



VMS-3

Part Number: 95-0031

# Ultraviolet Systems

VMS-3

Installation, Operation & Maintenance

aerospace  
climate control  
electromechanical  
filtration  
fluid & gas handling  
hydraulics  
pneumatics  
process control  
sealing & shielding



ENGINEERING YOUR SUCCESS.

The following are the types of flags used in this technical manual. They designate safety related items and important operational instructions and should be given special attention when they appear in the text:

**WARNING**

Text formatted in this manner concerns an operating procedure or practice that, if not strictly observed, can result in injury to personnel or loss of life.

**CAUTION**

Text formatted in this manner concerns an operating procedure or practice that, if not strictly observed, can result in damage to or destruction of equipment.

MODEL: VMS-3

POWER SUPPLY (VOLTS): \_\_\_\_\_

DATE OF PURCHASE: \_\_\_\_\_

PURCHASED FROM: \_\_\_\_\_

INVOICE #: \_\_\_\_\_

INSTALLED BY: \_\_\_\_\_

DATE OF INITIAL STARTUP: \_\_\_\_\_

The Racor VMS-3 Ultraviolet system is designed to provide a germicidal dosage of UV radiation to suspended micro-organisms in clear water passing through a disinfection chamber. The dosage is a function of both the intensity of the ultraviolet radiation from the lamp and the time the water is exposed. Exposure time is related to the flowrate, then higher the flowrate of water the shorter the exposure time. This system is rated for maximum 3 GPM flowrate to obtain a full dosage. Water leaving the chamber is instantly ready for use, no further contact time is required.

**WARNING**

Special precautions must be taken since water is present near electrical equipment. Always disconnect power before performing any maintenance

**WARNING**

Avoid exposure to direct or strongly reflected germicidal ultraviolet rays. Germicidal ultraviolet rays are harmful to the eyes and skin.

The VMS-3 is intended for use with visually clear water, not colored, cloudy or turbid water that would impair the transmissivity of the radiation through the water. The VMS-3 is not intended for treatment of water that has an obvious contamination such as raw sewage, nor is it intended to convert wastewater to microbiologically safe drinking water.

Influent water quality can negatively affect the performance of the system if the transmissivity is impaired or if materials are present that deposit on the quartz sleeve. For best results the following maximum concentration levels are recommended:

Turbidity	5 NTU
Manganese	0.05 mg/L
Total Suspended Solids	10 mg/L
pH	6.5 – 9.5
Color	None
Hardness	6 GPG or 100 ppm
Iron	0.3 mg/L

## SPECIFICATIONS

Flowrate	3 GPM, 11 LPM
Inlet and Outlet Ports	3/4" Male NPT
Length	13.5", 34 cm
Extra length for lamp replacement In place	13", 33 cm
Height including ports	5.5", 14 cm
Width	4.3", 11 cm
Chamber diameter	4.3", 11 cm
Dry Weight	10 lbs, 4 kg
Number of lamps	1
Power consumption (including Ballast loss)	16 W
Maximum operating pressure	100 psi, 6.8 bar
Ambient temperature	33 – 100 F, 1 – 38 C

## INSTALLATION

The VMS-3 should be installed in a dry, sheltered location protected from direct weather and protected from freezing. Depending on the air humidity and the temperature of the water being treated, condensation is possible on the outside of the unit during operation. Therefore installation location should be selected so that dripping condensation cannot damage other equipment.

The unit should be installed closest to the point-of-use and after other water devices such as de-ionizers, water softeners, carbon filters, prefilters, RO units, storage tanks, pressure tanks and pumps. This reduces the chance of purified water being re-contaminated by bacteria in any of these units. Remember, UV radiation does not have any residual disinfection properties. The UV system should be connected to the cold water service.

The UV system will function best when mounted horizontally with the connection ports facing upwards. Either port can be used for the inlet or outlet. VMT offers an optional set of mounting clamps as part number 90-1586. For complete design dosage air must be purged from the chamber, which will happen naturally when the discharge port is upwards. If the unit is mounted on a slope or vertically, use the higher port as the outlet. Some air pocket may still remain above the outlet, this shortens the residence time slightly but does not present a operational problem. If mounted vertically, it is necessary to provide support below during maintenance as the sleeve or lamp can drop down.

The regular service required is lamp replacement (annually) which is a dry service. If clearance space is not available for bulb changeout in place, the chamber must be removed to a bench for the service. In that case, consider isolation valves and union connections to simplify removal and reinstallation of the unit with minimum water spillage.

Three power supply versions of the VMS-3 are available:

VMS-3-110V comes with a power cord and plug for a US standard 110/1/60 receptacle. The ballast includes an LED indicator light that confirms the UV bulb is functioning.

VMS-3-220V comes with a “European” style plug on a cable for 220-240/1/50 power. The ballast includes a LED indicator light that confirms the UV bulb is functioning.

VMS-3-12VDC comes with two wire leads from the ballast to be connected to a 12 Volt supply. This version does not have any indicator LED for the bulb, but a indicator window is provided on the end cap at the opposite end from the lamp connection.

The lamp is packed separately from the chamber. With the electrical supply disconnected, push the lamp socket onto the lamp first and then slide the lamp straight into the quartz sleeve without angling. Push the end cap on, over the static gland nut. Attach the ground connector (if supplied) to the grounding tab on the chamber.

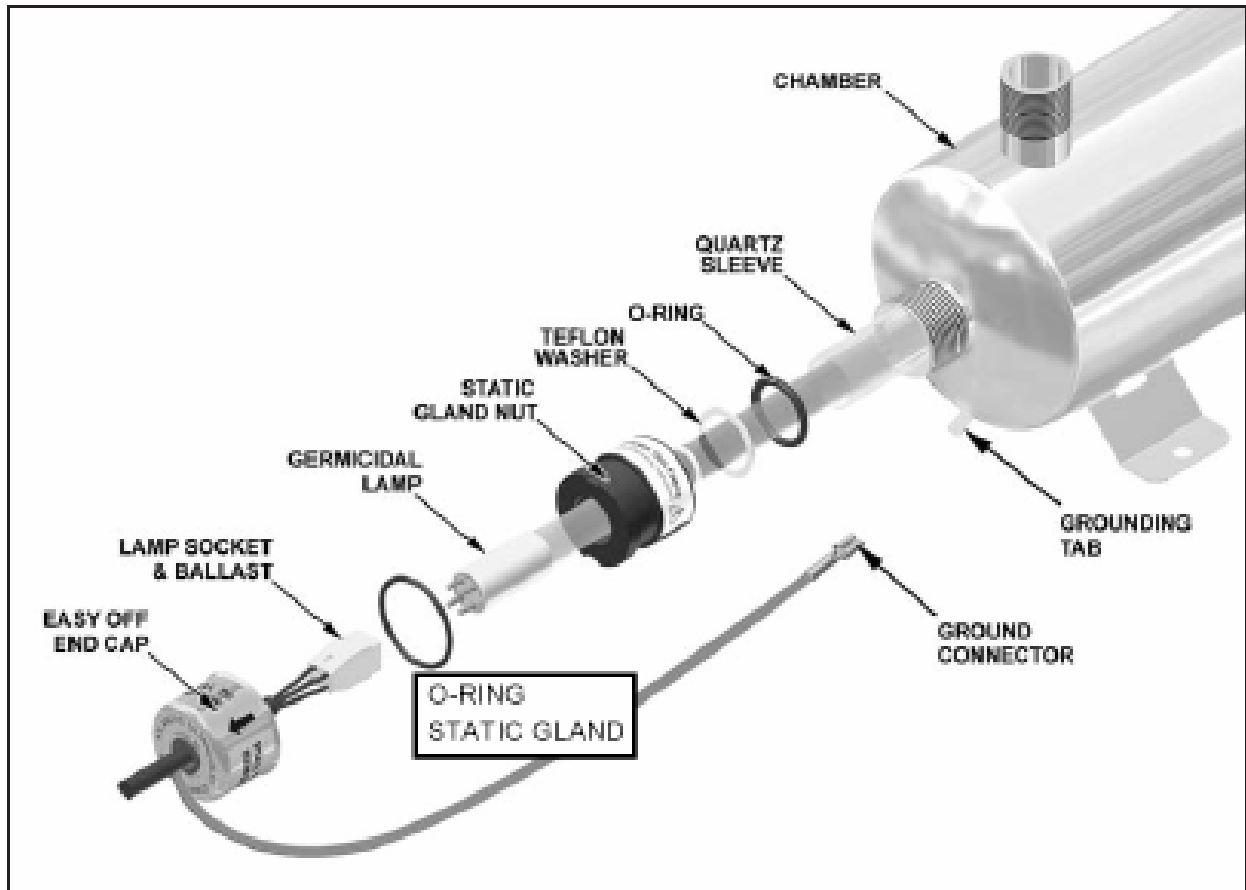
**WARNING**

Special precautions must be taken since water is present near electrical equipment. Always disconnect power before performing any maintenance

**CAUTION**

Lamp and Quartz Sleeve are easily damaged. Exercise care when installing the lamp.

## SERVICE PARTS



### PART NUMBERS for Consumable and Replacement Items

Germicidal Lamp	33-5002
Quartz Sleeve	33-5003
Lamp Socket & Ballast – 110V	33-5007
Lamp Socket & Ballast – 220V	33-5008
Lamp Socket & Ballast – 12 VDC	33-5009
O-Ring, Static Gland (two required)	33-5004
Static Gland Nut (two required)	33-5005
Teflon Washer (two required)	33-1235
O-Ring, Quartz Sleeve (two required)	33-1238
End Cap (far end, not shown)	33-5006

## MAINTENANCE

Ordinary maintenance consists of lamp replacement on a 10000 hour or one year interval and cleaning the quartz sleeve when conditions warrant.

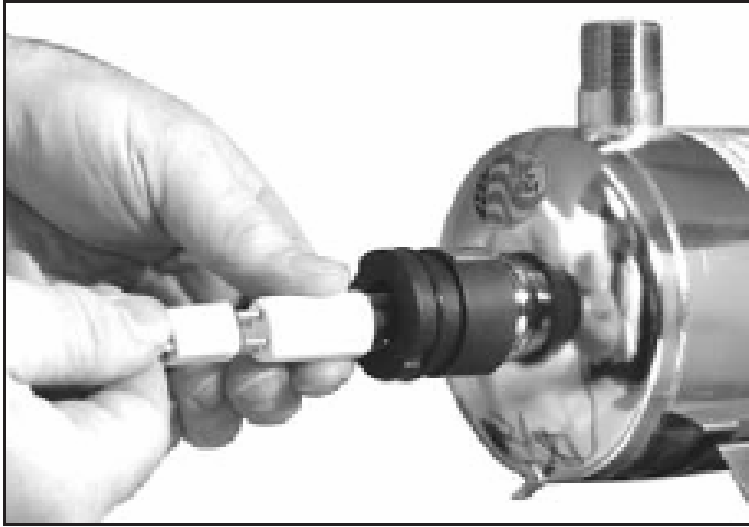
### Lamp Installation or Replacement



- 1) Disconnect power to the UV, and remove the ground connector (if equipped) from the chamber



- 2) Remove the end cap by pulling cap of the static gland nut.



- 3) Carefully withdraw lamp approximately 2 inches from the chamber. While holding the lamp end, remove the lamp socket.



- 4) Carefully remove the lamp from the chamber by pulling straight out without angling. Reinstall in the reverse order.

**WARNING**

Germicidal ultraviolet rays are harmful to eyes and skin. Do not restore power until lamp and end caps have been completely reinstalled.

**CAUTION**

Lamp and Quartz Sleeve are easily damaged. Exercise care when handling the lamp.



## Quartz Sleeve Cleaning or Replacement

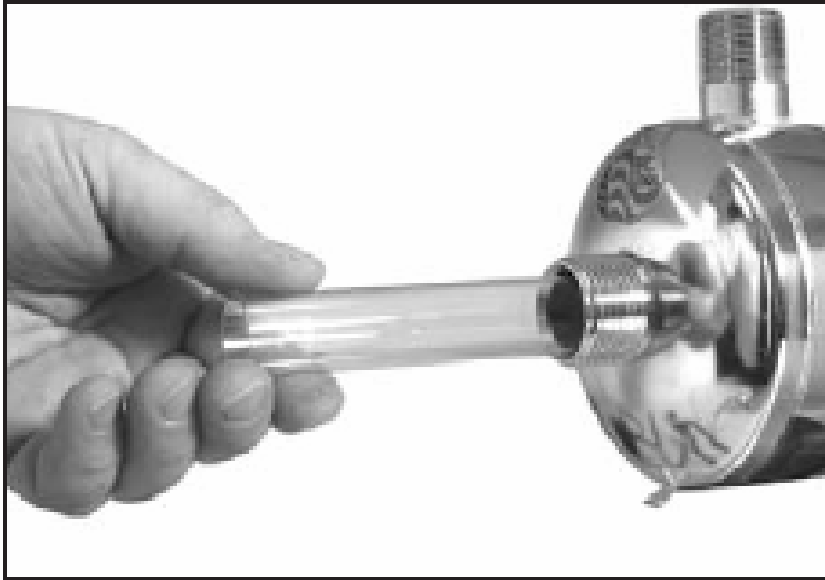
- 1) Follow the steps in the previous section to remove lamp. Shutoff water supply from the inlet and outlet ports of the chamber. If possible, drain all water from the chamber.



- 2) Unscrew the static gland nuts from each end of the chamber. Avoid striking the quartz sleeve with the static gland nut.



- 3) Remove the Teflon washer and O-Ring from both ends of the quartz sleeve. The Teflon washer will sometimes stick to the static gland nut, but can easily be removed.



- 4) Carefully remove the quartz sleeve from the chamber. As you first pull the sleeve, support the far end with your finger so that it does not drop to the bottom of the chamber as it starts moving
- 5) Once removed, clean the quartz sleeve with alcohol or a detergent. Stubborn stains can often be removed with a dilute solution of hydrochloric acid.

**WARNING**

Follow all manufacturers' instructions and precautions when handling cleaners and chemicals.

- 6) Reassemble in the reverse order. While inserting, keep the quartz sleeve parallel to the chamber, and as it nears the far end support with your finger. Make sure the quartz sleeve protrudes an equal distance at each end. Be sure that the O-rings are placed on the sleeve before the Teflon washer.

**CAUTION**

Tighten the static gland nuts firmly by hand only. Using hands tools can easily break the quartz sleeve.

- 7) Prior to installing the lamp, connect the water supply and check for leaks. When any leaks have been remedied, then install the lamp and connect the power supply.

**WARNING**

Germicidal ultraviolet rays are harmful to eyes and skin. Do not restore power until lamp and end caps have been completely reinstalled.

## **Replacement of Broken Quartz Sleeve**

### **WARNING**

Broken quartz is sharp. It is recommended that protective goggles and gloves are worn when handling broken quartz sleeves.

Follow the sleeve removal instructions in the previous section through step 4. Carefully remove as much of the broken quartz sleeve as possible from each end of the chamber. To remove fragments of quartz, hold the purifier vertically and shake – fragments will break and drop out of the gland fitting. Flush water through the chamber being careful to remove all quartz fragments from possible contamination of your water supply.

## **Disposal of Mercury Added Lamps**

Germicidal ultraviolet lamps, like standard fluorescent lamps, contain small amounts of mercury. Old lamps should not be placed in the trash. Dispose of properly. In the US, further information regarding disposal and recycling of lamps containing mercury can be found at [www.lamprecycle.org](http://www.lamprecycle.org)

## **Lamp-Out Protection**

VMS-3 units for AC power supply have a self resetting switch that disconnects power to the ballast if the power supply is plugged in with no bulb or a burnt out bulb. The ballast must remain unplugged for two minutes to reset the switch.