

# MODEL 241PGT and 241PG PARTICLE GENERATOR OPERATING INSTRUCTIONS

Thank you for selecting Sonaer's Ultrasonic Particle Generator

**Please read through these operating instructions**

so you will know how to operate your 241PGT or 241PG properly. After you have finished reading the instructions, put them away in a safe place for future reference.

**WARNINGS:** Avoid contact with energized crystal. This device will damage cells.

Alteration or modifications carried out without appropriate authorization will void warranty.

As with all electronic equipment, dropping unit may cause damage to generator or transducer.

*Never operate the unit without proper tube connections. Always operate in a closed loop system. Never allow liquid to pour or spill onto enclosure, liquid will by capillary action leak onto electronic components and cause a malfunction, no warranty will apply.*

Blowing fuse is an indication that liquid leaked into enclosure from above due to external spillage.

Always operate unit on a level surface.

**NOTE:** Before operating you new 241PGT or 241PG, check for any damage from shipping and ensure that a properly grounded 100-240 VAC source is available.

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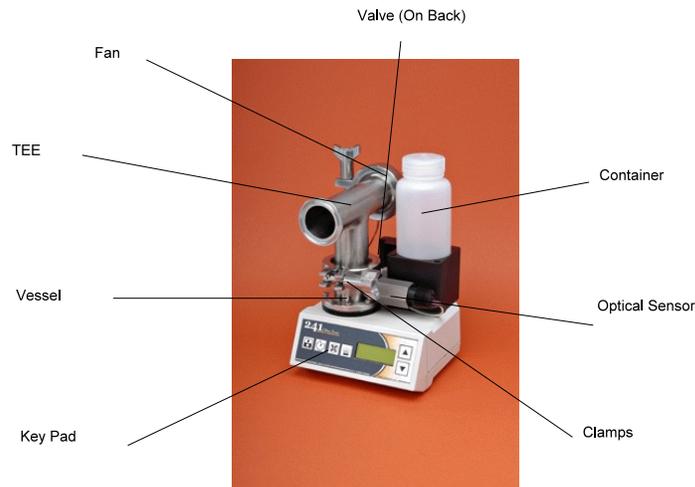
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## 1.0 General Description

Thank you for selecting Sonaer's model 241PGT or 241PG Particle Generator. The model 241PGT or 241PG is a fully microprocessor operated 2.4MHz ultrasonic nebulizer system capable of converting low viscosity liquids into fine cloud-like particles.

The unit comes standard with FEP TEFLON coated surfaces, GOLD plated element, TEFLON coated liquid holding cell, TEFLON valve, TEFLON tubes and fittings, TEFLON optical sensor, LCD display, membrane keypad, 304 stainless steel quick disconnect pipe fittings, 2.0 cfm variable air flow, variable particle generation, TIMER control, external enable/disable for connecting the unit to automated equipment or operating the unit as a stand alone.

## 2.0 241PGT or 241PG Components



**Key Pad** Located on the front of the unit, allows the unit to be programmed. Contains the On/Off, TIMER, Fan, Particle Generation and Up Down functions.

**Vessel** TEFLON coated with optical sensor. Is used to hold the liquid being processed and directs the liquid on top of the vibrating element for making micron particles.

**TEE** This part is removable and provides access to the vessel. Removing this allows the unit to be adapted to vacuums and gas flows. Unit comes standard with a low velocity fan. Tube size is 1.5 inch sanitary fitting.

**Fan** The fan provides a low velocity air flow over the vessel where particles are being made. This low velocity air flow is used to carry particles out of the vessel and to the area where particles are used for a process. The fan can be programmed in variable speeds from 0 - 100% of full power in 5% increments.

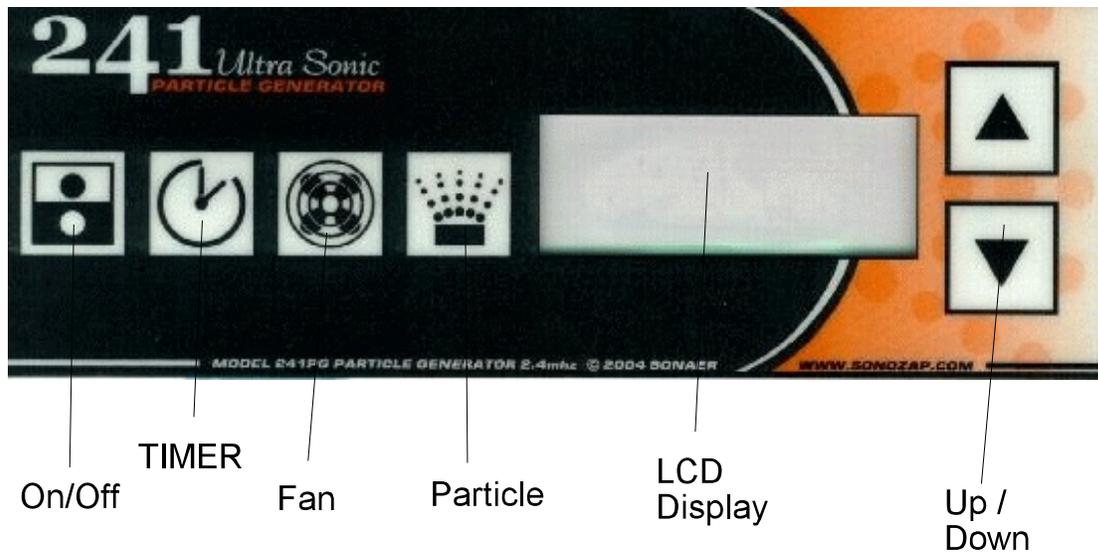
**Valve** This component is used to automatically fill the vessel as liquid is used up. The valve will turn on when needed. Each time the valve opens a small “^” will be seen on the right corner of the LCD display.

**Container** Holds the liquid being processed. Fill as needed. Do not over fill. Over filling will allow liquid to spill onto the enclosure and leak into the unit, where damage will occur. No warranty will apply.

**Optical Sensor** TEFLON optical sensor assures that the vessel is filled at all times before operating. Keep clean to avoid damage. A dirty optical sensor can give incorrect readings and cause the liquid to run dry. No warranty will apply.

**Clamps** Are used to hold the individual components together. Between the clamps is a TEFLON seal. Removing the clamps provides the user with other particle removal methods as vacuums and gas flows.

### 3.0 Front Panel



**On/Off** Allows the user to turn the unit On and Off. On power up the unit will default to the start up screen, where the Time, Fan speed and Particle power can be adjusted for the application.

**TIMER** This key will allow the user to program the amount of time particles will be

generated, from 1 second to 11 hours. The time can be set when the display reads **PWR:OFF**. When the unit is activated by pressing the **On/Off** key and the timer function is selected, the unit will count down. To select/deselect timer, press **time** key.

**Fan** The fan key is used to both program the speed of the fan and to turn the fan on and off. When the unit is activated by pressing the **On/Off** key and the fan function is selected, the unit will enable the fan. To select/deselect fan, press **fan** key.

**Particle** The particle key is used to both program the amount of particles to be generated and to turn the particle generation on and off. Particles are generated from 0 - 100% in 5% increments. When the unit is activated by pressing the **On/Off** key and the Particle function is selected, the unit will enable the particle generation. To select/deselect particle, press **Particle** key.

**Up/Down** Is used to change the parameters of the timer, fan and particle generation. Note: The down key is used to shift left when programming the timer function.

#### 4.0 Programming

Fill the container with the liquid used to make particles.

Turn the power to the unit On. The On/Off switch is located at the rear of the unit. When the unit is powered LCD display will indicate **PWR:OFF** and will be ready to operate.

At this time the unit can be programmed for Time, Fan speed and Particle power.

##### To Set Operating Time

Press the **TIMER** key. The seconds digits will be flashing. Use the **Up Key** to increase the seconds. The unit will scroll up from 00 seconds to 59 seconds and recycle. If you want 00 seconds, just select the **Down Key**. This will move the cursor to the minutes field. Use the **Up Key** to change the minutes, **Down Key** to move to the hours field. Use the **Up Key** to change the hours. If you do not want to make any changes, select the **Timer Key** to save the selection.

During operation this function will count down only when the particle generation is enabled. If the particle generation is set at 0%, than the timer will **not** count down. This is ultrasound time only. After the count reaches 0 the functions of the unit will be disabled and stop.

## To Set Fan Speed

Press the **Fan** key. Use the **Up Key** to increase the fan speed and the **Down Key** to decrease the fan speed. The speed can be changed in 5% increments. Select the **Fan key** to save the results

## To Set Particle Output

Press the **Particle** key. Use the **Up Key** to increase the particle generation and the **Down Key** to decrease the particle generation. The particle output can be changed in 5% increments. Select the **Particle** key to save the results.

## 4.5 Setting up the 241PGT or 241PG

Use this procedure to operate the 241PGT or 241PG when empty and filled to operate.

Turn 241PGT or 241PG on and set the fan speed and particle to zero.

Remove the TEE from the top of the unit.

Turn on/off icon to begin filling. A click can be heard from the valve.

Liquid should fill the vessel up to the optical sensor. If the liquid does not come out fast enough, air maybe in the line. Remove the air by tapping tubes and valve if necessary until a good flow fills the vessel. It should be filled in less than 4 minutes. After the unit is ready place the TEE on the unit and operate.

## 5.0 Operation

After programming the unit, or use the preprogrammed factory defaults, the unit is ready to operate.

Turn the power switch at the back of the unit **On**

The LCD should be providing information about the unit.

Before enabling power the unit must read **PWR:OFF**

To enable the power to the unit, press the **On/Off** key on the keypad, this will enable the functions programmed into the unit set in section 4.0.

To turn on and off the functions of the unit during the operation, select the function key on the keypad. The functions that are enabled during the operation will be shown on

the LCD display by flashing between each function. If one function is selected, than only one function will be displayed. If any two functions are selected, than only those two functions will be flashing, and so on. **Note: The timer function will be displayed longer than the fan and particle function.**

If no functions are operating, the unit will indicate **All Off**.

During operation it might be necessary to change the setting that was programmed into the unit, except the **Time**. To change the speed of the fan or particle generation, wait until the LCD display has the function you would like to change. Once the function is displayed with the power level, use the **Up/Down** keys to change the value. Wait a couple of seconds without hitting the up/down keys and the results will be saved.

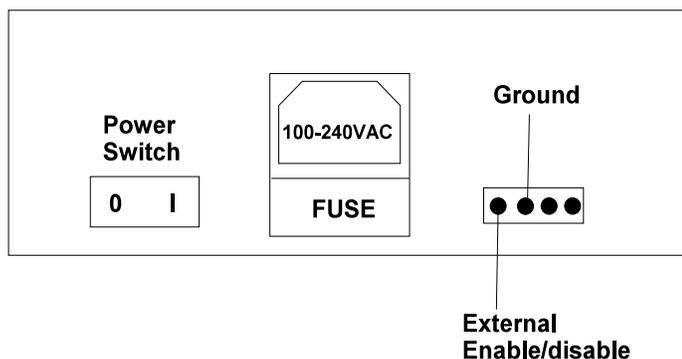
**Note:** Before power to the element is activated, the unit will indicate “**Please Wait Filling**”. After filling, the unit will be enabled. After 4 minutes and if the vessel is not completely filled, the unit will indicate “**Check Fluid Supply**” (Check Setting up the 241PGT or 241PG page 6). The unit at this point maybe partially filled, either because air might be in the line or the viscosity is too high. Leave liquid in, shut unit off and retry. It maybe necessary to lightly tap the tubes to get air out. If the “**Check Fluid Supply**” is indicated on the display after 30 minutes and the liquid is below the point of the optical sensor, than air is getting in the system. If the liquid is well above the optical sensor, than it could be the sensor or it is dirty.

The unit has a built-in rest period. The rest period will be enabled after 30 minutes of running at 100% power. Lower powers will increase the time rest period turns on. This allows the unit to cool off before resuming particle generation.

Whatever the state of the unit was in when the unit was shut off, will be recalled upon power up.

Each time the **Timer** key is selected during the operation, it will restart at the time programmed.

## 6.0 Back Panel



To turn power **ON** press the “1” to turn power **OFF** press the “0”

The fuse is located in the small box located below the plug connection.

For automated processes, use the **External Enable/Disable** connection. Do not connect to pins at the right of **Ground**, internal programming only.

The **External Enable/Disable** pin has an internal pull-up resistor to 5 VDC. Bring this pin low to disable particle function. When this pin is low, the **Timer** will stop counting. Open this pin brings the signal high will resume counting. Mating connector Molex **P/N MOL50-57-9404, Pin P/N MOL16-02-0102** .

## **7.0 Operation with a Vacuum or Gas Flow**

Detach the fan from the connector.

This function will be disabled for vacuum and gas connections.

**Note: Make sure that the liquid has been emptied.**

To open the top of the enclosure, use a small flat screwdriver and gently press in the tabs located on the side. Slide the cover upwards. Once the cover is off, disconnect the fan connector from the PCB. This connector is marked on the PCB as FAN, located to the left. If you are not sure how to perform this, please seek a qualified tech to remove cover and disconnect fan.

## **8.0 Maintaining the 241PGT or 241PG**

For long life, always keep your 241PGT or 241PG clean. Empty unit after each use and clean. Liquids kept inside unit will over time corrode through Teflon coatings and peel. Use PGT and Gold element if you think coatings are not robust for liquids being used. Liquids with particles will by cavitation remove coatings faster than liquids without particles. Hi acid concentrations will also erode coatings.

After each use empty the unit and clean on and around the crystal with a Q-Tip (something soft). Remove any residue and any build-up directly on crystal, around o-rings and reservoir.

Do not allow chemicals to spill on the plastic fan or onto the plastic enclosure.

If the crystal wears down, replace with a new one. Pitting of the gold plating or coatings is a sign that the crystal is eroding and needs replacement.

Clean residue from optical sensor, a false reading will over flow unit or not fill vessel. An error message could appear.

## 9.0 Troubleshooting

If the unit does not make particles with the liquid, but it makes particles with water, change the characteristics of the solution to lower the viscosity and surface tension.

If first operating the unit and the unit displays “**Check Fluid Supply**” the tubing or valve that fills the vessel has air in the line. Remove air by tapping or applying a small pressure to the container that holds the liquid.

When operating the particle generator for an extended period of time and the display indicates “**Check Fluid Supply**” the container needs to be filled. This might happen with a level in the container of about 3/4", indicating it needs to be filled.

If when operating the particle generator, the unit will stop making particles before the timer ends or just stops, it means that the unit is getting too hot and excessive current shuts the unit off before damage occurs. Turn off and let cool before operating again.

If the fuse burns out, it is usually the transformer is damaged from either liquid leaking inside unit or the ultrasonic nebulizer module is damaged. This can be caused from poor maintenance allowing the crystal to erode or allowing chemicals to harden on the surface of the crystal without cleaning.

If the display is blank, it usually means that liquid has been spilled on the electronic components below.

If the liquid is above the optical sensor, it usually means that it is dirty. If it is clean than the sensor could be defective.

## LIMITED WARRANTY

**WARRANTY: Warranty is one year for main PCB. All other components are 60 days. No warranty on crystal. Warranty is honored if customer has a program in place that assures unit is maintained by emptying unit after each use and cleaning. If no proof of maintenance is provided, warranty is void, no exceptions. This also means if not maintained and crystal cracks or wears out and leaks on main PCB, warranty is void.**

Sonaer warrants that products distributed by Sonaer in the USA that fail to function properly under normal use due to a manufacturing defect when installed and operated according to the owner's instructions enclosed with the unit will be repaired or replaced with a unit of comparable value, at the option of Sonaer, without charge to you for parts or actual repair work. Parts supplied under this warranty may be new or rebuilt at the option of Sonaer.

This warranty covers the product during the warranty period whether in the possession of the original owner or subsequent owner proved by receipt. In the event service is required, the product must be delivered within the warranty period, customer will provide transportation, return of the repaired unit will be payed by Sonaer.

This warranty does not cover the costs of parts or labor which would be otherwise provided without charge under this warranty, should the product be repaired by any other source other than Sonaer.

The warranty will be void should any alterations or modifications be performed to the product without appropriate authorization from Sonaer.

The warranty will be void for all experimental uses of this equipment without the written consent of Sonaer, Inc.

## HOLD HARMLESS

Sonaer makes devices that make very fine particles from liquids. Some of the liquids as gasoline, alcohols, jet fuel, acetone can become very explosive when exposed to heat or sparks and will cause death or bodily harm. Biological agents when made into fine particles can and will travel through the air which will cause death or bodily harm. Customers who use such equipment for research or processes should take the proper precautions to prevent any harm to people or damage to property and will hold Sonaer and its representative held harmless for all uses of this equipment. This equipment is experimental for scientific research and will benefit society with improvements in medicine and new processes.

**Under no circumstances will this equipment be sold directly or indirectly to any nation that the Untied States of America deems to house terrorists or any other organization here or abroad with the intent to cause bodily harm or property damage. This equipment is for scientific purposes and friendly use only.**