage, solution depth, solution temperature or tank loading.

Sweep frequency is included to help eliminate inconsistent cleaning due to standing waves or areas of overly intense ultrasonic activity (hot spots).

Each generator features independent amplitude power intensity control to allow the operator to vary the intensity of the ultrasonic power from approximately 15% to 100%.

Plumbing components and generators are easily accessible from all sides of frame. Electrical components are located in a removable front mounted control panel for ease of service.

The console is provided with an operator control panel at the front of each unit with thermostat and ultrasonic timer controls as well as a side-mounted recirculation pump ON/OFF switch box.

Systems are plumbed with a pull-through filter unit fitted with a 50micron element. Filter elements are washable and re-useable multiple times before needing replacement.

SonicMax Series Systems Specifications

Model/Size	*2012*	*2814*	*2825*	*3516*	*3523*	*4718*	*4723*
Depth	6″	10″	13″	13″	15″	17″	18″
Ultrasonic Power (Avg)	750W	1500W	3000W	2000W	3500W	4000W	5000W
Fluid Capacity	7 gal	18 gal	42 gal	33 gal	54 gal	65 gal	87 gal
Heater Wattage	1500	3000	6000	4000	6000	6000	10000*
Basket Dimensions	17″x10″x5″	25″x11″x7″	25″x23″x12″	32″x14″x11″	32″x21″x13″	44″x16″x15″	44″x21″x16″
System Dimensions	38″x28″x37″	46″x33″x40″	46″x37″x40″	52″x37″x42″	52″x37″x42″	64″x37″x45″	64″x37″x45″
Operating Voltage	115/60/1	230/60/1	230/60/1	230/60/1	230/60/1	230/60/1	230/60/3

*Reduced during Sonic timed operation

Installation

Site Preparation and Uncrating

Locate the system in an appropriate place that allows adequate flow of air and ventilation. Verify that the type of electrical power required by your model is available nearby (See "Specifications" above). It is recommended that water supply and drain be present.

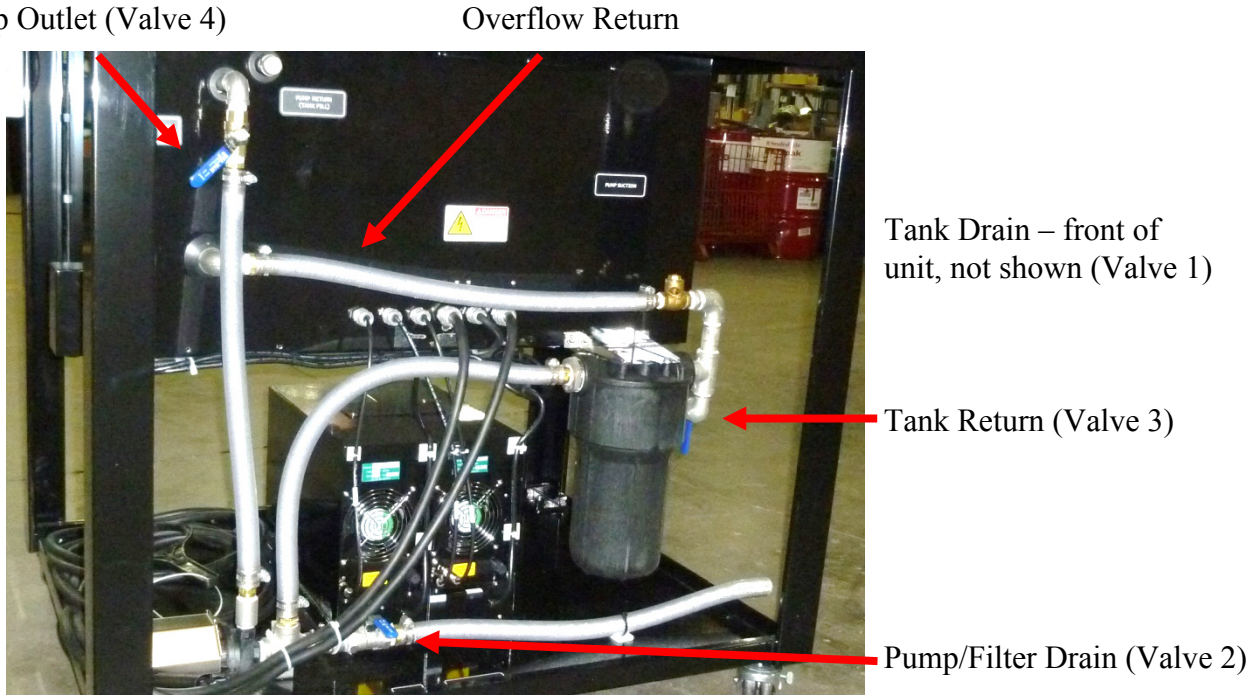
It is recommended that the unit is placed on a flat, level surface with at least **42** inches of maintenance work space reserved in each direction from the system for service accessibility as well as personnel safety.

⚠WARNING	Be sure to follow local grounding procedures as required for this type of system. Do not operate this system without proper ground connections.
⚠WARNING	The detergent waste should be handled and disposed of according to local codes and manufacturer/MSDS instructions.

Equipment should be carefully uncrated and inspected for damage. Follow your facility's standard procedures for making notification if any shipping damage is found.

Operation

⚠WARNING	Operating the system with any portion of the safety systems or procedures bypassed can result in severe system damage and human injury.
CAUTION	Never operate the unit with a low liquid level. Always ensure that liquid level is at **"FILL LINE"** prior to use.



Piping Diagram

Initial Set-Up and Operating Procedure

1) Verify that both the front control panel mounted thermostat knob and side mounted pump switch are in the off position.
2) Verify all plumbing valves are set in the following positions: Valves 1 and 2 are fully closed and valve numbers 3 and 4 are adjusted halfway open. Never start the pump with valves 3 and 4 closed. See **"Piping Diagram"** above.
3) Remove the lid(s) and basket(s) from unit.
4) Inspect fluid level in tank. If tank is empty, perform Steps 4a through 4c to fill tank with cleaning solution. If fluid level in tank is below **"FILL LINE"** and/or overflow weir is less than 1/3 full, perform Step 4d to top off fluid level. If fluid is at **"FILL LINE"** and overflow weir is 1/3 to 1/2 full, proceed to Step 5.
    a. Begin to fill main tank with water (preferably heated to standard hot water heater 110-120°F) until liquid is just below **"FILL LINE"** mark etched on inside rear wall of tank.
    b. Carefully – and with protection from splashing and in accordance to MSDS – begin to add concentrated detergent to main tank as directed in detergent instructions. Liquid may begin to spill over into the overflow weir.
    c. Check liquid level in overflow weir. Liquid level should be roughly 1/3 to 1/2 full without basket and parts in main tank. For optimal performance, the level in the weir after basket and parts have been submerged should be at least 2 inches lower than the fluid level in main tank, which should be at the **"FILL LINE."** If necessary add water to overflow weir.

        If using pre-mixed cleaning solution, perform Steps 4a through 4c without concern for mixing fluids: fill main tank to **"FILL LINE"** and overflow weir to approximately 1/3 to 1/2 full. Take care to minimize splashing and follow all instructions on solution label and MSDS.
    d. If fluid levels are low, add sufficient pre-mixed cleaning solution of the same kind already present in unit to return fluid level to **"FILL LINE"** and bring overflow weir to approximately 1/3 to 1/2 full. Take care to minimize splashing and follow all instructions on detergent/solution label and MSDS.
5) Turn thermostat control knob to desired process temperature. The green pilot light next to the thermostat will illuminate, indicating that the heater is running.
6) Turn pump switch to "On" position.

7) Replace lid(s) and turn sonic timer switch located on front panel to 15 minutes. This will allow the ultrasonics to degas any new liquid as well as aid in heating prior to your system's first cleaning (see "**Degassing**" for more information). The heat-up time will vary depending on the initial temperature of your solution, but is generally between 60-90 minutes.
8) Once the green pilot light has turned off, the system has reached the desired temperature set point and is ready to process parts.

⚠CAUTION	Cleaning solution, counter, and lid surface area and become **HOT!** Eye and Skin protection should be used.

9) While wearing appropriate protection, remove tank lid(s). Place parts in basket(s) provided and lower basket(s) into tank until handles rest on counter lip area (**never clean parts in bottom of tank without basket**). Replace lid(s) over basket(s) and turn sonic timer to desired process time. Process times will vary depending on the part(s) and their condition.
10) When timer has stopped, remove lid(s) and remove basket(s) slowly. Rest basket(s) above tank to allow cleaning solution to drip back into tank. Remove basket(s) and part(s) from rest and cover tank. Rinse part(s) as recommended.
11) If no additional parts are to be cleaned, turn off unit as described in **"Shut Down System."**

Degassing

Any liquid will retain dissolved gases. For an ultrasonic cleaner to work properly, the dissolved gases must be driven out of solution. The cleaning power of an ultrasonic comes from the collapse of the vacuum cavity or bubble. If there is any dissolved gas in the cleaning fluid it will migrate to the area of lowest pressure (the vacuum cavity), preventing the collapse of the cavity and reducing the cleaning power.

Perform the following any time new cleaning solutions is added to the unit prior to part cleaning:

Step	Description
1	Adjust the **Ultrasonic Timer** to 15 min.
2	The recirculation pump should be OFF during degassing.
3	The Ultrasonics will turn OFF automatically when the timer has elapsed.

Shut Down System

⚠WARNING	Tank walls remain **HOT** for a period of time after the unit is turned off. Exercise appropriate caution when performing cleaning and maintenance operation. Wear appropriate protective clothing, or wait until the tank walls have cooled.

Step	Description
1	When the machine is not in use, power down the system properly.
2	Check that **Heater Thermostat**, **Ultrasonic Timer** and **Pump Switch** are in the **OFF** positions.
3	Clean the tank and drain the system completely as needed to maintain a clean tank bottom. See "Preventative Maintenance" for more details.

Preventative Maintenance

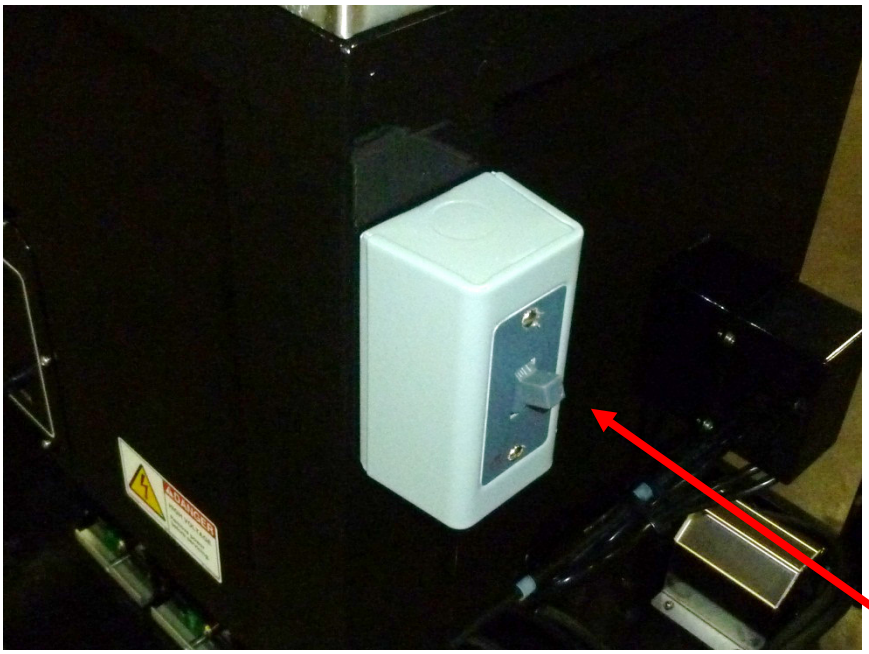
System Views and Components

Heater ON pilot light

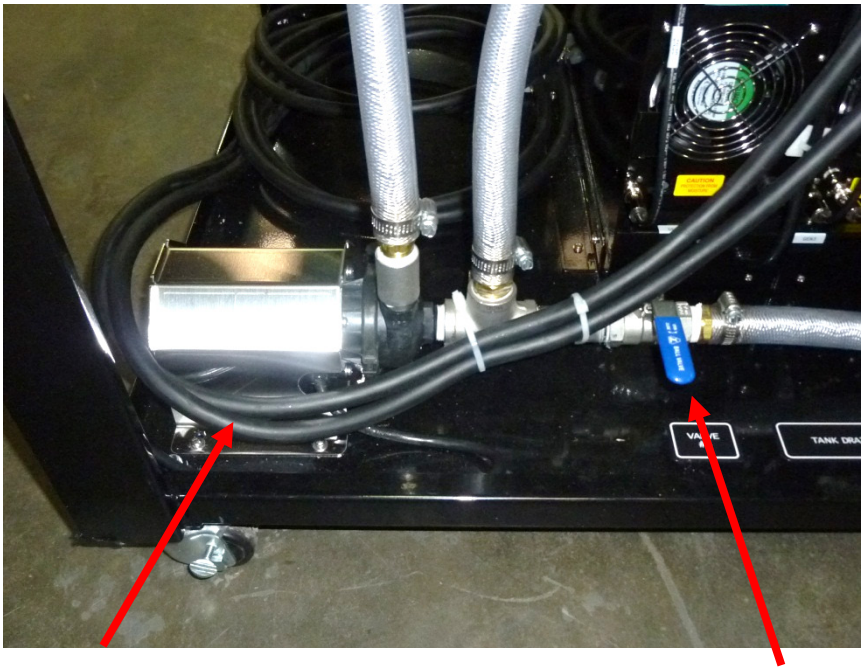
Heater Circuit Fuse

Ultrasonic Timer

Thermostat

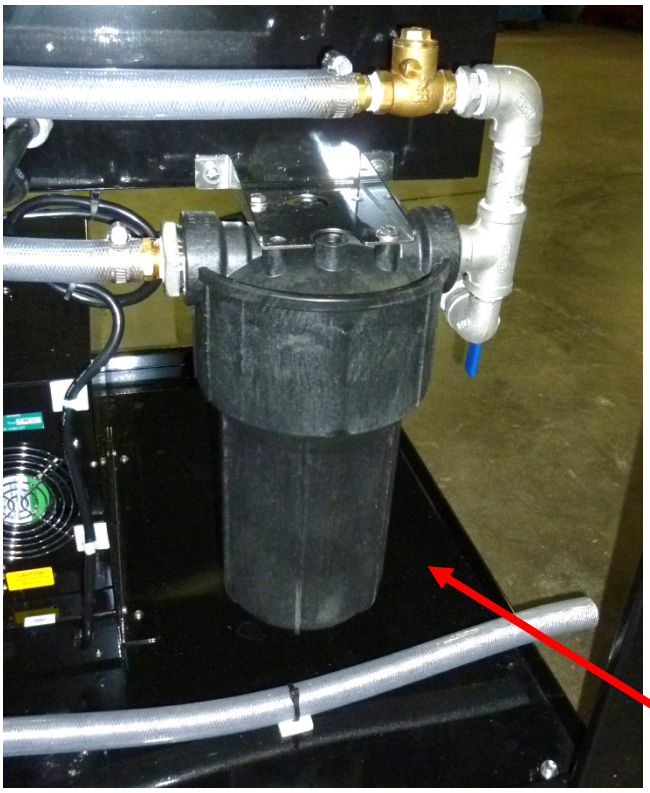


Pump Switch Housing



Pump Housing

Drain Valve for Pump and Filter



Filter Housing Assembly

Preventative Maintenance Schedule

Item	PM Activity/Schedule	
Tanks	Drain, clean, and refill water for all wet tanks (wash, rinse, reservoir, etc.).	At Least Weekly
Plumbing	Check plumbing for leaking.	Daily
Electrical	Check Cabling and plugs for fraying or loose connections only with power disconnected.	Quarterly
Plumbing	Changing filter.	As Needed
Plumbing	Close inspection to verify there is no leakage.	Monthly

⚠WARNING	Components and fluids will remain hot for a period of time after unit is turned off. Allow time to cool down before performing service.
NOTE	Do not use abrasive cleanser, which may damage the tank surface. Always exercise care not to scratch, dent, or gouge tanks surfaces.
NOTE	Filter change-out requirements are strongly dependent upon process specifications and may vary significantly from one process to another. Maintaining a record detailing the cleaning processes and system maintenance performed can aid in predicting the frequency of filter change-out.

Drain, Clean, and Refill

Step	Description
1	Ensure that pump, ultrasonics, and heater are off. Allow hot solution and surfaces to cool. Unplug unit from outlet(s).
2	Place a container under drain valve near pump and under tank drain at front of unit. Ensure that valves 3 and 4 are not fully closed. Drain main tank and overflow weir (open valve 1). Open Pump drain (valve 2) and drain. Take care to minimize splashing and follow cleaner label and MSDS instructions.
3	Clean tank bottoms whenever tanks are drained. Remove any foreign objects. This is necessary to minimize the possibility of small objects becoming lodged in a drain line, resulting in a service issue.
4	Inspect tank walls for accumulation of deposits or other contaminants. If tank walls require cleaning, clean-room wipes or the equivalent are recommended.
5	Close valves 1 and 2 and refill unit with new solution according to instructions in Operating Procedure.

Servicing Filter Cartridge

Step	Description
1	Ensure that pump, ultrasonics, and heater are off. Unplug unit from outlet(s) or disconnect main power, as applicable. Allow hot solution and surfaces to cool.
2	Place a container under the filter drain valve near pump and under tank drain at front of unit. Ensure that valves 3 and 4 are not fully closed. Drain main tank and overflow weir (open valve 1). Open Pump drain (valve 2) and drain. Take care to minimize splashing and follow cleaning solution label and MSDS instructions.
3	Place a container under the filter housing. While wearing appropriate safety equipment and taking care to avoid splashing, unscrew filter housing with supplied wrench.
4	Remove filter cartridge. Filter is washable and can be used multiple times. If the filter is unfit to be returned to service, dispose of properly.

Step	Description
5	Remove debris and sludge from inside the inlet portion of housing to avoid interference with cover seal or flow of fluid being filtered.
6	Install clean filter. Be sure filter is properly seated inside the housing.
7	Inspect cover gasket for cuts or other signs of failure, replacing if necessary, and make sure it is properly seated.
8	Re-install housing on filter head. Avoid over-tightening or damage to head and housing may result. Close drain valves and refill system as noted in start-up procedures.

Parts List

Models	Description
All	Filter Element 50 micron*
All	Pump Switch Assembly
All	Pump Switch Overload
All	Thermostat 0-250F
All	0-30 Minute Timer
All	Pilot Light
2012,2814,3516	Front Panel Fuse ABC20
2825,3523,4718,4723	Front Panel Fuse ABC5
All	Pump
All	Hose (by the foot)
All	Hose clamp
2825,3523,4723	Sonic Contactor C12
4718	Sonic Contactor C16
4723	Sonic Fuse KTK 15
4723	Heater Contactor C16
2825,3523,4718,4723	Heater Contactor C23
2825,3523,4718	Heater Fuse KTK 30
4723	Heater Fuse KTK 15
4723	Heater Fuse KTK 20
4723	Relay 2-pole
4723	Relay Base

* Other micron sizes available: 20, 100

Warranty Information

Graymills Corporation warrants that the equipment manufactured and delivered hereunder when properly installed and maintained, shall be free from defects in workmanship.

This warranty does not apply to damages or defects caused by operator carelessness, misuse, abuse, improper application, or abnormal use; the use of add-on parts or equipment which damages or impairs the proper function of the unit and modifications made by Buyer.

Graymills' obligation under this Warranty shall be limited to:

1. Replacing or repairing tank and structural parts within one year from the date of installation or 13 months from the date of shipment whichever occurs first. The decision to replace rather than repair shall be made by **Graymills Corporation**;
2. Replacing or repairing components supplied but not manufactured by **Graymills**, such as pneumatic cylinders, controls, pneumatic systems, motors, heater controls and heaters to the extent such components are warranted by the original manufacturer's warranty, provided that Buyer gives **Graymills** prompt notice of any defect or failure and satisfactory proof thereof.

Before **Graymills** can repair or replace a defective part under warranty, call **Graymills** for a Return Merchandise Authorization number (RMA number must appear on outside of package or it will be refused and returned). Upon prepaid return to **Graymills**' factory, **Graymills**' examination must disclose such part to be defective.

This warranty does **not** apply to expendable parts such as rollers, bearings, cylinder packings and any other parts which need replacement periodically due to normal wear nor to rusting of a mild steel heated unit used with aqueous (water) based cleaning solutions. A new warranty period shall not be established for repaired or replaced materials, or products. Such items shall remain under warranty for only the remainder of the warranty period of the original materials or products. **Graymills** warrants that the equipment will function mechanically as quoted in the published specification. **Graymills** does not warrant process performance nor does **Graymills** assume liability for equipment selection, adaption or installation.

The foregoing warranties are in lieu of all other warranties whether oral, written, expressed, implied or statutory. Implied warranties of fitness for a particular purpose and merchantability shall not apply. **Graymills**' warranty obligations and Buyer's remedies thereunder (except as to title) are solely and exclusively as stated herein. In no case will Graymills be liable for consequential damages, loss of production or any other loss incurred because of interruption of service