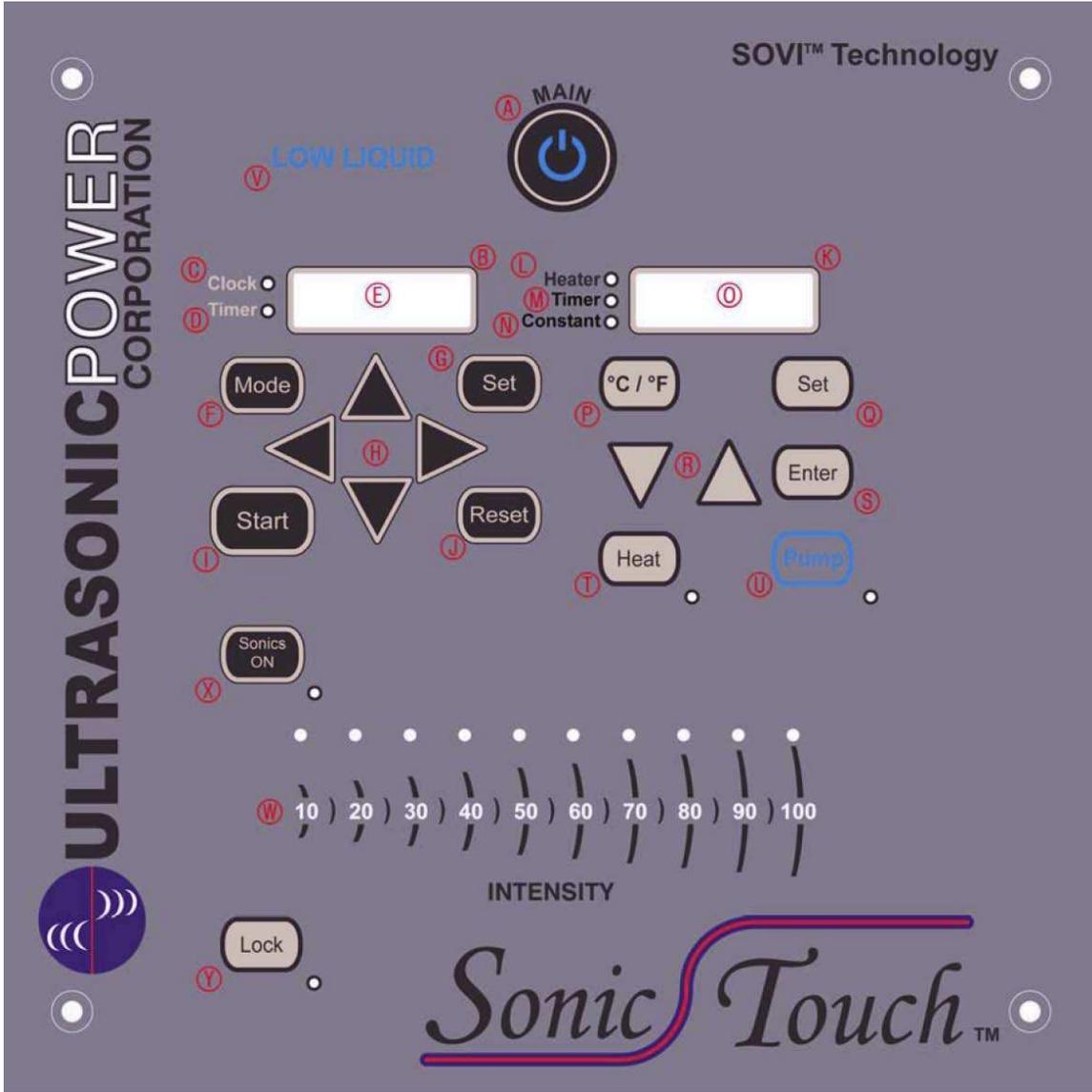
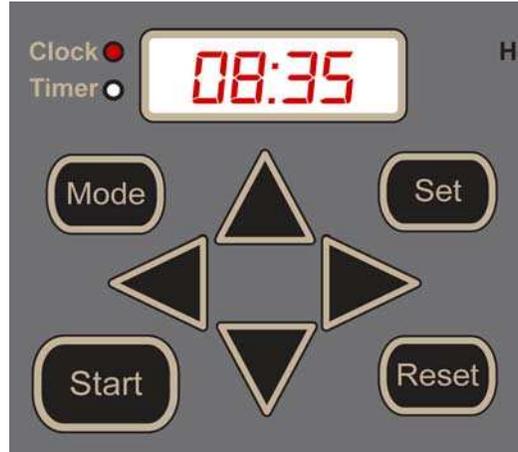


Explanation of Controls

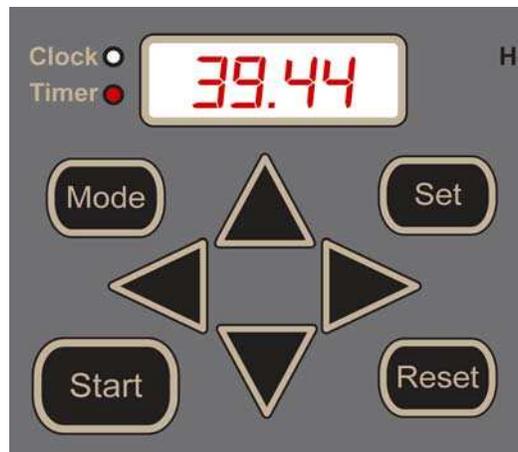


	Control / Indicator	Function
A	Main Button	Press button to energize and de-energize the system. The button will illuminate when cleaner is ON.
B	Clock / Countdown Timer	Clock can be set to automatically turn on and off the heater element at a particular time once a day. The Countdown Timer is used to run the ultrasonic cleaner for a desired period of time.
C	Clock Indicator	LED indicates display is in clock mode.
D	Timer Indicator	LED indicates display is in timer mode.
E	Clock / Timer Digital Display	Indicates current time (24 hour clock) or time left on countdown timer.
F	Mode Button	Press to change display between clock and timer mode
G	Set Button	Press to set current time, schedule heater ON and OFF times, set countdown timer (Max 9 hours, 59 minutes, 59 seconds).
H	Arrow Buttons	Up and Down buttons increase and decrease digit being set, while Left and Right buttons move to other digit to be set.
I	Start Button	Press to start Countdown timer, press to accept clock and timer setting.
J	Reset Button	Press to reset Countdown timer.
K	Thermostat	Thermostat controls desired temperature of the tank.
L	Heater Indicator	Indicates heater element is ON.
M	Heater Timer Indicator	Indicates heater is in Timer Control Mode
N	Heater Constant Indicator	Indicates heater is in Constant Control Mode
O	Thermostat Digital Display	Indicates current tank temperature in °C / °F.
P	Degree Format Button	Press to change between °C / °F.
Q	Set Button	Press to set desired tank temperature set point.
R	Arrow Buttons	Up and Down buttons increase and decrease temperature setting.
S	Enter Button	Press to accept temperature setting.
T	Heat Button and Indicator	Press to enable Master Heater Control, Once pressed the heat button indicator will illuminate. If this button has been pressed and the indicator is illuminated then the heater element can be controlled by the Clock / Timer and Thermostat
U	Pump Button and Indicator	Press to turn the Pump ON. The indicator will illuminate when pump is on. *If option is installed
V	Low Liquid Indicator	Indicates when the level of liquid in the tank is LOW. If system senses low level it will illuminate this indicator as well as disabling the ULTRASONICS, HEATER and PUMP. *If option is installed
W	Intensity Slider and Indicators	Slide finger or Press Slider to set Intensity Level. Intensity is set in 10% increments from 0 to 100%. LED indicators correspond with intensity level.
X	Sonics ON Button and Indicator	Press to turn the Ultrasonic Generators ON manually.
Y	Lock Button and Indicator	Press to turn on the Key Lock feature. When the Key Lock feature is enabled, the indicator will be lit. The Key Lock feature locks all keys except for the MAIN, START and LOCK buttons

Countdown Timer Functionality



When the machine is turned on using the "MAIN" button, you will see the current time. This time is displayed in 24-hour format. Notice the LED next to the word "Clock" is illuminated. If the user presses the "MODE" button the following occurs:

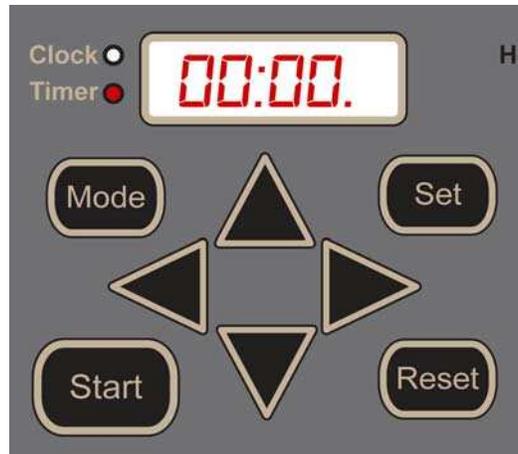


The LED next to the word "Timer" illuminates. The last "TIMER SET" value will be displayed. Currently 39 minutes and 44 seconds are displayed. If the user hits "START" the timer will begin to countdown, and the ultrasonic cleaner will begin to clean. The cleaner will run until the timer expires, or the user presses the "Reset" button. If the user allows the timer to expire, the word "Done" will be displayed for 2 seconds and the timer will be reset to the last "Timer Set" value, and wait for "Start" press.

If the user presses "Reset" the timer will be reset to the last "Timer Set" value, and wait for "Start" press.

Setting the Timer

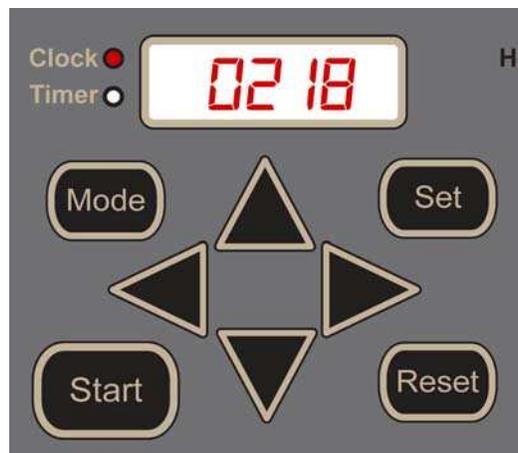
The "Set" button can be pressed at anytime. If the "Set" button is pressed while in TIMER MODE, the following occurs:



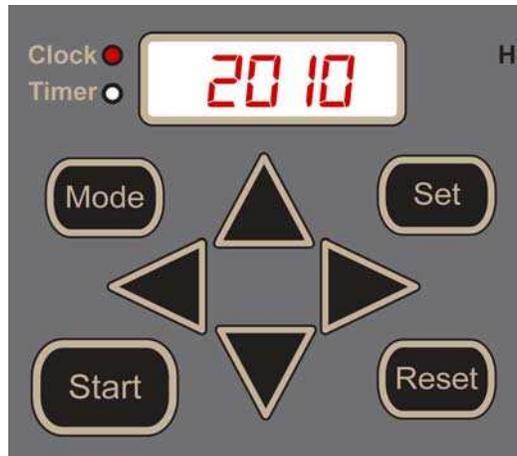
Now the user can simply use the UP, DOWN, LEFT and RIGHT arrow buttons to set the COUNT DOWN TIMER. The time (digit) being displayed will blink indicating it is being set. A maximum of 9 Hours, 59 Minutes and 59 seconds can be entered. Once the desired time is set, the user must press the "Set" button to save the time and return to the Timer Mode.

Setting the Clock

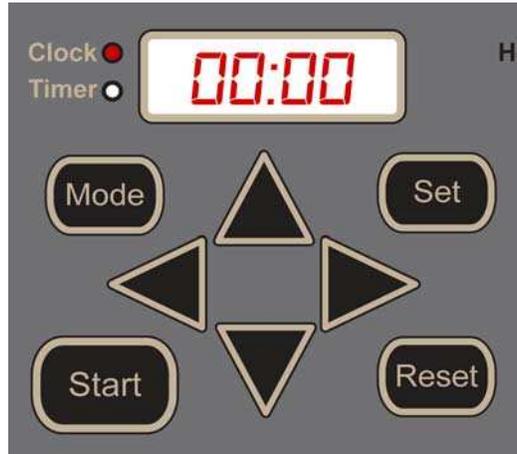
If the "Set" button is pressed while in CLOCK MODE, the following occurs:



The first two digits are for the month. The last two digits are for the current day. The Example above shows February 18th. Once you are finished, press the Set button.



Now you will 4 digits to set the current year. The Example above shows the year 2010. Once finished, press the Set button.



Now the user can simply use the UP, DOWN, LEFT and RIGHT arrow buttons to set the Clock. The time being displayed will blink indicating it is being set. Once the correct current time is entered, the user must press the "Set" button to save the time.

Notes:

1. The system works correctly for all years from 2000 to 2100.
2. The whole current time, month, date and year need to be set for the clock to update correctly. If there is a power loss while setting the time, month, day or year the clock needs to be set again.
3. The following input combinations are considered error by the system and "Err" will be displayed.
 - a. Entering a time greater than 23:59
 - b. Entering 00 in the month or day of the month columns
 - c. Entering a month greater than 12
 - d. Entering a value greater than 29 for the month of February
 - e. Entering a day of month greater than 30 for April, June, September or November

In the above cases the values we were trying to enter will be discarded and all zeros such as 00:00 or 0000 will be displayed.

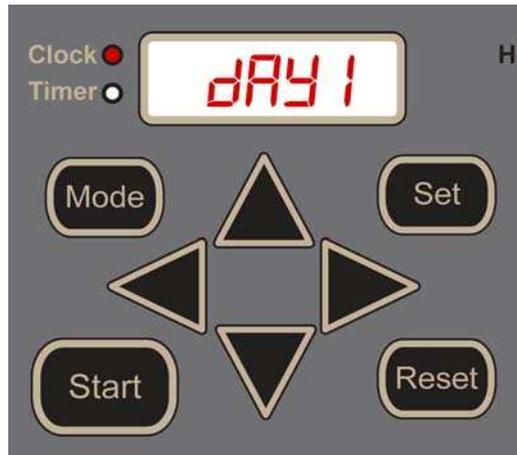
Note: After you save the time by hitting set, the time is saved into memory and the sequence can be terminated by pressing the mode button. The process can be continued to setup the heater timer.

Setting the Heater Timer

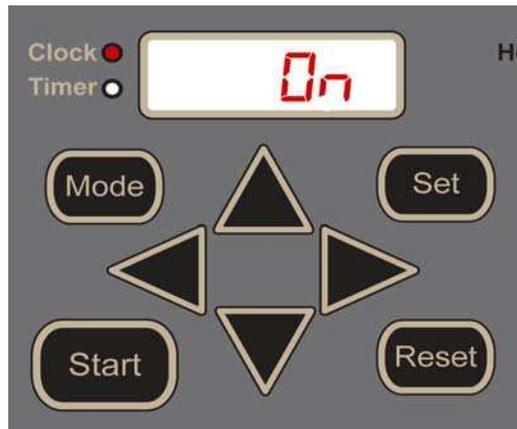
Now you will be able to program the scheduled "ON and OFF" times for the heater. The 7 Day Week has the following code:

Sunday = 1	Monday = 2	Tuesday = 3	Wednesday = 4
Thursday = 5	Friday = 6	Saturday = 7	

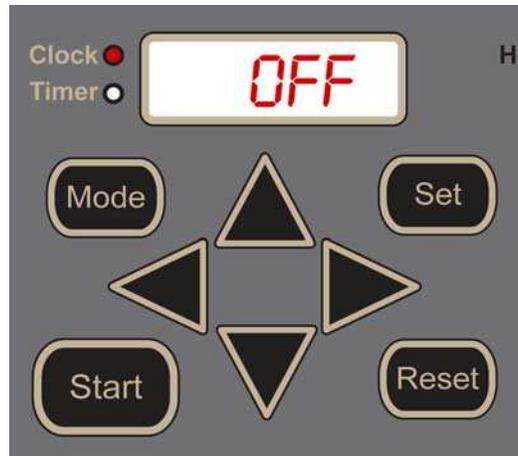
Day 1 (Sunday) will be the first day you set the ON and OFF times. Press "Set" on the day1 screen.



For a brief moment (2-3 seconds) you will see the following displayed:



The "On" text is merely telling you, that you are about to enter the time at which you would like the heater to turn ON. You will enter the time you would like the heater to turn on just like you did when setting the current time. Once that is complete you will press the "Set" button again. From there you will move into the "OFF" time entry. For a brief moment (2-3 seconds) you will see the following displayed:



The "OFF" text is merely telling you, that you are about to enter the time at which you would like the heater to turn OFF. You will enter the time you would like the heater to turn off just like you did when setting the current time. Once that is complete you will press the "Set" button to save your entry and return to the Date Scheduler. The program will increment to the next day. Input ON/OFF times for the remaining days. If you would like to clear the day so that nothing happens, you must set the "ON" time the same as the "OFF" time. Once all 7 days are set the display goes back to displaying the current time.

Notes:

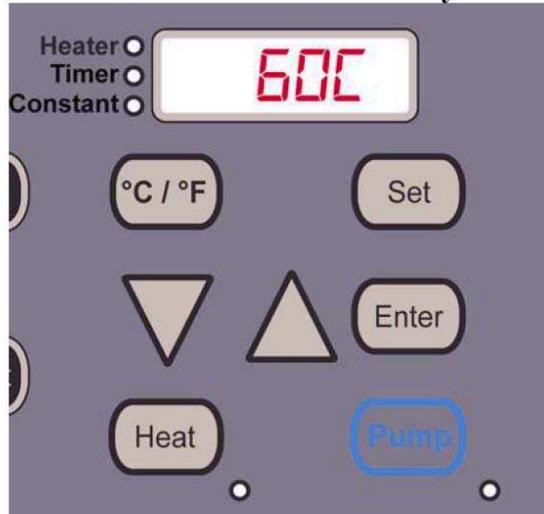
1. The ON, OFF times for all the seven days needs to be set for the system to record the changes between power down and power ups.
2. "Err" message is displayed if the user tries to enter a time greater than 23:59.

Thermostat Functionality

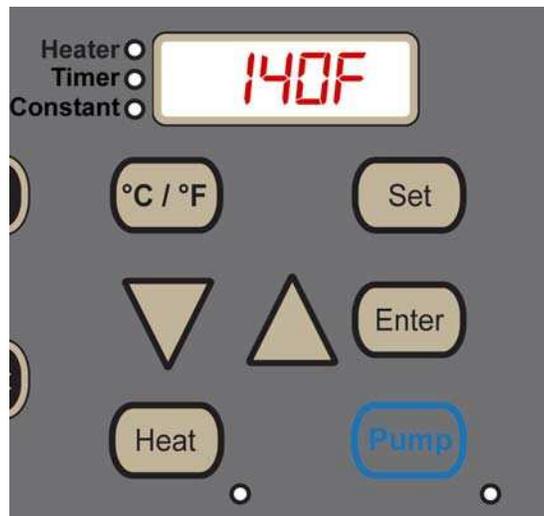


ULTRASONIC POWER
CORPORATION

Thermostat Functionality



When the machine is turned on, you will see the "real time" temperature of the fluid in degree Celsius after a 1 minute delay. At this point if the user presses the "°C / °F" button the following occurs:



The temperature being displayed will be converted from Celsius to Fahrenheit or vice versa.

Setting the Temperature Set Point

The "Set" button can be pressed at anytime. Once it is pressed you can use the arrow keys to set the desired temperature set point.

Note:

1. If pressed held, the up arrow key increments up to 5 times in increments of 1 degrees, the next 5 times in increments of 5 degrees, then in increments of 10 degrees thereafter.
2. Similarly, the down arrow, if pressed and held, decrements up to 5 times in decrements of 1 degrees, the next 5 times in decrements of 5 degrees, then in decrements 10 degrees thereafter.
3. You cannot set a temperature less than 0 degrees Celsius (32 °F) or more than 255 degree Celsius (491°F).

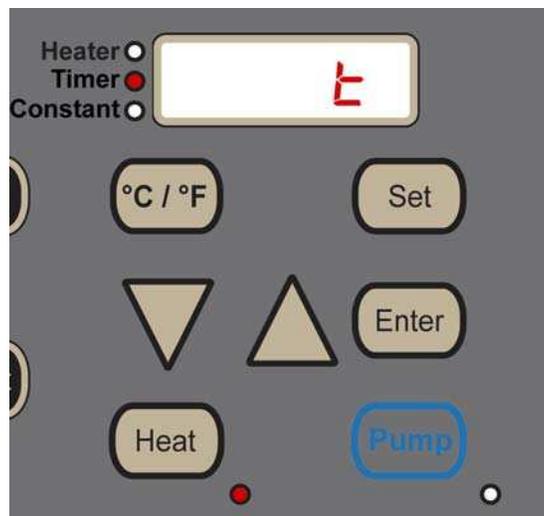
Once the desired temperature is set, you must press the "set" button again to decide if the heater is to be operated in the constant control mode or timer control mode.

Setting the Heater Control Modes

There are two modes in which the heater will operate.

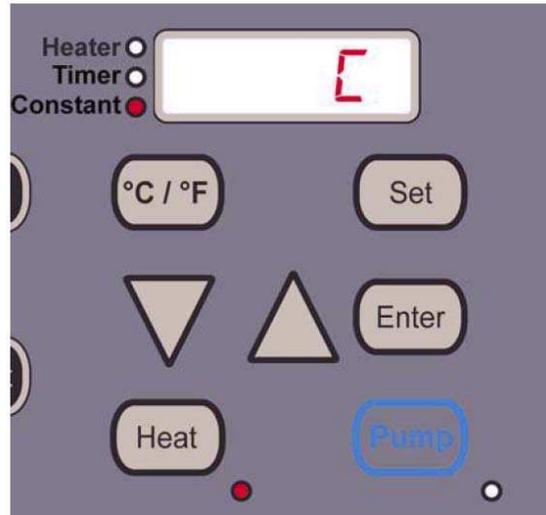
1. Timer Control Mode
2. Constant Control Mode

The timer control mode is enabled when the operator wants the heater to turn on and off on the scheduled time. Please see "**Setting the Clock**" and "**Setting the Heater Timer**" for setup instructions. The timer control mode is used when the operator wants the heater to turn on and off for a particular period of time during the day. To enable this mode, after setting the temperature and pressing the "Set" button, you have to press the up arrow. The display changes as shown below:



If the operator would like to have the heater maintain the temperature set point indefinitely / regardless of the timer, the operator must put the heater into the Constant Control Mode. To enable this mode, after setting the temperature and pressing "Set button" you have to press the "down" arrow.

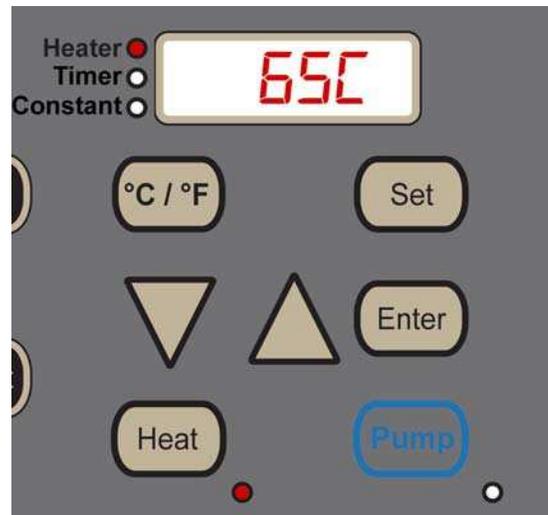
You can also change between Timer Control Mode and Constant Control Mode by pressing the up and down arrows at this stage. A screen shot of the display in constant mode is shown below.



Once, you have set the temperature and the heater control mode, press "ENTER" button to save the heater settings. The display changes and goes back to displaying the current temperature of the fluid.

Note: In the above pictures the LED indicator next to the MASTER HEATER CONTROL BUTTON is on. This is turned on if and only if the MASTER HEATER CONTROL BUTTON has been pressed and is illuminated. If activated the thermostat and clock have control over the heating element.

If the temperature of the fluid is below the "temperature set point" the thermostat will turn on the heater. The Heater indicator LED will illuminate telling the user that the HEATER is ON.



Once the temperature of the fluid reaches the temperature set point the heater will be turned off. The thermostat will keep the temperature of the fluid within ± 2 degrees of temperature set point.

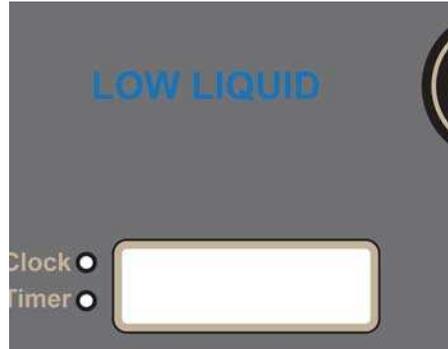
Pump Control



If your machine is equipped with a PUMP, your control panel will have a back lit PUMP button. If you press the "PUMP" button the indicator located towards the bottom right of the button will illuminate and the PUMP will be active.

Note: Do not try to connect or remove the pump while the control panel is powered.

Low Liquid Warning

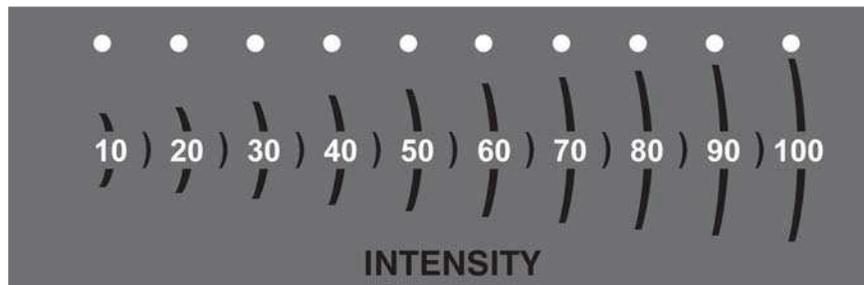


If your machine is equipped with a LOW LEVEL SENSOR, and there is not enough liquid in the tank, the LOW LIQUID warning will be illuminated. In this condition, the ULTRASONICS, HEATER, and PUMP will be disabled.

Note:

1. It takes 3-5 seconds after the liquid has dropped below the acceptable levels to report low liquid.
2. Similarly, it takes 3-5 seconds after the liquid has risen to safe levels to remove the warning.

Intensity Control



The intensity of the ultrasonic cleaner is controlled by this slider. Simply slide finger or press slider to set Intensity Level. Intensity is set in 10% increments from 0 to 100%. LED indicators correspond with intensity level.

Ultrasonic Control



If you press the "Sonics ON" button, the indicator located towards the bottom right of the button will illuminate and the Ultrasonic Generators will be active.

If the timer is counting down and the user presses the "Sonics ON" button, the timer will be reset, but the Ultrasonic Generators will stay on.

The Ultrasonic Generators can be turned off by pressing the "Sonics ON" button once again or by pressing the "Reset" button.

Key Lock Control

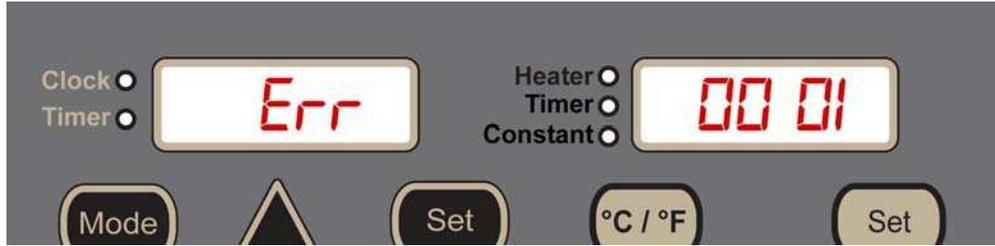


If you press the "Lock" button, the indicator located towards the bottom right of the button will illuminate and the Key Lock feature will be active. The Key Lock feature simply locks out all of the buttons from accidental presses. The only keys that will be left active are the following:

1. Main button
2. Start button
3. Lock button

To deactivate the Key Lock feature simply press the "Lock" button again and the indicator will turn off and the feature will be disabled.

Error Codes



The Ultrasonic Cleaner is equipped with a special error reporting system. If an ultrasonic generator has a problem, it will send an error message to the LED displays. The display on the left will show "Err", which represents an Error has occurred. The display on the right will show an error code. This code will tell the operator what has happened to the machine. The following is the list of error codes and their meanings:

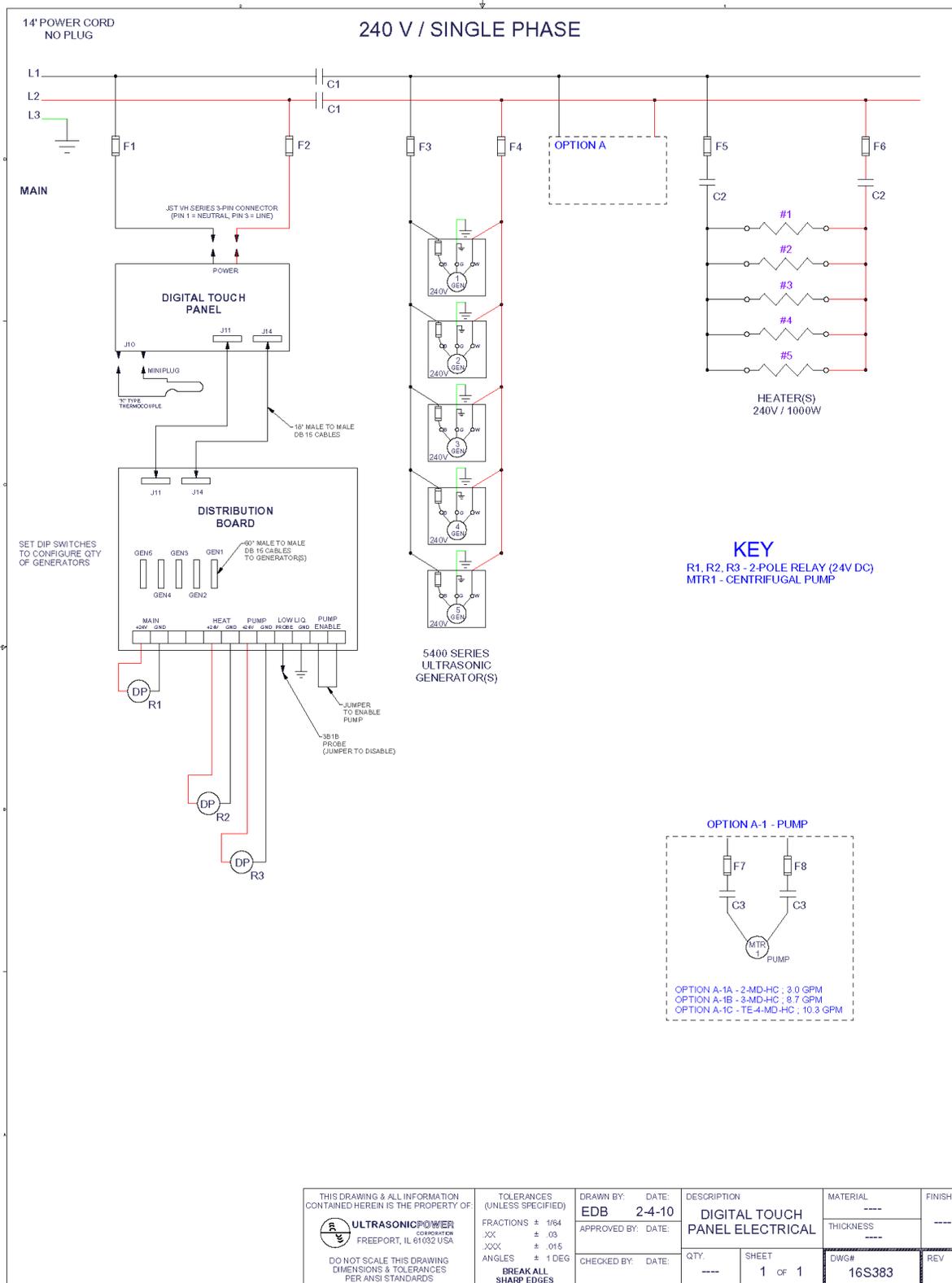
1. 0001 = Generator 1 TOP heat sink assembly
2. 0002 = Generator 1 BOTTOM heat sink assembly
3. 0003 = Generator 2 TOP heat sink assembly
4. 0004 = Generator 2 BOTTOM heat sink assembly
5. 0005 = Generator 3 TOP heat sink assembly
6. 0006 = Generator 3 BOTTOM heat sink assembly
7. 0007 = Generator 4 TOP heat sink assembly
8. 0008 = Generator 4 BOTTOM heat sink assembly
9. 0009 = Generator 5 TOP heat sink assembly
10. 0010 = Generator 5 BOTTOM heat sink assembly
11. 0020 = Control panel overheat
12. 0021 = Control panel overheat #2
13. 0030 = System Error - Reset

The machine will continue to operate while these codes are flashed for error codes 0001 through 0010. The machine will stop operating and will need to reset the machine for error codes 0020, 0021, and 0030.

If the error code is for the generator, unplug the machine from the power source, then remove the side panel of the machine and make check for abnormalities to the appropriate ultrasonic generator. Make sure that the power cord is properly installed and check for blown fuses, in the rear of the generator. Also do a visual check on the ultrasonic transducers to see if there are any burnt wires or cracked PZT's (stacks).

Error codes 0020 and 0021 occur if the control panel overheats (above 140°F), please let the machine cool down and reset the machine. Error code 0030 occurs if the internal processor had to reset due to some error or component failure. For additional assistance please refer to the troubleshooting section of the Console System Operator Manual, or call Ultrasonic Power Corporation for additional assistance.

Electrical Schematic - 240V / 1PH



Standard System Configuration – 240V, Single Phase

		Heater Wattage (W)									
		1000		2000		3000		4000		5000	
1000	F1, F2 -	1.0 A	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A
	Generator -	5.3 A	5.3 A	Generator -	5.3 A	Generator -	5.3 A	Generator -	5.3 A	Generator -	5.3 A
	Generator QTY -	1.0	1.0	Generator QTY -	1.0	Generator QTY -	1.0	Generator QTY -	1.0	Generator QTY -	1.0
	F3, F4 -	8.0 A	8.0 A	F3, F4 -	8.0 A	F3, F4 -	8.0 A	F3, F4 -	8.0 A	F3, F4 -	8.0 A
	Generator Relay -	25.0 A	25.0 A	Generator Relay -	25.0 A	Generator Relay -	25.0 A	Generator Relay -	25.0 A	Generator Relay -	25.0 A
	Heater -	5.0 A	10.0 A	Heater -	15.0 A	Heater -	20.0 A	Heater -	25.0 A	Heater -	30.0 A
	Heater QTY -	1.0	2.0	Heater QTY -	3.0	Heater QTY -	4.0	Heater QTY -	5.0	Heater QTY -	6.0
	F5, F6 -	8.0 A	12.0 A	F5, F6 -	20.0 A	F5, F6 -	25.0 A	F5, F6 -	30.0 A	F5, F6 -	35.0 A
	Heater Relay -	25.0 A	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A
	System Amperage -	10.3 A	10.3 A	System Amperage -	20.3 A	System Amperage -	20.3 A	System Amperage -	25.3 A	System Amperage -	30.3 A
Power Cord -	14.0 GA	14.0 GA	Power Cord -	10.0 GA	Power Cord -	10.0 GA	Power Cord -	10.0 GA	Power Cord -	10.0 GA	
2000	F1, F2 -	1.0 A	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A
	Generator -	10.7 A	10.7 A	Generator -	10.7 A	Generator -	10.7 A	Generator -	10.7 A	Generator -	10.7 A
	Generator QTY -	2.0	2.0	Generator QTY -	2.0	Generator QTY -	2.0	Generator QTY -	2.0	Generator QTY -	2.0
	F3, F4 -	12.0 A	12.0 A	F3, F4 -	12.0 A	F3, F4 -	12.0 A	F3, F4 -	12.0 A	F3, F4 -	12.0 A
	Generator Relay -	25.0 A	25.0 A	Generator Relay -	25.0 A	Generator Relay -	25.0 A	Generator Relay -	25.0 A	Generator Relay -	25.0 A
	Heater -	5.0 A	10.0 A	Heater -	15.0 A	Heater -	20.0 A	Heater -	25.0 A	Heater -	30.0 A
	Heater QTY -	1.0	2.0	Heater QTY -	3.0	Heater QTY -	4.0	Heater QTY -	5.0	Heater QTY -	6.0
	F5, F6 -	8.0 A	12.0 A	F5, F6 -	20.0 A	F5, F6 -	25.0 A	F5, F6 -	30.0 A	F5, F6 -	35.0 A
	Heater Relay -	25.0 A	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A
	System Amperage -	15.7 A	15.7 A	System Amperage -	25.7 A	System Amperage -	25.7 A	System Amperage -	30.7 A	System Amperage -	35.7 A
Power Cord -	12.0 GA	12.0 GA	Power Cord -	10.0 GA	Power Cord -	10.0 GA	Power Cord -	8.0 GA	Power Cord -	8.0 GA	
3000	F1, F2 -	1.0 A	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A
	Generator -	16.0 A	16.0 A	Generator -	16.0 A	Generator -	16.0 A	Generator -	16.0 A	Generator -	16.0 A
	Generator QTY -	3.0	3.0	Generator QTY -	3.0	Generator QTY -	3.0	Generator QTY -	3.0	Generator QTY -	3.0
	F3, F4 -	20.0 A	20.0 A	F3, F4 -	20.0 A	F3, F4 -	20.0 A	F3, F4 -	20.0 A	F3, F4 -	20.0 A
	Generator Relay -	25.0 A	25.0 A	Generator Relay -	25.0 A	Generator Relay -	25.0 A	Generator Relay -	25.0 A	Generator Relay -	25.0 A
	Heater -	5.0 A	10.0 A	Heater -	15.0 A	Heater -	20.0 A	Heater -	25.0 A	Heater -	30.0 A
	Heater QTY -	1.0	2.0	Heater QTY -	3.0	Heater QTY -	4.0	Heater QTY -	5.0	Heater QTY -	6.0
	F5, F6 -	8.0 A	12.0 A	F5, F6 -	20.0 A	F5, F6 -	25.0 A	F5, F6 -	30.0 A	F5, F6 -	35.0 A
	Heater Relay -	25.0 A	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A
	System Amperage -	21.0 A	21.0 A	System Amperage -	31.0 A	System Amperage -	31.0 A	System Amperage -	36.0 A	System Amperage -	41.0 A
Power Cord -	10.0 GA	10.0 GA	Power Cord -	8.0 GA	Power Cord -	8.0 GA	Power Cord -	6.0 GA	Power Cord -	6.0 GA	
4000	F1, F2 -	1.0 A	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A
	Generator -	21.3 A	21.3 A	Generator -	21.3 A	Generator -	21.3 A	Generator -	21.3 A	Generator -	21.3 A
	Generator QTY -	4.0	4.0	Generator QTY -	4.0	Generator QTY -	4.0	Generator QTY -	4.0	Generator QTY -	4.0
	F3, F4 -	25.0 A	25.0 A	F3, F4 -	25.0 A	F3, F4 -	25.0 A	F3, F4 -	25.0 A	F3, F4 -	25.0 A
	Generator Relay -	25.0 A	25.0 A	Generator Relay -	25.0 A	Generator Relay -	25.0 A	Generator Relay -	25.0 A	Generator Relay -	25.0 A
	Heater -	5.0 A	10.0 A	Heater -	15.0 A	Heater -	20.0 A	Heater -	25.0 A	Heater -	30.0 A
	Heater QTY -	1.0	2.0	Heater QTY -	3.0	Heater QTY -	4.0	Heater QTY -	5.0	Heater QTY -	6.0
	F5, F6 -	8.0 A	12.0 A	F5, F6 -	20.0 A	F5, F6 -	25.0 A	F5, F6 -	30.0 A	F5, F6 -	35.0 A
	Heater Relay -	25.0 A	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A
	System Amperage -	26.3 A	26.3 A	System Amperage -	36.3 A	System Amperage -	36.3 A	System Amperage -	41.3 A	System Amperage -	46.3 A
Power Cord -	10.0 GA	10.0 GA	Power Cord -	8.0 GA	Power Cord -	8.0 GA	Power Cord -	6.0 GA	Power Cord -	6.0 GA	
5000	F1, F2 -	1.0 A	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A	F1, F2 -	1.0 A
	Generator -	26.7 A	26.7 A	Generator -	26.7 A	Generator -	26.7 A	Generator -	26.7 A	Generator -	26.7 A
	Generator QTY -	5.0	5.0	Generator QTY -	5.0	Generator QTY -	5.0	Generator QTY -	5.0	Generator QTY -	5.0
	F3, F4 -	30.0 A	30.0 A	F3, F4 -	30.0 A	F3, F4 -	30.0 A	F3, F4 -	30.0 A	F3, F4 -	30.0 A
	Generator Relay -	30.0 A	30.0 A	Generator Relay -	30.0 A	Generator Relay -	30.0 A	Generator Relay -	30.0 A	Generator Relay -	30.0 A
	Heater -	5.0 A	10.0 A	Heater -	15.0 A	Heater -	20.0 A	Heater -	25.0 A	Heater -	30.0 A
	Heater QTY -	1.0	2.0	Heater QTY -	3.0	Heater QTY -	4.0	Heater QTY -	5.0	Heater QTY -	6.0
	F5, F6 -	8.0 A	12.0 A	F5, F6 -	20.0 A	F5, F6 -	25.0 A	F5, F6 -	30.0 A	F5, F6 -	35.0 A
	Heater Relay -	25.0 A	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A	Heater Relay -	25.0 A
	System Amperage -	31.7 A	31.7 A	System Amperage -	41.7 A	System Amperage -	41.7 A	System Amperage -	46.7 A	System Amperage -	51.7 A
Power Cord -	10.0 GA	10.0 GA	Power Cord -	8.0 GA	Power Cord -	8.0 GA	Power Cord -	6.0 GA	Power Cord -	6.0 GA	
Pumps	2-MD-HC	F7, F8	Add to System Amps	0.7 A	1500W Ultrasonics use 2000W Column						
	3-MD-HC			1.2 A	2500W Ultrasonics use 3000W Column						
	TE-4-MD-HC			0.7 A							

Generator Wattage (W)