Installation & Operations Manual
UV-MAX ULTRA Mobile Surface Disinfection Unit

Advisories

Purpose

The Energenics UV-MAX ULTRA system has been designed to offer direct disinfection exposure to surface areas. The system design allows for microbial disinfection control.

The Energenics UV-MAX ULTRA device was developed utilizing Ultraviolet Light (UV) for direct exposure disinfection. The system can disinfect 360 degrees from the system center.

Contents

This manual will serve as your reference guide for installation, operation, and service of your UV-MAX system.

This manual covers the system/equipment/products listed below:

- o **UV-MAX ULTRA**

Disposal of Mercury Added Lamps

Germicidal ultraviolet lamps, like standard fluorescent lamps contain small amounts of mercury. Mercury added lamps should not be placed in the trash. Dispose of properly. For further information regarding the disposal and recycling of lamps containing mercury, along with Federal and State requirements visit LampRecycle.org.

UV-MAX Safe Operation Procedure

1. Always wear personal protective equipment (PPE) when operating UV-MAX ULTRA to limit exposure to UV-C light

2. Place UV-MAX ULTRA in area to be treated

3. Ensure a PIR Sensor (Passive Infrared) is positioned toward the entryway. PIR sensors operations are explained in the FAQ section at the end of this manual.

4. Connect UV-MAX ULTRA to 120vac plug receptacle

5. Press Start Cycle on UV-MAX ULTRA control and exit treatment area

6. Adhere to recommended safety precautions to avoid potential injury

Safety

1. You should never look directly at a UV lamp in operation without wearing approved safety glasses. Safety glasses should be made of any material other than Quartz or Teflon.

2. The space should be vacant and closed prior to UV-MAX ULTRA operation

3. **Never command the system on when the treatment space is occupied**

<div style="border:1px solid orange;">

Safety Observation: **It is required for the person(s) responsible for the installation of this equipment, operators of this equipment, and operation personnel managers to review and understand this manual.**

USE OF LISTED SYSTEM / EQUIPMENT MUST COMPLY WITH INSTRUCTIONS AND SAFETY REQUIREMENTS.

</div>

Safety Guidelines

Long term exposure to ultraviolet light is dangerous. UV-C can produce eye injuries and skin irritation similar to a sun burn over prolonged exposure. These effects are considered transient. UV-C may also be carcinogenic but since it has very limited penetrating ability it is unlikely to cause damage to anything besides the outer layer of skin or other exposed surfaces.

The UV-MAX ULTRA is designed for zero user exposure to UV-C; however, we will review safety factors regarding UV-C for better knowledge and understanding.

Protective Clothing and Eyewear

It is not recommended that any personnel be subject to direct UV-C exposure. In the event such exposure is probable, personnel should wear clothing providing full coverage of exposed skin and appropriate eye protection.

Polycarbonate safety glasses designed to filter UV and those of the wrap-around type are recommended.

OSHA Guidelines for Ultraviolet Exposure

OSHA provides technical guidance regarding protecting employees from ultraviolet light with respect to laser hazards only.

OSHA has two standards that cover employee exposure to radiation: *Nonionizing Radiation* (29 CFR 1910.97) and *Ionizing Radiation* (29 CFR 1910.1096). You may access a copy of the OSHA radiation standards from their website at http://www.osha.gov.

The non-ionizing radiation standard only covers the radio frequency region, including microwaves. The ionizing radiation standard covers alpha, beta, gamma, and X-rays; neutrons; high-speed electrons and protons; and other atomic particles; but **does not include** sound or radio waves, or visible, infrared, or **ultraviolet light**. Therefore, there are no OSHA-mandated employee exposure limits to ultraviolet radiation.

System Description

The UV-MAX ULTRA is designed for maximum disinfection through the shortest exposure time. More UV-C wattage allows shorter surface exposure times. Exposure times vary based on furthest distance from the UV-C source. The system design provides the optimum in:

- o UV dosage output to footprint served

- o Rugged design build

- o Ease of use controls

- o User safety protection

INDUSTRIAL STRENGTH FRAME AND STRUCTURE	PIR SENSOR DETECTION SAFETY SHUTOFF
CORROSION PROOF CONSTRUCTION	INDIVIDUAL LAMP FAILURE/MONITOR INDICATOR LED'S
6" INDUSTRIAL CASTERS	EMERGENCY STOP BUTTON
HIGH OUTPUT PRE-HEAT LAMPS FOR LONG RUN TIME LENGTH	BUILT TO IP56 WATER AND DUST STANDARDS
ROOM SENSING TECHNOLOGY	SELECTABLE TARGET PATHOGEN

System Delivery

When you receive your UV-MAX ULTRA, you will need to unpack and inspect the system. Please perform the following procedure:

1. Unpack your new system and stand upright

2. Inspect fully for damage

    If damage present, contact MaxAssure, Inc prior to use (239) 643-2778

3. Verify secure lamp installation

4. Plug in system power cord

5. Power on the unit

Your UV-MAX ULTRA system is now ready for operation
(See Operation Overview)

Operation Overview

The UV-MAX is designed to operate in the following manner:

Start Sequence

1. Locate unit in unoccupied space positioned for operation

2. Plug system into power supply

3. Press "Bacteria" or "Spores" Operation Mode

4. Initiate system cycle by pressing "Start Cycle"

5. Evacuate space

**Audio and Visual Indicators**

1. Audio Alarm

   There is no audible alarm for countdown or run cycle on the UV-MAX ULTRA as not to interfere with medical facility monitoring equipment alert systems

2. Visual Indicators

   a. Countdown Timer display present during countdown cycle
   b. Flashing "System On" during run cycle
   c. Home Screen displayed upon completion of cycle

3. Display of System

   a. Operations
   b. Controls
   c. Indication of System Functions

Operation Settings

Normal operation for factory default settings are covered on this page.

1. Review system for condition.

   a. There should be no physical damage to the system

   b. Lamps shall be clean

   c. System frame shall be in good condition

   d. Display of system shall be clean
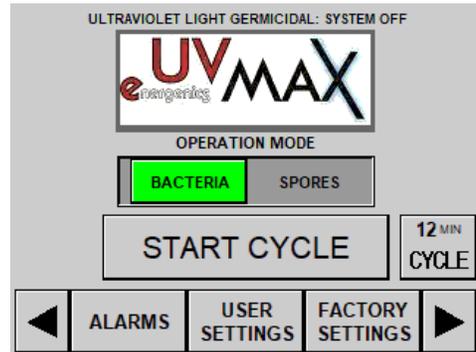
2. Plug in system power cord

3. Ensure all personnel are out of treatment area

4. Operate system

   a. Select "Start Cycle" to initiate treatment cycle

   b. The system will enter Countdown mode

   c. Once process is complete, panel will revert to Home screen
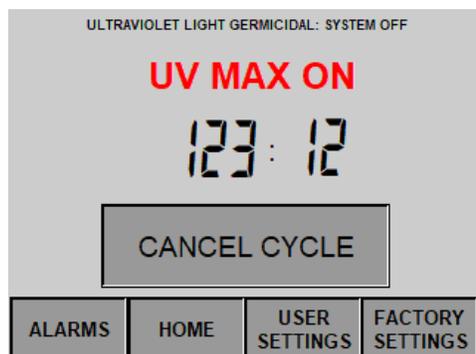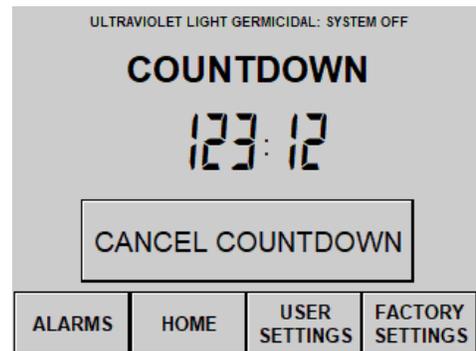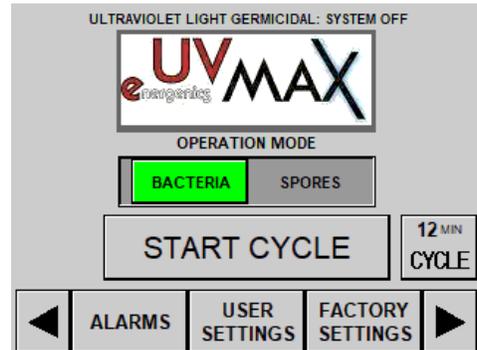
Customizable Operation Settings

Customizing settings for normal operation are covered on this page.

Target Pathogen Selection Options

1. From Start Cycle home screen, user may select either "Bacteria" or "Spores" Operation Mode (System default is Bacteria Mode)

2. Selection may also be made by selecting "User Settings" and choosing Operation Mode

Countdown Timer Customizing

1. From Start Cycle home screen, press "User Settings"

2. The User Settings screen is displayed with Countdown Timer Adjustment arrows available to increase or decrease countdown cycle time

   *Countdown Timer– control for time delay from when Start Cycle button is pressed to when system lamps come on

3. After adjusting to preferred settings, press HOME button to return to Start Cycle screen

4. Press START CYCLE button to begin customized treatment cycle
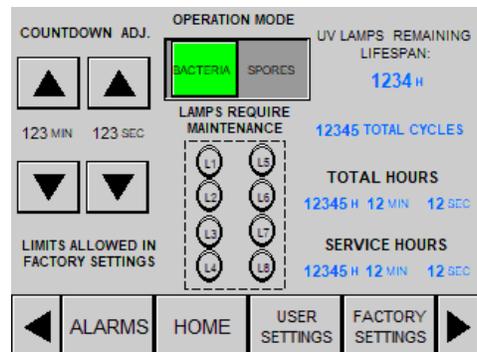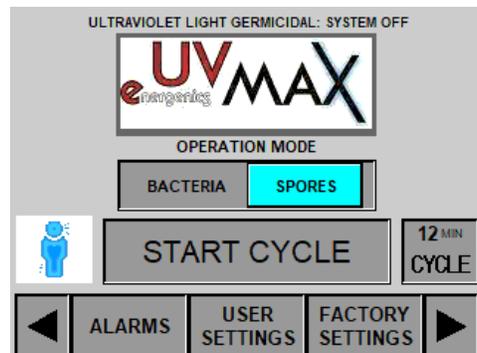
Status Screens

Room Sensing Technology covered on this page.

Room Sensing Feature

The UV-MAX ULTRA is equipped with Room Sensing Technology in which the device will calculate the distance between walls and calculate the required machine run-time depending on Operation Mode (Bacteria or Spores) selected.

1. From Home Screen, press Right Arrow at bottom right of screen.

2. Room Sensing Screen will appear with distance shown between each measuring laser and wall. This screen is for observation only.

    a. Each laser will measure up to a 16' radius for a total of 32' forward and backward and 32' side to side

    b. The machine will always calculate run-time based on the longest measured point ensuring a sufficient treatment dose

    c. If any distance measure is greater than 16', the machine will automatically run 30-minute cycle on Bacteria setting and 60-minute cycle on Spores setting.

3. Cycle time is displayed on Room Sensing screen and can be observed automatically adjusting with movement of the machine and selection of target Operation mode

4. Press "Home" button to return to Start Cycle screen for initiating treatment
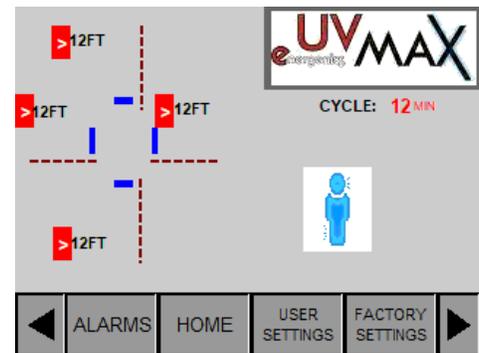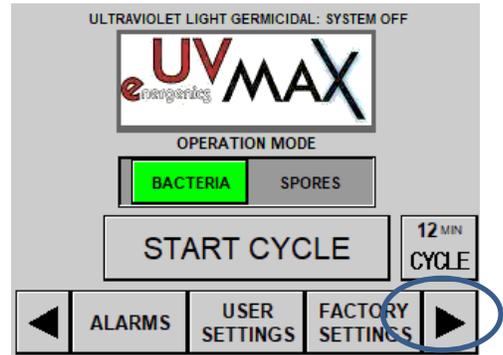
Status Screens

Cycle stop displays for normal system operation are covered on this page.

Emergency Stop

Should cycle deactivation occur by engagement of the Emergency Stop button, the following method will be required to reset the system:

1. Observe Emergency Stop Active status on control screen

2. Release Emergency Stop by pulling up on the red knob

3. Press "Cycle Status" to see treatment time remaining

4. Select "Home" button to return to main screen

5. Press "Start Cycle" to resume normal operation of system

PIR Sensor Cycle Interruption

Should cycle interruption occur by means of a PIR sensor activation, the following will be required:

1. Observe the interruption status type on the control panel

2. Ensure no one is in treatment area

3. Select HOME button to return to main screen

4. Press START CYCLE to restart normal safe operation of system
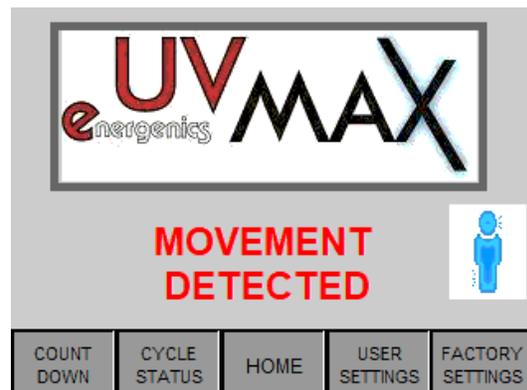
Status Screens

System lamp faults and service indicators are covered on this page.

Alerts

A Service or Alarm indicator may be illuminated on the Home screen. Should this occur, the following steps should be taken to address the alert:

1. Observe the alert type on the control panel

2. Ensure all system alerts have been properly addressed

3. Select HOME button to return to main screen

4. Press START CYCLE to resume normal system operation
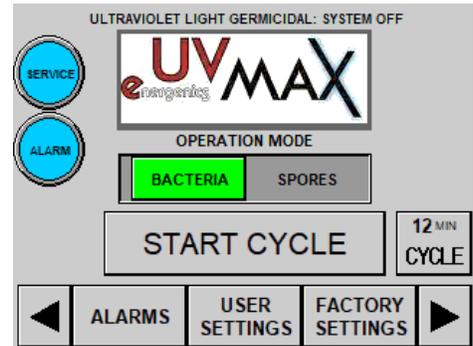
Service Indicators

The "Service" alert will illuminate every 8 run hours as a "clean lamps" notification or when lamps need replacement. The User Setting screen will differentiate need to perform:

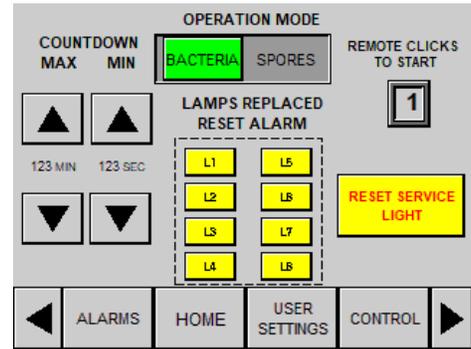1. Lamp Cleaning

   a. Press "Service" button on home screen

   b. Lamp Clean indicators will be illuminated in Yellow

   c. Wipe lamps with isopropyl alcohol and clean cloth

   d. Press "Factory Settings" on bottom right of screen

   e. Enter Passcode (1470) and press Enter

   f. Press "Reset Service Light" button to clear alert
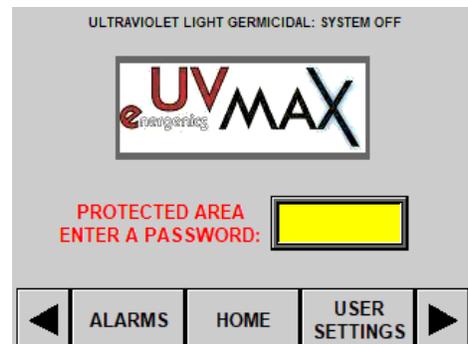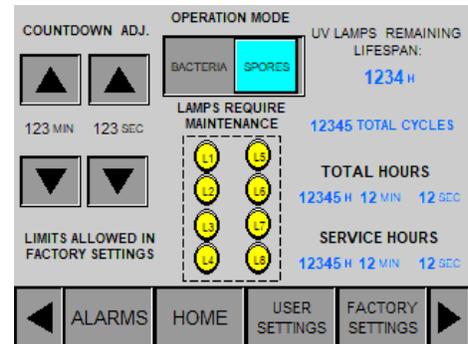
Status Screens

(con't)

g. Press "Home" to return to Start Cycle screen

Lamps are designed for 12,000 run hours after which point, they will only provide 80% of original UVC dosage output and will continue to degrade. The device will alert for lamp replacement at 8,000 run hours. It is recommended that lamps be replaced at this time for optimal dosage output.

2. Replace Lamp(s)

   a. Press "Service" button on Home screen

   b. Lamp Replacement indicators will be illuminated in Red

   c. Replace lamps as indicated

   d. Press "Factory Settings" button

   e. Enter Passcode (1470) and press enter

   f. Press "Reset Service Light" to clear alert

   g. Press "Home" to return to Start Cycle screen
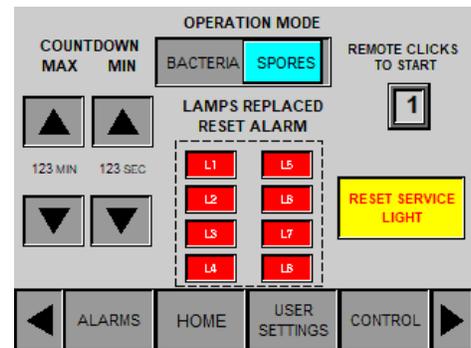
Alarm Indicators

In the "Alarm" indicator is illuminated on the Home screen:

1. Press "Alarm" indicator to observe the Alarm Log

2. Ensure all system alerts have been properly addressed

3. Select HOME button to resume normal system operation
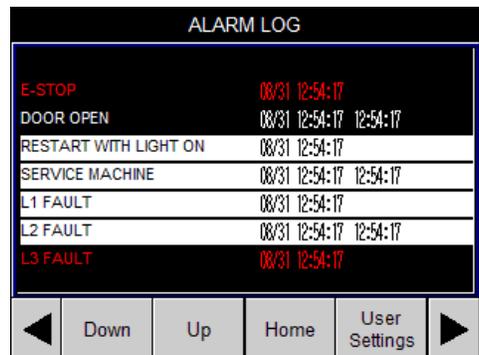
4. Should Alarm persist, contact MaxAssure, Inc customer service (239) 643-2778

System Care

The UV-MAX ULTRA system is designed for repeat performance with consistent results. Based on system designs, minimal maintenance is required. Adherence to the following regular service of your system should provide years of disinfection.

Each Duty Cycle

1. Inspect the system interior, exterior, and lamps for clean conditions
2. Clean as needed

Monthly

1. Inspect the system interior, exterior, and lamps for clean conditions
2. Clean as needed
3. It is recommended to test system performance using an ATP meter

Bi-Annual

1. Inspect the system interior and exterior lamp for clean conditions
2. Clean as needed
3. It is recommended to test system performance using an ATP meter

"Service Machine" Message

1. Every 8 running hours it is recommended that lamps be wiped down with clean cloth and isopropyl or rubbing alcohol. This will remove any debris that may have accumulated on the lamp. Once cleaned, you can reset this message by pressing USER SETTINGS button followed by RESET SERVICE LIGHT

Note: The above steps are listed as the basic level of care, should the system be utilized in a heavy work environment, further care may be required.

Troubleshooting

The below statements are listed as troubleshooting guidelines. Further information is available through Energenics support.

Q: What should I do if the unit will not turn on?

    A: Verify there is power to the system
    A: Verify the display is reads correctly
    A: Verify the Emergency Stop is not engaged

Q: Why does the unit turn off when I enter the room?

    A: Safety features turn off lamps based on detection by the PIR sensor.

Q: My system will turn on, but the lamps will not come on.

    A: Verify the start cycle button is pressed
    A: Inspect the lamp for age or physicalfailure
    A: Contact Energenics Support for further information

Q: My system is running fine, how do I verify the lamp output is correct?

    A: The system has a status screen at the end of the cycle
    A: Faults will indicate if the system is not performing correctly

Q: The touchscreen has presented a flashing "Service Machine" icon. What does this mean?

    A: Every 8 running hours it is recommended that lamps be wiped down with isopropyl or rubbing alcohol. This will remove any debris that may have accumulated on the lamp. Once cleaned, you can reset this message by pressing USER SETTINGS button followed by RESET SERVICE LIGHT

FAQ (continued)

Q: What is a PIR (Passive Infrared) Sensor?

A: Passive InfraRed sensors (PIRs) are electronic devices which are used in some security alarm systems to detect motion of an infrared emitting source, usually a human body.

Radiation (energy) is invisible to the human eye but can be detected by electronic devices designed for such a purpose.

The term 'passive' in this instance means the PIR does not emit any energy of any type but merely sits 'passive' accepting infrared energy through the 'window' in its housing.

An intruder entering the protected area is detected when the infrared energy emitted from the intruder's body is focused by a Fresnel lens or a mirror segment and overlaps a section on the chip which had previously been looking at some much cooler part of the protected area.

That portion of the chip is now much warmer than when the intruder wasn't there.

As the intruder moves, so does the hot spot on the surface of the chip.

This moving hot spot causes the electronics connected to the chip to de-energize the relay, operating its contacts, thereby activating the detection input on the alarm control panel.

Q: Is UV-C disinfection strictly line of sight?

A: Yes, it needs to shine on the surface to disinfect. It will not go around objects or disinfect shadowed areas.

Q: Does UV-C light reflect off surfaces?

A: Yes, it reflects off many surfaces, but loses intensity dramatically if the surface is not highly polished like the Stainless-Steel center installed on our unit.

Q: Is the UV-C light I can see under the door dangerous?

A: Zero exposure to people is imperative so block it or protect your eyes and skin (please note: 254nm UV-C wavelength is invisible, what is seen is visible light)

FAQ (continued)

Q: Does UV-C light go through glass or windows?

A: Standard window glass blocks almost 100% of UV-C light according to the IUVA. (Normal glass, as used in a window, is transparent to UV radiation to a wavelength of about 330 nm (UV-A). The transparency is quite high so almost all UV-A light will pass through glass. Below 330 nm (UV-B and UV-C), almost 100% is blocked by normal glass.

Q: Can I use an ATP Meter with the UV MAX

A: Yes, it can be used to measure how clean a surface is

Q: Can I use a response card with the UV MAX?

A: Yes, it can be used to indicate the correct dosage (intensity x time x distance) has been applied to a surface

Q: What is the difference between bacteria and sporicidal modes?

A: Your UV-MAX Ultra is equipped with two modes of operation, Bacterial and Sporicidal. It is important for the user to understand the difference between the two. For sporicidal mode, the time function is doubled. Spores are the more difficult microorganism to target due to the composition of the cell membrane. In order to be categorized as a spore a rigid protective layer on the cell membrane must exist. Most common bacteria and viruses do not have this protective layer or have a layer of less rigid protection like lipids and are much easier to deactivate using UV-C light. A common example of a sporicidal target is Clostridium difficile, or C. Diff.

Below is a chart to illustrate ease of deactivation among common organisms.

EASE OF KILL	DIFFICULT ↑ EASY	Small non-enveloped	MS2,Cdiff, TB
		Large non-enveloped	Norovirus, MRSA, Candida
		Enveloped	HIV, Coronavirus Flu