# UVM5000

## UV254 Organics Monitor

Owner’s Manual v 2.1 (4.15.20)

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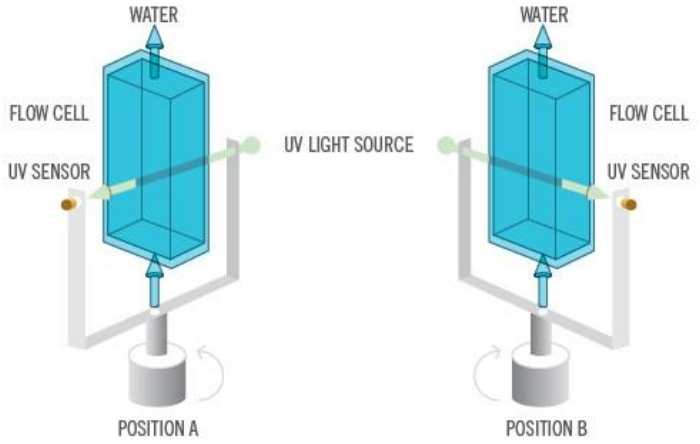
# 2 Overview

**Thank you for purchasing from Chemtrac, Inc.**

The UVM5000 is a continuous UV 254nm organic testing monitor which utilizes an innovative dual path measurement technique, shown in the following illustration.




The UVM5000 is designed to take sensor readings at 90-degree angles to each other through two different path lengths through a rectangular quartz flow cell. The two sensor readings give the amount of light able to pass through two different path lengths of test water. From these two measurements alone, the UV transmittance (UVT) or UV absorbance (UVA) of the test water is calculated without continuous need for calibration.

By continuously taking readings in the two directions through the flow cell, calibration is effectively performed every time a sample is taken. Therefore, quartz fouling and lamp fluctuations are inherently compensated for by the measurement process itself, improving accuracy.

Your product model and serial number are as follows:

| | |
|---|---|
| Model Number | UVM5000 |
| Serial Number* | |

*Your Serial Number is located on the inside of the cabinet door.

# 3 Safety

## 3.1 Safety Instructions

**Please read and follow all safety instructions outlined in this owner's manual prior to installation and/or operation.**

1. Visually inspect this analyzer prior to installation. If the quartz flow cell or UV lamp is broken or damaged in any way, do not use. Contact Chemtrac for replacement parts.

2. Ensure that all responsible personnel carefully read this manual before installing or servicing this analyzer.

3. This analyzer contains a UV lamp, which emits light at UV wavelengths. Never look directly at the UV light, as it could cause permanent eye damage and burn unprotected skin.

4. Never service this analyzer without unplugging the power supply.

5. Failure to properly install and maintain this analyzer may impact its effectiveness and warranty.

6. Improper use of this analyzer may cause injury.

# 4 Technical Specifications

The UVM5000 provides affordability, increased accuracy, and reduced maintenance.

**Table 1: UVM5000 Specifications**

| CHARACTERISTIC | TECHNICAL DATA |
|---|---|
| RANGE | 10-100% UVT 0.0025-1 UVA |
| ACCURACY | ± 0.5% FS |
| RESOLUTION | 0.1% UVT 0.001 UVA |
| UNITS | $cm^{-1}$ |
| PATH LENGTH | 10 mm (position A); 20 mm (Position B) |
| SAMPLING TIME | 10 seconds |
| CALIBRATION | The dual light path technology allows for continuous automatic calibration during operation. Periodic in-situ zeroing to DI water |
| CLEANING | • Significantly reduced clean requirements due to dual path measurement capability.<br>• Periodic in-situ chemical cleaning or optional automatic chemical cleaning |
| SELF-DIAGNOSTICS | Detection and diagnosis of internal system fault |
| OPERATOR INTERFACE | Five push buttons to control a comprehensive hierarchical menu system |
| DISPLAY | • 4-line x 20-character backlit LCD.<br>• Indicator light for system alarms and warnings |
| ALARMS | Operator configurable alarms for: high and low set points, low lamp output, leak detected, system fault, etc. |
| HUMIDITY CONTROL | Humidity sensor with large plug-in regenerating desiccant system |
| OUTPUTS | • 4-20mA output configurable to either UVA or UVT<br>• RS232 for configuration via PC<br>• Digital Output / Dry Contact |
| WAVELENGTHS | 253.7 nm |
| LIGHT SOURCE | Low pressure mercury UV lamp |
| LAMP LIFE | 12 to 18 months |
| DIMENSIONS | 17” high x 14” wide x 8” deep (43 cm x 36 cm x 20 cm) |
| ENCLOSURE | NEMA 4x, wall mountable |
| FLOW RATE | 300-1000 mL/min |
| PRESSURE RATING | 20 PSI (1.38 bar) |
| FLUID CONNECTIONS | 1/4” (6 mm) push-to-connect fittings and flex tubing |
| ELECTRICAL | 24 VDC 40W power adapter (accepts 90-250 VAC 50/60 Hz) |
| STORAGE TEMP. | -20°C to +60°C (-4°F to +140°F) |
| OPERATING TEMP. | 0°C to 45°C (32°F to 113°F) |
| RATED WATER TEMP. | 0°C to 75°C (32°F to 167°F). With high temperature upgrade: 70°C to 95ºC (158°F to 203°F) |
| WEIGHT | 22 lb (10 kg) |
| WETTED MATERIAL | HDFE, Nickel-plated Brass, Polypropylene, Quartz, Teflon, Viton, 316 Stainless Steel |
| WARRANTY | 1-year limited warranty |

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# 5 Installation

## 5.1 Site Assessment

Prior to installation, the site should be assessed to collect all relevant information that may affect the installation or operation of the system. Chemtrac has provided a checklist that can be used to ensure any installation or operational problems can be addressed, resulting in the most efficient and effective installation and startup of the system.

**Table 2: Installation site assessment checklist and recommendations**

| | CHECK | TIP |
|---|---|---|
| 1 | System installed outdoors? | Avoid areas with high exposure to sun and weather if possible. |
| 2 | If outdoors, system in direct sunlight? | Select shaded area/shade hood for system or indoor location. |
| 3 | Temperature range at the installation location? | Maximum operating temperature of 50°C. |
| 4 | Expected humidity at the installation location? | Areas of high humidity may benefit from a spare desiccant pack. |
| 5 | Type of material the system will be mounted on? (i.e. Concrete, steel, railing) | Ensure the mounting hardware is appropriate and will support up to 50lbs per component. |
| 6 | Sufficient space and clearance to access and service the system? | Refer to drawings in mounting section to ensure appropriate location is selected. Minimal distance between system components is favored. |
| 7 | Power available at installation location? | 100-240VAC 50/60 Hz 4.0A input power required. |
| 8 | System location relevant to measurement stream, what is the distance? | Shortest possible distance minimizes measurement lag. |
| 9 | Favorable measuring conditions? (i.e. no turbulence, air bubbles, large suspended solids etc.) | Select location with minimal measurement interferences. |
| 10 | Pressurized system able to supply 300-1000 ml/min flow? | If necessary, use a needle valve to lower flow and maintain less than 20 PSI in analyzer. Splice connection from the side of the pressurized pipe, to avoid air bubbles from top and sediment on bottom. |

## 5.2 Unpacking and Inspection

To begin, remove the monitor from the packaging and carefully inspect the product to ensure that no visible damage has occurred during shipping. Next, ensure to remove the packing material that is contained inside the cabinet. It is important to note that the quartz flow cell and the rotating arm have been packed separately.

The following items will be:

**Table 3: Unpacking Checklist**

| ITEM |
|---|
| UVM5000 Organics Monitor |
| Rotating Arm Assembly (packed inside the UVM5000 enclosure) |
| 10 mm x 20 mm Quartz Flow Cell (packed inside the UVM5000 enclosure) |
| 1L Calibration Bottle with ¼" Flex Tubing |
| 24 VDC Power Adapter and Cable (packed inside the UVM5000 enclosure) |
| Dehumidifier (packed inside the UVM5000 enclosure) |
| Owner's Manual |

**Please ensure all items are unpacked and accounted for before moving on to assembly.**

## 5.3 Assembly

### 5.3.1 Installing the Rotating Arm

1. Position the flat side of the motor shaft so it is facing out as shown in Figure 5.1.
2. Place the rotating arm on the motor shaft as shown in Figure 5.2, pushing down as far as possible.
3. Tighten the shaft locking screw with a #2 Phillips screwdriver as shown in Figure 5.3.

### 5.3.2 Installing the Quartz Flow Cell

1. Remove the flow cell carefully from the packaging. The flow cell should be clean, and care should be taken to prevent fingerprints, especially in the middle region of the flow cell where the light beam passes through. (Wearing gloves is recommended.)
2. Insert the flow cell into position under the flow cell header as shown below in Figure 5.4. Align the black dot on the flow cell with the black dot on top of the white plastic flow cell guide.
3. Carefully and slowly lower the clamp ensuring it is aligned with the flow cell as shown in Figure 5.5 and Figure 5.6. The flow cell clamp should not require much force when clamping down. If any significant force is required, try adjusting the position of the flow cell to prevent damage.

**Figure 5.1: Flat edge facing out**

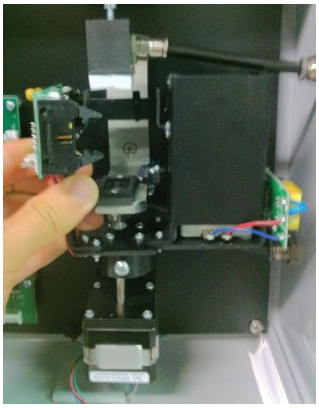


**Figure 5.2: Slide arm on to shaft**

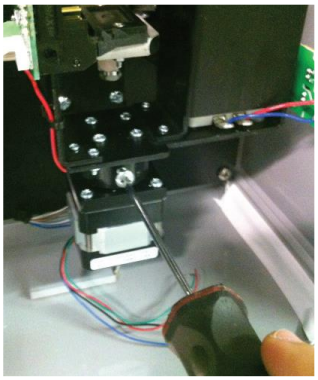


**Figure 5.3: Tighten locking screw**

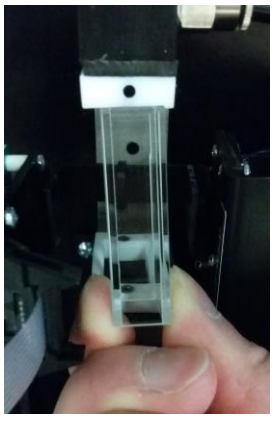


**Figure 5.4: Place flow cell on seal**

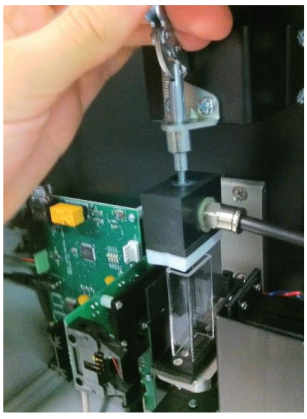


**Figure 5.5: Lower clamp**

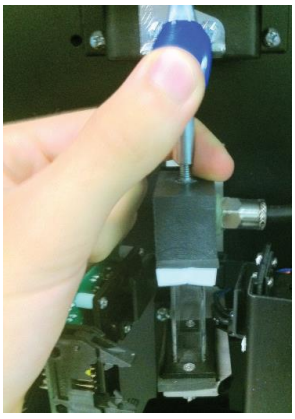


**Figure 5.6: Tighten clamp**

### 5.3.3 Installing the Ribbon Cable

**Note:** Ensure not to pinch the ribbon cable when installing as this can create a weak spot in the cable and reduce the life of the cable.

1. Position the flex ribbon connector to the rotating arm as shown in Figure 5.7.

2. Press the connector into the slot until you feel it click into place (Figure 5.8).

3. Press the top and bottom hold down clamps against the connector to anchor it into position (red arrows in Figure 5.8).

4. Attach the other end of the ribbon cable into the slot at the control board and then secure the top and bottom clamps against the connector (Figure 5.9).

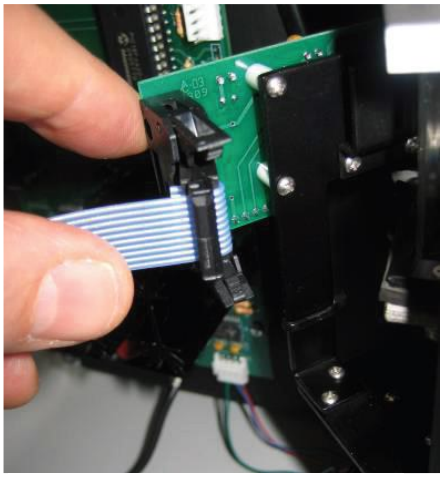


**Figure 5.7: Orient ribbon cable**

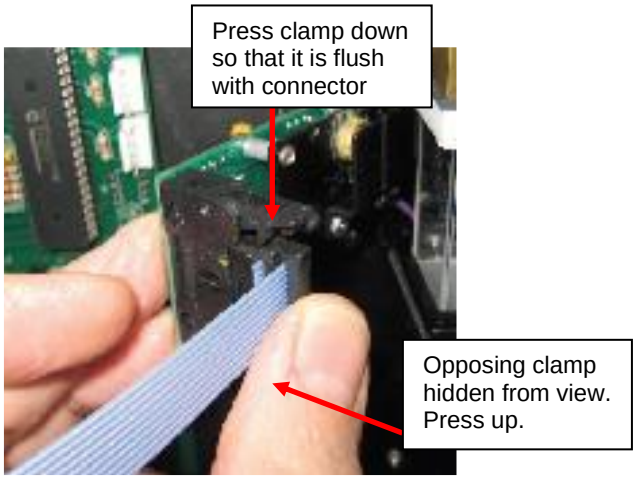



**Figure 5.8: Snap receptacle into place; secure clamps**

**Figure 5.9: Attach cable to control board**

## 5.4 Mounting

The monitor should be attached to the wall at all four of the mounting holes provided (top left and right; bottom left and right in Figure 5.10). Use screws and washers that are sturdy enough to support the cabinet weight of approximately 20 lbs.

Cabinet dimensions are to the nearest 1/8 inch. Refer to Section 18, Cabinet Dimensions and Clearance for drawings of dimensions and clearance.

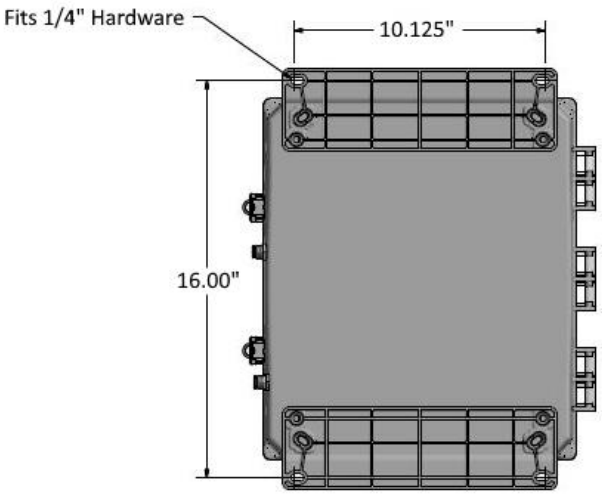



**Figure 5.10: Cabinet mounting**

The expanded view at right (Figure 5.11) shows an example of a ¼" bolt and washer inserted in the front side of the cabinet.

**Figure 5.11: Sample bolt and washer for attachment**

## 5.5 Plumbing

Process water from a pressurized pipe flows into the monitor via a ¼" push to connect fitting. The sample is analyzed by the sensor inside the cabinet and discharged to drain as shown in Figure 5.12.

**IMPORTANT**: If the UVM5000 was supplied with the Dual Feed or Auto Clean option, be sure to review the manual(s) that were supplied with those optional devices before plumbing the system.

A shut off valve must be installed to allow the flow to the monitor to be shut off when servicing is required. A flow control valve is also recommended to regulate the flow to 0.3 – 1.0 L/min. A simple needle valve is often used if pressure is somewhat consistent.

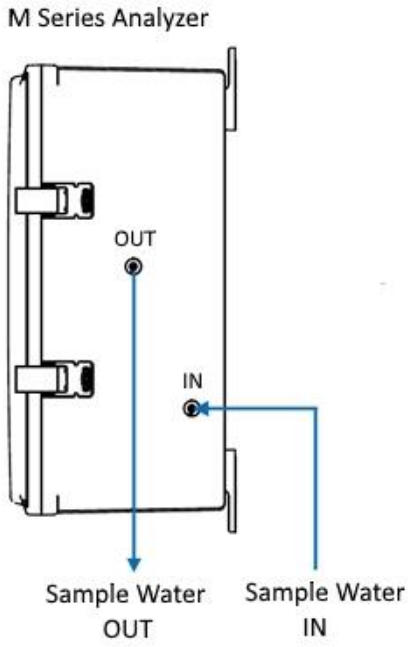



**Figure 5.12: Analyzer plumbing overview**

There are two push-in fittings on the side of the cabinet labeled IN and OUT as shown in Figure 5.13.

1. Connect ¼" OD flex tubing from the process to the IN-push connector on the monitor.

2. Connect another piece of ¼" tubing to the OUT port on the monitor and divert the line to the drain.

**IMPORTANT:** The test water must be allowed to flow unrestricted to the drain so that no significant water pressure occurs inside the analyzer. The maximum pressure rating for the monitor is 20 PSI.


**Figure 5.13: Plumbing ports**

## 5.6 Turbidity and Filtration

Depending on the application, the role of turbidity can be treated either as a part of the measurement, or as an interference in the measurement.

For example, a UV disinfection application will generally require a transmittance measurement that includes the effects of both dissolved organics and light blocking particulate, whereas an organics monitoring application will often require a measurement of the organics isolated from the light blocking effects of particulate.

Because of this, Chemtrac's monitors can include an optional 550 nm turbidity compensation measurement. Since 550 nm light is not significantly sensitive to organic material but is sensitive to light blocking particulate, the 550-nm turbidity compensation measurement can provide an isolated measurement of turbidity that allows this turbidity component to be extracted from the 254-nm measurement. This results in a measurement of organics material independent of turbidity and particulate in the water. The same results can also be achieved by removing light blocking particulate from the sample stream through filtration.

### 5.6.1 Turbidity Compensation (Optional)

Optional turbidity compensation can be added to any UV254 analyzer. Turbidity compensation allows for sampling without filtration in water with turbidity levels below ~60 NTU. Above 60 NTU, a 50-200-micron filter should be installed prior to sampling. If 50-micron is not sufficient to obtain 60 NTU on the filter effluent, a 20-micron filter should then be added. Refer to menu item Turbidity Comp. in Section 9, Menu Structure, to enable the turbidity compensation feature.

### 5.6.2 Filtering

All UV254 analyzers without turbidity compensation can obtain an accurate reading of dissolved organic matter at a turbidity level below ~10 NTU. If the sample water has turbidity levels that fluctuate above 10 NTU, a 50-micron filter should be installed prior to sampling. Should 50-micron not be sufficient to obtain 10 NTU on the filter effluent, a 20-micron filter should then be added.

## 5.7 Electrical Connections

The 24 VDC power is supplied to the UVM5000 by means of a DC power adapter that is plugged into a wall outlet of 100-240 VAC 50/60 Hz. The two 24 VDC wires from the adapter are run through the connector in the bottom of the monitor. The black wire is connected to terminal #11 (-) and the red wire (+) is connected to terminal #12, as shown in Figure 5.14.

Both 24 VDC power and communication lines feed into the monitor via one ¾" electrical conduit fitting on the bottom of the monitor and must be connected to the terminal block on the main control board.

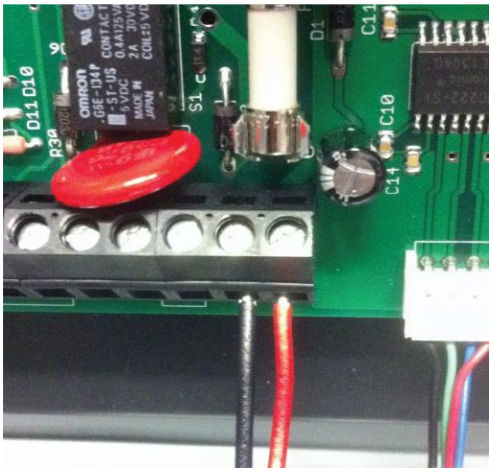



**Figure 5.14: Power connections**

## 5.8 4-20 Ma Connections and Dry Contacts

Primary communication is provided by a 4-20mA sourcing current loop output. RS-232 is also included to allow direct connection to a PC COM port if desired. A configurable digital output / dry contact is also available. These provide the operator with alarms for operator configured UVT/UVA set-points and system failure alarms. Dry contact connections are from terminals #5 & #6. The 4-20 mA output connections are from negative terminal #3 and positive terminal #4.

**Dual Feed Connection** – For the dual feed option, a second pair of 4-20 mA output connections are from negative terminal #1 and positive terminal #2. This output signal is for the water stream 2.

**Automatic Chemical Clean Connection** - Power to the optional Automatic chemical clean system is provided at connector terminals #9 and #10, which run to the left terminal block on the circuit board in the chemical clean cabinet. Matching the correct polarity is important. The chemical clean logic is through connector terminals #7 & #8, which run to the right terminal block on the circuit board in the chemical clean cabinet. Polarity is not important.

**Table 4: Main Terminals**

| | |
|---|---|
| 1 | Stream 2 4-20mA – (dual feed option only) |
| 2 | Stream 2 4-20mA + (dual feed option only) |
| 3 | 4-20mA – |
| 4 | 4-20mA + |
| 5 | Dry Contact Out |
| 6 | Dry Contact Out |
| 7 | Clean Control Out |
| 8 | Clean Control Out |
| 9 | 24VDC Out – (Black) (for use with Auto Clean) |
| 10 | 24VDC Out + (Red) (for use with Auto Clean) |
| 11 | 24VDC In - (Black) |
| 12 | 24VDC In + (Red) |

**Note:** Terminal numbering from left to right

# 6 Start-up

After the monitor has been installed as described in the Installation section, operation of the monitor is very straight-forward.

## 6.1 Start-up Instructions

1. Inspect the inside of the monitor to ensure **all** packing material (which may restrict moving parts inside the monitor) has been removed.
2. Ensure the 24 VDC power wires are securely attached to the correct corresponding terminals. Do not plug the monitor in at this time.
3. After making sure the flow rate has been set to 0.3 – 1.0 L/min and the drain is unrestricted and not kinked, open the inlet valve to allow test water to flow through the monitor and check for any leaks in the flow cell, piping, and fittings for at least 10 minutes before proceeding to the next step. Ensure there are no bubbles flowing through the flow cell and no water droplets are on the inside of the monitor.
4. Plug in the power supply. Display screen will read “Initializing.”
5. Calibrate your Analyzer. Measurements are not assumed to be accurate until the analyzer is calibrated. See Section 8, Zeroing (Calibration).
6. Configure the monitor to your application, i.e. enter warning and alarm set points, dry contact, 4-20mA set-up, data logging. See Section 9, Menu Structure.

   **IMPORTANT:** In areas of high humidity, the UVM5000 door must remain closed for a minimum of three hours to allow for the dehumidifier to dry the air inside the enclosure. (Refer to Section 13). If you receive a Humidity alarm while calibrating, the door may not have been closed long enough. Wait until the alarm is removed, and then start calibration again.

# 7 Operator Interface

1. **Menu Button** – Press to access menu.
2. **Indicator Light**
3. **Zero Button –** Press to calibrate.
4. **Up/Down Buttons –** Cycle through the menu.
5. **Enter Button** – Press to access menu options.


**Figure 7.1: Operator interface**

# 8 Calibration (Zeroing)

The monitor must be calibrated before accurate UVT/ UVA data can be read. Two methods for calibration can be used:

- Zero monitor to DI or RO water reference of 100% UVT
- Zero monitor to a known water value

The first method is using 100% transparency as the standard by which the monitor is zeroed, whereas the second method uses a known transparency. Both are accurate, but the second method allows for greater accuracy because the expected measured values are presumably clustered around the known value instead of falling within a wider range in the measurement scale.

## 8.1 Using RO or DI Water Method

Carry out these steps using a fresh supply of DI or RO water:

1. Close the monitor door and secure both door clamps.
2. Make sure the monitor is powered up.
3. Shut off the water supply to the monitor if not already done.
4. Disconnect the ¼" supply tubing at the inlet connection on the monitor.
5. Fill the supplied wash bottle with DI/RO water and connect the ¼" bottle tubing to the inlet connection on the monitor.
6. Hold a finger over the small vent hole in the wash bottle cap, as shown in Figure 8.1.
7. Squeeze the bottle to get the DI water to flow through the monitor.
8. Once the fluid starts to flow remove finger from the vent hole and place bottle on top of the monitor, as shown in Figure 8.2. The fluid should continue to flow through the monitor. If it stops go back to step 6.
9. The LCD display should display a UVT or UVA reading (depending on display mode).
10. Let about half the DI water run through the monitor before pressing the Zero button. Use the down arrow to select "Zero to DI Water". Then press "Enter" and the monitor will calibrate itself to 100% in UVT mode or 0.000 in UVA mode.
11. The monitor has now been calibrated to DI/RO water. Disconnect the wash bottle hose from the inlet of the monitor.
12. Connect the supply line to the monitor and open the valve to start the flow running.

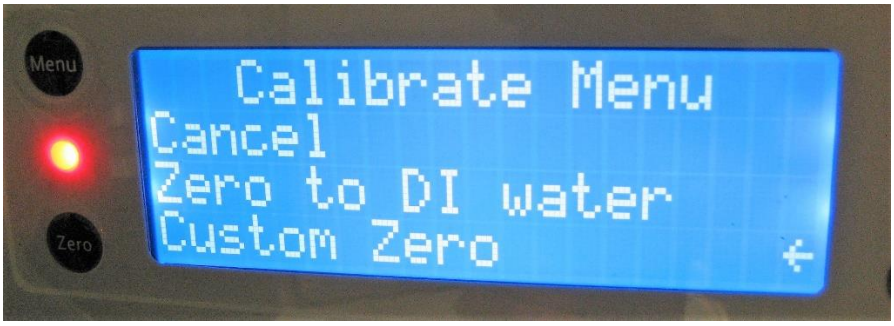
**Figure 8.1: Setting up flow**

**Figure 8.2: Bottle on top of cabinet**

## 8.2 Using Known Water Method

**Carry out these steps:**

1. Press the Zero button on the monitor. The Calibration menu appears.
2. Scroll down to 'Custom Zero' using the down arrow button. Press Enter.




3. A default value is displayed in the 'New UVT:' field (in this example, 75.0).
4. Press the up arrow to increase the number above 75.0 or the down arrow to decrease the number below 75.0. When you have keyed in the number of known water transparency, press Enter.


Note that if you only know your UVA value then this can be converted to UVT using the formula:

$$UVT = 100 * 10^{(-UVA)}$$

5. The monitor is now calibrated to the correct value.

# 9 Menu Structure

| MENU ITEM | DESCRIPTION |
|---|---|
| **AVERAGING** | |
| On: 1 Off: 0 | |
| Average | Press ‘Enter’ then up/down to select running average for last 10 readings (Default = 0: Off) |
| **UVT/UVA MODE** | |
| 0 : UVT | |
| 1 : UVA | |
| 2 : Crltn. | |
| Select | Press ‘Enter’ then up/down to select UVT, UVA, or Correlation mode (Default = 0: UVT) |
| **SETPOINTS** | |
| UVT Warning | Press ‘Enter’ then up/down to select UVT warning set point (Default = 75) |
| UVT Alarm | Press ‘Enter’ then up/down to select UVT alarm set point (Default = 50) |
| UVA Warning | Press ‘Enter’ then up/down to select UVA warning set point (Default = 0.20) |
| UVA Alarm | Press ‘Enter’ then up/down to select UVA alarm set point (Default = 0.30) |
| Crltn. Warning | Press ‘Enter’ then up/down to select the correlation warning set point (Default = 160) |
| Crltn. Alarm | Press ‘Enter’ then up/down to select the correlation alarm set point (Default = 200) |
| **4-20mA SETUP** | |
| 4mA UVT | Press ‘Enter’ then up/down to select 4mA UVT reading for scaling (Default = 0) |
| 20mA UVT | Press ‘Enter’ then up/down to select 20mA UVT reading for scaling (Default = 100) |
| 4mA UVA | Press ‘Enter’ then up/down to select 4mA UVA reading for scaling (Default = 0) |
| 20mA UVA | Press ‘Enter’ then up/down to select 20mA UVA reading for scaling (Default = 1) |
| 4mA Crltn. | Press ‘Enter’ then up/down to select 4mA correlation reading for scaling (Default = 0) |
| 20mA Crltn. | Press ‘Enter’ then up/down to select 20mA correlation reading for scaling (Default = 200) |
| **SECONDARY DATA** | |
| Lamp 1 | Displays the lamp output after it passes through the flow cell 1 cm position |
| Water 1 | Displays the water output after it passes through the flow cell 1 cm position |
| VIS 1 | Displays the raw VIS as it passes through the flow cell 1 cm position |
| Lamp 2 | Displays the lamp output after it passes through the flow cell 2 cm position |
| Water 2 | Displays the water output after it passes through the flow cell 2 cm position |
| VIS 2 | Displays the raw VIS as it passes through the flow cell 2 cm position |
| Temperature | Displays temperature inside cabinet – Celsius |
| Humidity | Displays the relative humidity inside cabinet – RH |
| Status Code | Displays status code for system diagnostics |
| **DRY CONTACT SETUP** | |
| See Set Alarms | |
| 0: Nothing | |
| 1: Alarm | |
| Select | Press ‘Enter’ then up/down to select 0 or 1 to turn on/off dry contact (Default = 0: Nothing) |

| MENU ITEM | DESCRIPTION |
|---|---|
| **CLEANING SYSTEM** | |
| Enable Clean | Press 'Enter' then up/down to select 0 or 1 to turn on automatic cleaning system if supplied (Default = 0) |
| Reset Clean | Press 'Enter' then up/down to select 0 or 1 to reset fluid alarms after refilling fluid (Default = 0) |
| Force Clean | Press 'Enter' then up/down to select 0 or 1 to force the cleaning system to begin a cleaning cycle (Default = 0) |
| Pumping Time | Operator configurable. Enter a number between 90 and 180 seconds. |
| **CLEAN FREQUENCY** | |
| 0: No Cleaning | |
| 1: 4 hours | |
| 2: 12 hours | |
| 3: 24 hours | |
| 4: 3 days | |
| 5: 1 week | |
| 6: 2 weeks | |
| 7: 1 month | |
| Select | Press 'Enter' then up/down to select cleaning frequency 0 - 7 (Default = 4: 3 days) |
| **ROTATION** | |
| On: 1 Off: 0 | |
| Select | Press 'Enter' then up/down to turn on/off the rotating arm (Default = 1: On) |
| **REF POSITION** | ***Factory settings** |
| Steps | Press 'Enter' then up/down to change motor alignment, increasing the # adjusts the position clockwise |
| **RS-232 DATA LOG** | |
| **Setup** | |
| Baud Rate: 9600 | Fixed parameters for RS-232 logging |
| Parity : none | Fixed parameters for RS-232 logging |
| Stop Bits : 1 | Fixed parameters for RS-232 logging |
| Flow Ctrl : none | Fixed parameters for RS-232 logging |
| **Data for Log** | |
| Add:1 Remove:0 | |
| Sensors | Press 'Enter' then up/down to select all lamp and water sensor data (Default = 0) |
| Temp/Humid | Press 'Enter' then up/down to select cabinet temp and humidity data (Default = 0) |
| UVT | Press 'Enter' then up/down to select UVT data (Default = 1) |
| UVA | Press 'Enter' then up/down to select UVA data (Default = 0) |
| Crltn. | Press 'Enter' then up/down to select correlation data (Default = 0) |
| Status | Press 'Enter' then up/down to select status code for alarms & diagnostics (Default = 0) |

* Factory setting - unit specific value set at factory. Value can be located on the label on the inside of the cabinet door.

| MENU ITEM | DESCRIPTION |
|---|---|
| **DATALOG FREQUENCY** | |
| 0: No Data Log | |
| 1: 10 seconds | |
| 2: 1 minute | |
| 3: 10 minutes | |
| 4: 1 hour | |
| Select | Press ‘Enter’ then up/down 1 - 4 to select logging frequency (Default = 1: 10 seconds) |
| **ALARMS** | |
| Humidity | Alarm status (0 = no alarm 1 = alarm) |
| Temperature | Alarm status (0 = no alarm 1 = alarm) |
| Leak Detection | Alarm status (0 = no alarm 1 = alarm) |
| UVT Warning | Alarm status (0 = no alarm 1 = alarm) |
| UVT Alarm | Alarm status (0 = no alarm 1 = alarm) |
| UVA Warning | Alarm status (0 = no alarm 1 = alarm) |
| UVA Alarm | Alarm status (0 = no alarm 1 = alarm) |
| Crltn. Warning | Alarm status (0 = no alarm 1 = alarm) |
| Crltn. Alarm | Alarm status (0 = no alarm 1 = alarm) |
| Lamp Failure | Alarm status (0 = no alarm 1 = alarm) |
| Lamp Low | Alarm status (0 = no alarm 1 = alarm) |
| Lamp High | Alarm status (0 = no alarm 1 = alarm) |
| Cleaning | Alarm status (0 = no alarm 1 = alarm) |
| Clean Fluid Empty | Alarm status (0 = no alarm 1 = alarm) |
| Clean Fluid Low | Alarm status (0 = no alarm 1 = alarm) |
| System Fault | Alarm status (0 = no alarm 1 = alarm) |
| **SET ALARMS** | |
| See Dry Contact | |
| 0: Disabled | |
| 1: Alarm | |
| Humidity | Press ‘Enter’ then up/down to select high cabinet humidity alarm (Default = 1) |
| Temperature | Press ‘Enter’ then up/down to select high cabinet temperature alarm (Default = 1) |
| Leak Detection | Press ‘Enter’ then up/down to select leak inside cabinet alarm (Default = 1) |
| UVT Warning | Press ‘Enter’ then up/down to select low UVT warning point as alarm (Default = 0) |
| UVT Alarm | Press ‘Enter’ then up/down to select low UVT alarm point as alarm (Default = 0) |
| UVA Warning | Press ‘Enter’ then up/down to select high UVA warning point as alarm (Default = 0) |
| UVA Alarm | Press ‘Enter’ then up/down to select high UVA alarm point as alarm (Default = 0) |
| Crltn. Warning | Press ‘Enter’ then up/down to select high correlation warning point as alarm (Default = 0) |
| Crltn. Alarm | Press ‘Enter’ then up/down to select high correlation alarm point as alarm (Default = 0) |
| Lamp Failure | Press ‘Enter’ then up/down to select lamp failure alarm (Default = 1) |

| MENU ITEM | DESCRIPTION |
|---|---|
| Lamp Low | Press ‘Enter’ then up/down to select low lamp output alarm (Default = 1) |
| Lamp High | Press ‘Enter’ then up/down to select high lamp output alarm (Default = 1) |
| Cleaning | Press ‘Enter’ then up/down to select when cleaning cycle active (Default = 0) |
| Clean Fluid Empty | Press ‘Enter’ then up/down to select when cleaning solution empty alarm (Default = 0) |
| Clean Fluid Low | Press ‘Enter’ then up/down to select when cleaning solution low alarm (Default = 0) |
| System Fault | Press ‘Enter’ then up/down to select internal system error alarm (Default = 1) |
| **MUTE** | |
| Alarms | Press ‘Enter’ then up/down (0 or 1) to select audible alarms (Default = 0, which means alarms are audible). Entering 1 will mute alarms for 5 minutes. UVT value is frozen until mute is automatically turned off after 5 minutes. |
| **DUAL FEED** | (Only used with Dual Feed units) |
| Enable | Press ‘Enter’ then up/down to select 0 to disable or 1 to enable (Default = 0) |
| Idle Time | Press ‘Enter’ then up/down to select number of minutes to wait while switching between sample lines (Default = 2) |
| Cycle Time | Press ‘Enter’ then up/down to select minutes for total dual feed cycle time (15 - 60 minutes) (Default = 30) |
| **DARK CURRENT** | ***Factory setting** |
| Set Value | Press ‘Enter’ then up/down to adjust the dark current |
| **SET POTENTIOMETERS** | ***Factory setting** |
| Set Water | Press ‘Enter’ then up/down to adjust the water potentiometer |
| Set Lamp | Press ‘Enter’ then up/down to adjust the lamp potentiometer |
| **CORRELATION CALCULATION** | **(Default = 100)** |
| Slope 1 | Press ‘Enter’ then up/down to adjust the linear correlation factor for the correlated measurement – single feed |
| Slope 2 | Press ‘Enter’ then up/down to adjust the linear correlation factor for the correlated measurement – dual feed |
| **TURBIDITY COMP.** | |
| Enable | Press ‘Enter’ then up/down to select 0 to disable or 1 to enable. |
| Weighting | (Default = 100) |
| Dark Current | 0 |
| Pot Value | 245 |

* Factory setting - unit specific value set at factory. Value can be located on the label on the inside of the cabinet door.

# 10 4-20 mA Setup

The UVM5000 is equipped with a 4-20 mA output capability.

The 4-20 mA can be set to produce a user selectable UVT or UVA value for the low (4 mA) and a separate value for high (20 mA) up to 110% UVT.

Figure 10.1 below is an example of a 4-20 mA setup for a customer who wanted to log UVT values between 40% and 80% UVT.

Refer to 4-20 mA setup in the menu system.

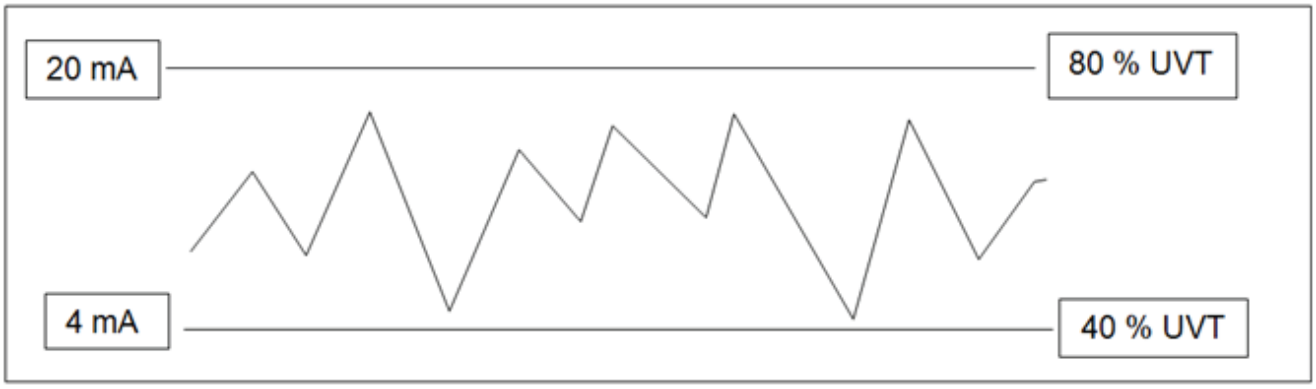



**Figure 10.1: 4-20 mA set-up**

# 11 RS-232 Data Logging

The UVM5000 has the capability to data log various performance variables on a local computer via an RS-232 interface. The data log frequency as well as the specific data to be logged is configurable. Refer to RS-232 Data Log in the menu structure.

The RS-232 data feed is through a 9-pin serial cable to a com port on a local computer supplied by the owner. Only 2 wires are used as shown in Figure 11.1. If the computer does not have a 9-pin serial port, then a USB to serial adapter can be used.

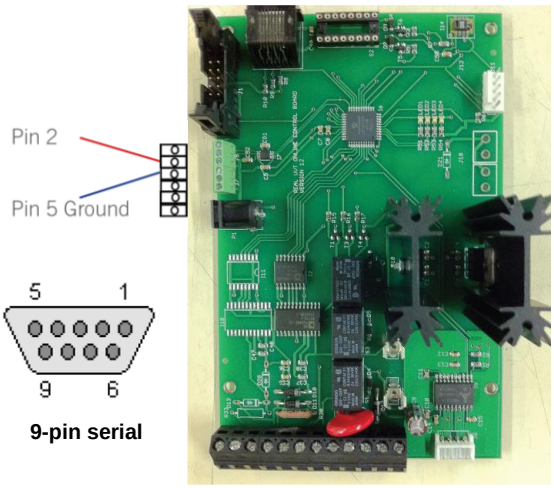



**Figure 11.1: Main board**

Note that the communication protocol for RS232 is ASCII. An example of one data stack is shown here based on the use of optional turbidity compensation:

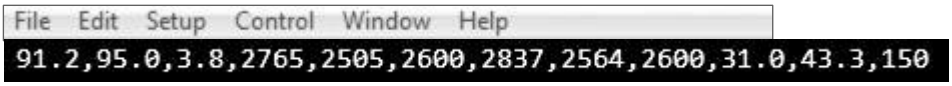

The order of the data stack in ASCII (from left to right) is: UVT (or UVA) | Lamp 1 | Water 1 | VIS 1 | Lamp 2 | Water 2 | VIS 2 | Temperature | Humidity | Status. The output value can be UVT, UVA, or correlation mode, which is selected via the UVA/UVT Mode in the Analyzer menu in Section 9.

Table 5 itemizes each parameter and its corresponding value. Without turbidity compensation, no VIS 1 or 2 values would be listed.

**Table 5: Data logging - ASCII string description for Analyzer**

| PARAMETER | VALUE |
|---|---|
| UVT | 91.2 |
| LAMP 1 | 2765 |
| WATER 1 | 2505 |
| VIS 1 (Optional) | 2600 |
| LAMP 2 | 2837 |
| WATER 2 | 2564 |
| VIS 2 (Optional) | 2600 |
| TEMPERATURE | 31.0 |
| HUMIDITY | 43.3 |
| STATUS | 150 |

If your system has a Dual Feed accessory (and optional turbidity compensation is still in effect), the ASCII string would be slightly different. UVT is replaced by UVT 1 and 2, which correspond to Stream 1 and 2, and % Removal. An example of one row of characters is shown below:




The order of the data stack in ASCII (from left to right) is: UVT 1 | UVT 2 | % Removal | Lamp 1 | Water 1 | VIS 1 | Lamp 2 | Water 2 | VIS 2 | Temperature | Humidity | Status

Table 6 itemizes each parameter and its corresponding value. Without turbidity compensation, no VIS 1 or 2 values would be listed.

**Table 6: Data Logging - ASCII string description for Analyzer with Dual Feed**

| PARAMETER | VALUE |
|---|---|
| UVT 1 (Stream 1) | 91.2 |
| UVT 2 (Stream 2) | 95.0 |
| % REMOVAL | 3.8 |
| LAMP 1 | 2765 |
| WATER 1 | 2505 |
| VIS 1 (Optional) | 2600 |
| LAMP 2 | 2837 |
| WATER 2 | 2564 |
| VIS 2 (Optional) | 2600 |
| TEMPERATURE | 31.0 |
| HUMIDITY | 43.3 |
| STATUS | 150 |

# 12 Slope Correlation Method

The following method can be used to correlate the UV254 data to the parameter of choice such as TOC, COD, etc. Note that for many applications the absorbance reading of the UVM5000 can correlate very well with standard water quality parameters.

1. Make sure the main display screen shows the UV absorbance (UVA) value of the water currently flowing through the monitor. Record the UVA value (UVA Value).

2. Immediately after recording the displayed value, take a water sample.

3. Using a lab or a portable test instrument, determine the value of the desired water quality parameter (factor programmed to COD, TOC, DOC, BOD, Color, etc.) for the water sample (Lab Value).

4. The relationship between the UVA value and the desired water quality parameter can then be determined using the formula on the right.

$$\textit{Slope to Enter} = \frac{\textit{Lab Value}}{\textit{UVA Value}}$$

5. Alternatively, the slope can be determined via multiple test points over the expected testing range of the monitor. In this case, the slope can be calculated simply using a spreadsheet package (such as Microsoft Excel) to plot a best fit line through several test points.

6. Once the slope (correlation factor) has been determined, enter it in the “Slope 1:” field within the Crltn. Calculation menu. The default value is 100 and the range is from 0 to 500.


7. Expand the +UVT/UVA mode menu, scroll down to Crltn mode and select it.

8. A value for the water parameter is now displayed on the main display page.

9. The slope can be re-determined using the above steps as necessary.


**Note:** Monitors with Dual Feed option use two correlation factors (Slope 1 for stream 1 and Slope 2 for stream 2).

# 13 Dehumidifier for Humidity Control

The UVM5000 includes a dehumidifier to control the humidity inside the monitor. Standing upright in a holder at the bottom left corner of the monitor as pictured in Figure 13.1, the dehumidifier maintains low relative humidity (RH) to prevent condensation from forming on the quartz flow cell walls.


**Figure 13.1: Dehumidifier in position**

The color of the beads visible through the plastic window on the front of the dehumidifier indicate the degree of moisture saturation (See Figure 13.2). Dry is indicated by yellow and wet is indicated by green. The unit lasts 20-30 days before regeneration is needed.

When a recharge is required, remove the dehumidifier from the cabinet and plug it into a 110 - 240 VAC wall outlet for 10-12 hours to regenerate. The color of the beads will change from green to yellow when the dehumidifier is fully regenerated.

The dehumidifier may take several minutes and possibly up to an hour to properly dry the air inside the monitor. Each time the door to the cabinet is opened this drying process starts over, so it is recommended to keep the cabinet door closed as much as possible when in a high ambient humidity environment.


**Figure 13.2: Dehumidifier Bead Color and Moisture Saturation**

The humidity alarm (See Figure 13.3) is triggered if the humidity level is 25 %RH or above. Note that this level of humidity is not necessarily harmful to the monitor. The main problem posed by humidity is the increased potential for condensation forming on the flow cell especially if the sample water is very cold, as this can severely affect the accuracy of the monitor.

To check the progress of the drying process, use the “Humidity” entry under “Secondary Data” in the main menu to check the current relative humidity inside the monitor.


**Figure 13.3: Humidity Alarm**

At sites where humidity is known to not be excessively high, and where water temperature is known to be room temperature or above, it may not be necessary to use the dehumidifier as condensation cannot form on the flow cell under these conditions.

# 14 Maintenance

A standard recommended maintenance schedule is as follows:

**Table 7: Maintenance tasks and frequency**

| FREQUENCY | TASK |
|---|---|
| Weekly | Visual inspection (display faults, etc.) |
| Monthly | Validate UVM5000 reading with a Chemtrac UVP1000 Portable Organics Monitor, or equivalent. Recalibrate if necessary. |
| 12-18 Months | Replace UV Lamp and Ribbon Cable |

## 14.1 Cleaning Frequency and Fluid

Two of the most important factors that affect the analyzer performance are the cleaning fluid used to clean the flow cell, and how often the flow cell is cleaned (cleaning frequency). The optimum cleaning fluid and cleaning frequency is dependent on the type of sample water being analyzed.

### 14.1.1 Cleaning Frequency

The optimum frequency of cleaning is quite variable depending on the amount and type of fouling agents in the water. This will be dependent on the application and installation point.

The following frequencies may be used as a starting point upon installation.

Wastewater: 4-24 hour frequency

Source Water: 1-7 day frequency

High Purity: 2-4 week frequency

Once in operation, observe the flow cell for signs of fouling prior to the first cleaning cycle. If fouling is present, increase the cleaning frequency accordingly. The measured data can also be observed for signs of a “sawtooth” effect in UVT mode as shown in Figure 14.1. If the sawtooth effect in UVT mode shows a downward trend as displayed in Figure 14.2, the sensor is drifting, and cleaning frequency must be increased. Figure 14.3 and Figure 14.4 show the sawtooth pattern in UVA mode (next page).

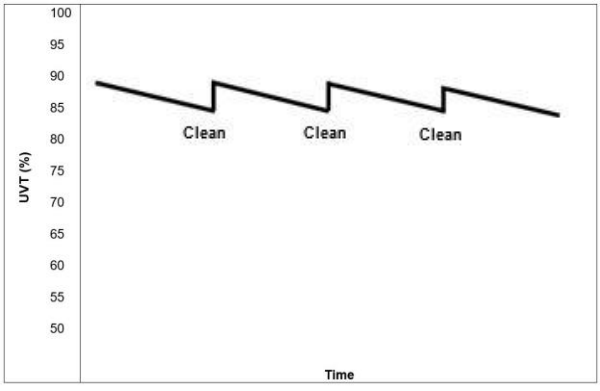



**Figure 14.1: UVT Mode - Effective Cleaning**

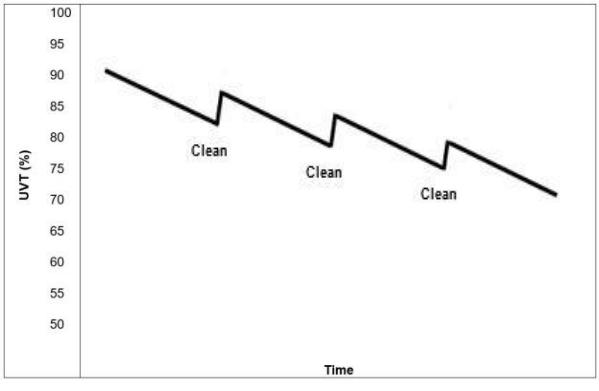



**Figure 14.2: UVT Mode - Inadequate Cleaning**

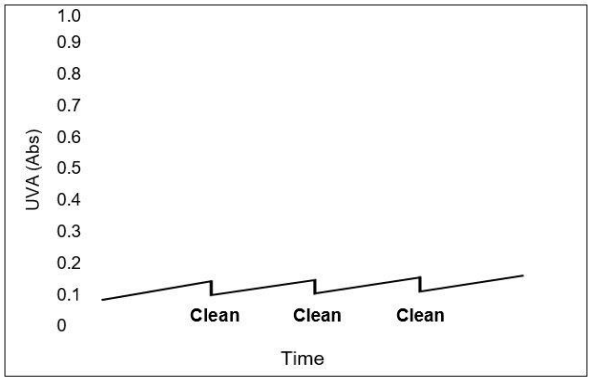



**Figure 14.3: UVA Mode - Effective cleaning**

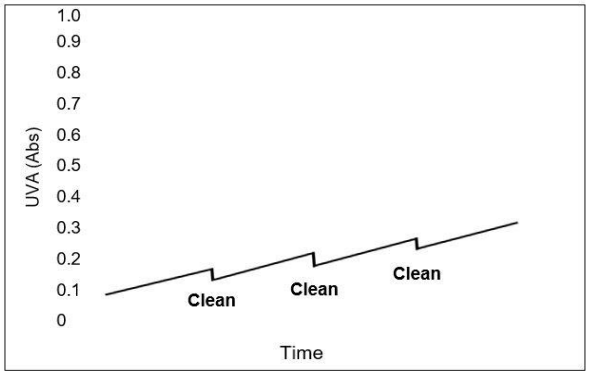



**Figure 14.4: UVA Mode - Inadequate cleaning**

### 14.1.2 Cleaning Fluid

Selecting an effective cleaning solution is essential for optimal performance. The following commercial cleaning solutions and acids are readily available to remove common fouling agents.

**Table 8: Commercial cleaning solutions**

| SOLUTION | FOULING AGENTS |
|---|---|
| Lactic Acid <20% solution (CLR®) | Removes lime, calcium, rust, magnesium, and other dissolved minerals |
| Sulfamic Acid <10% solution (Lime Away®) | Removes lime, calcium, rust, magnesium, and other dissolved minerals |
| Phosphoric Acid <30% solution (Rust Off, Hagasen Blue) | Removes lime, calcium, rust and color staining |
| Citric Acid <20% solution | Removes mineral scaling |
| Sodium Hypochlorite <6% solution | Removes oil, grease and biofilm |
| Acetic Acid <20% solution | Removes oil and grease |
| Sulfuric Acid <10% solution | Removes oil and grease |

## 14.2 Cleaning Quartz Flow Cell

The optimal cleaning method for the UVM5000 is an automatic scheduled clean with the Auto Clean System.

Without the Auto Clean System, cleaning of the quartz flow cell can be performed using either the in-situ method or the manual method. The in-situ method is recommended since it is much faster and easier and just as effective.

### 14.2.1 In-situ Quartz Flow Cell Cleaning Method

1. Shut off the water supply to the monitor if not already done.
2. Disconnect the ¼” supply tubing at inlet connection on the monitor.
3. Fill the supplied wash bottle with cleaning fluid and connect the ¼” bottle tubing to the inlet connection on the monitor.
4. Hold a finger over the small vent hole in the wash bottle cap, as shown in Figure 14.5.

**Figure 14.5: Setting up flow**

5. Squeeze the bottle to get the cleaning fluid to flow through the monitor.
6. Once the fluid starts to flow, remove finger from the vent hole and place bottle on top of the monitor, as shown in Figure 14.6. The fluid should continue to flow through the monitor. If it stops go back to step 4.
7. Let all the fluid run through the quartz flow cell until the bottle is empty, then disconnect the hose and bottle from the fitting.
8. Let the fluid remain in the quartz flow cell for 5-10 minutes until the quartz flow cell is clean.
9. Connect the supply line to the unit and open the valve to start the flow running.
10. If UV values do not come back in line with the known UV value, it is recommended to re-zero the monitor.

**Figure 14.6: Bottle on top of cabinet**

### 14.2.2 Manual Quartz Flow Cell Cleaning Method and Quartz Flow Cell Removal

1. Shut off the power to the monitor and close the water supply.
2. Place a container under the port connections to collect any water that may drain from the monitor. Disconnect the ¼" tubing at inlet and outlet connections on the monitor, to drain as much of the water as possible.
3. Open door of monitor and place a paper towel or cloth below flow cell because some water may still be in the cell. Slowly lift the blue lever of the quartz flow cell clamp pictured in Figure 14.7 on the right.
4. Grip the quartz flow cell with two fingers at the top and carefully remove from the holder.
5. Clean the quartz flow cell.
6. Place the quartz flow cell back in the holder (ensuring there are no fingerprints on both sides of the quartz flow cell where the light path comes through).
7. Lower the blue lever of the quartz flow cell clamp very slowly to lock the quartz flow cell in place, making sure the quartz flow cell is properly aligned as you lower the clamp.
8. Close the door of the monitor and reconnect the tubing.

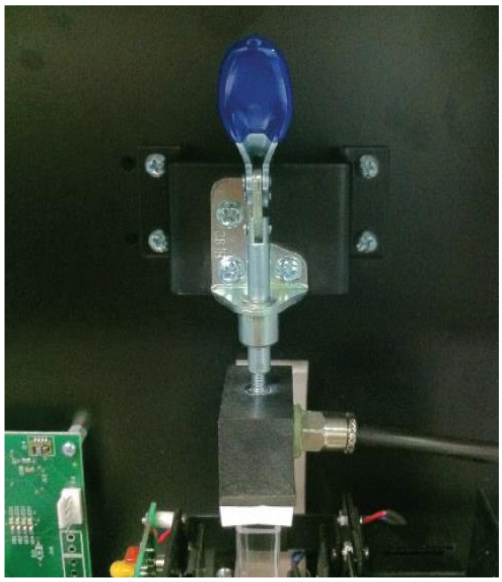


**Figure 14.7: Release clamp**

## 14.3 Replacing the UV Lamp

The lamp has a rated life of 12,000 hours, however under normal use it should last much longer. When the message “FAULT: Lamp Low” is displayed on the screen the lamp should be replaced. Note that the monitor will still work for some time with this warning on the screen, but it is recommended to replace the lamp at this point as soon as possible to ensure accuracy of the monitor. It is recommended that the lamp be replaced every 18 months or so for preventative maintenance. It is recommended that the blue-ribbon cable be replaced also at this time. Contact Chemtrac, or your supplier for a replacement lamp.

To replace the UV lamp, follow these steps:

1. Unplug the monitor from the power supply.
2. Shut off the water flow.
3. Drain the flow cell by disconnecting the ¼” tubing from the external push-in fittings on the side of the monitor.
4. Remove the flow cell by pulling up on the blue handle of the toggle clamp above the flow cell, being careful to hold the flow cell to prevent it from falling.
5. Disconnect the blue-ribbon cable from the rotating arm assembly.
6. Loosen the set screw that secures the rotating arm assembly to the motor shaft as shown in Figure 14.8.
7. Lift up on the rotating arm assembly and remove the assembly.
8. Use a small flat head screwdriver to pry the lamp base from the ceramic lamp socket, as shown in Figure 14.9.
9. Press the new lamp securely into the ceramic lamp socket.

Steps continued on next page…

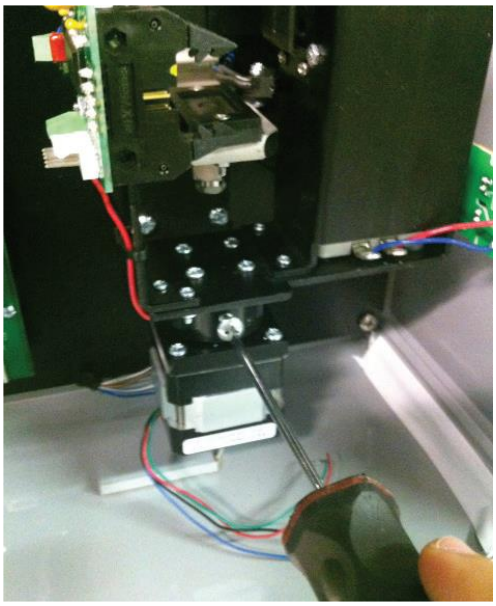


**Figure 14.8: Unscrew set screw**

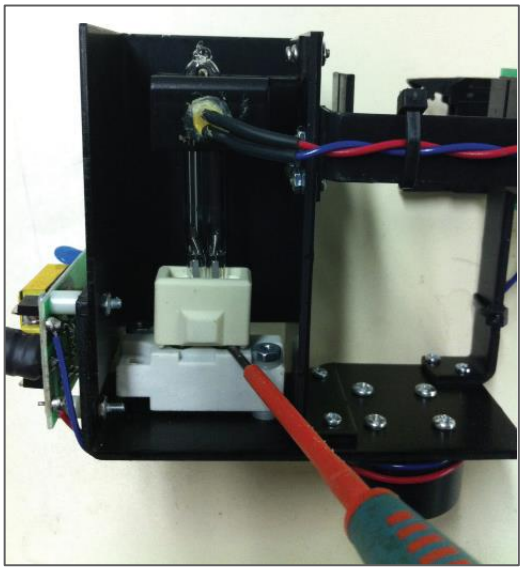


**Figure 14.9: Lever lamp out of socket**

10. Replace the rotating arm assembly back onto the motor shaft and tighten the set screw on the flat of the motor shaft.

11. Replace the blue-ribbon cable.

12. Replace the flow cell being careful the flow cell is properly aligned before lowering the toggle clamp, as shown in Figure 14.10.

13. Make sure the toggle clamp is pressed all the way down and the ¼” tubing is reconnected before starting the water flow again.

14. Check for leaks. If a leak occurs, immediately shut off the water supply and drain the flow cell and then reinstall it.

15. Power the monitor.

16. Close the door and watch the “Secondary Data” entry in the main menu to make sure raw sensor values are at expected levels.

**Note:** W and L values should be between 2000 and 3500 with DI water in the flow cell. These values will increase as the UV lamp warms up and so these values should be checked several minutes after the UV lamp turns on. If the raw sensor values do not reach the levels indicated, or they are too high, then contact Chemtrac, or your supplier for assistance.

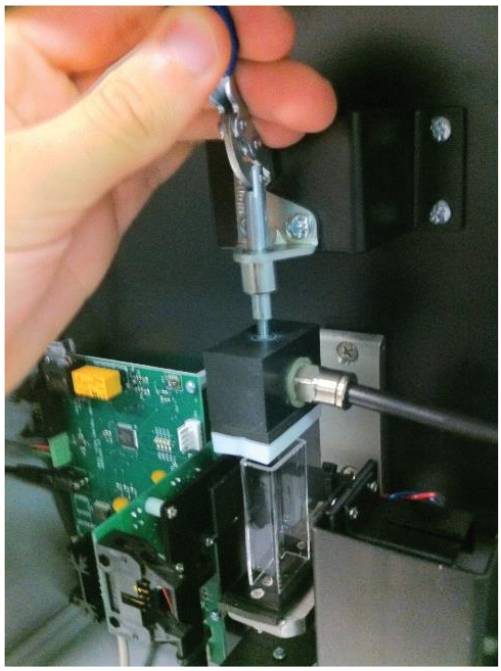


**Figure 14.10: Replace flow cell and lower clamp**

## 14.4 Ribbon Cable Replacement

The blue-ribbon cable that connects the main circuit board to the sensor board located on the rotating assembly is a Teflon, high flex 10 conductor cable. It is designed to withstand long term exposure to the deep UV light present inside the cabinet.

However, even this high flex cable will need to be replaced from time to time. Chemtrac recommends replacing the blue-ribbon cable every 12-18 months as preemptive maintenance.

The replacement is a very simple procedure requiring no tools:

1. Unclip the end connectors that secure the old ribbon cable to the control board and rotating arm by opening the wing clips.
2. Pull out the connector and reconnect the end connectors of the ribbon cable.
3. Close the wing clips to secure the new cable.

**Note:** A spare cable is included with every new UVM5000 Organics Monitor and is attached to the inside of the cabinet door. To order more cables please contact Chemtrac.

# 15 Troubleshooting Guide

An operator has three sources of information for system diagnostics:

1. LEDs on the main circuit board
2. System alarms displayed on the operator interface panel
3. Raw sensor data displayed via the “Secondary Data” menu on the operator interface panel

## 15.1 Main Circuit Board LEDs

If the system ever “freezes”, open the door and check the state of the LEDs on the Main Control Board. Normally, the pattern of lighting from the LEDs change in specific sequence to indicate different states of operation. If the LEDs are not changing after one minute, make a note of which ones are on or off, and compare that pattern to the table below. In the table, a zero means an LED is OFF, while 1 means an LED is ON.

**Warning**: The UV light may be left on when the door is opened. Make sure you have appropriate eye protection or restart with the door open.

| LED4 | LED3 | LED2 | LED1 | PROBLEM | SOLUTION |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | No power | Check power connections<br><br>Check fuse on main circuit board. If blown replace with 20mm x 5mm |
| 1 | 1 | 0 | 0 | Bad reference position check | Check reference microswitch on motor bracket. If damaged it may need to be replaced.<br><br>Check set screw attaching rotating mechanism to motor shaft is tightened on the flat of the motor shaft<br><br>If motor does not move shortly after startup, check motor connection to main circuit board. Possible bad motor or motor controller on main circuit board |
| 1 | 0 | 1 | 0 | Communication error to sensor board | Check connections from main circuit board to sensor board.<br><br>Check for breaks in the blue-ribbon cable.<br><br>May need to replace the sensor board. |
| 1 | 0 | 0 | 1 | Communication error to display board | Check serial and power connections to display board.<br><br>May need to replace display board. |

**Note:** Each UVM5000 is factory-calibrated to the specific components and the finished construction of the unit. Information for the calibration of a unit is stored on the main circuit board. Therefore, swapping boards means the calibration for a given unit is no longer correct as it based on the precise relationships between the components. When communication issues arise that could be an indication of circuit board failure or damage, contact Chemtrac for assistance.

## 15.2 Alarms and Warnings

Alarms and warnings related to lamp operation and analyzer status are listed under the “Alarms” menu. Alarms and warnings need to be enabled under the “Set Alarms” menu in order to be displayed.

| ALARM | PROBLEM / CONDITION | SOLUTION |
|---|---|---|
| Humidity | Humidity inside the analyzer is approaching a level that could cause condensation on the flow cell if water temperature is low enough. | The humidity alarm is tripped when the humidity level inside the analyzer is greater than 25%RH. If the water temperature is cold, then condensation could occur on the flow cell windows at this level of humidity. The dehumidifier included with the analyzer can be used to reduce the humidity to a level that will prevent condensation no matter what the water temperature.<br><br>If the sample water is warm, condensation on the flow cell may not be likely. In this case it may be possible to ignore or turn off the humidity alarm. |
| Lamp Off | Lamp output is too low to provide accurate measurements. | The lamp may need to be replaced if the lamp use is close to or more than 12,000 hours/18 months. Contact Chemtrac for replacement.<br><br>Note that the lamp may take several minutes to ignite after closing the door, especially after shipping. |
| Lamp High | The lamp output is too high and is out of range of the sensor. | If a new lamp has been installed it may be necessary to adjust the internal gain of the sensor. This can be performed by adjusting lamp sensor and water sensor potentiometer settings in the main menu. Note that higher potentiometer values decrease the sensor values. Note that if adjustment is necessary it is recommended to adjust both lamp and water potentiometers by the same amount to ensure best performance. |
| Lamp Low | The lamp output is low but not too low for the analyzer to provide accurate measurements. | It is nearly time for the lamp to be replaced, however, the lamp output is still high enough for the analyzer to produce accurate measurements. |
| Leak Detection | A leak has been detected inside the analyzer. | Immediately shut off the water flow to the analyzer.<br><br>Shut off the power to the analyzer after shutting off the water flow.<br><br>Assess the damage inside the analyzer and call Chemtrac for further instructions.<br><br>If the Auto Clean system is connected to the analyzer it will have been signaled to shut of the water flow assuming no electrical short has occurred. Note that the Auto Clean system requires power and signals from the analyzer to shut off the water flow. |
| Sensor Comm | There is a communication error between the sensor and the main board. | Check the ribbon cable for damage. Replace the cable if damage has occurred. |

| ALARM | PROBLEM / CONDITION | SOLUTION |
|---|---|---|
| Temperature | Internal temperature of the analyzer is approaching maximum recommended operating temperature. | It may be necessary to relocate the analyzer to a cooler location or if it is outside it could require shading from the sun. |
| UVT Warning | UVT value is approaching the operator setpoint. | Flow cell is dirty and needs to be cleaned OR a grab sample should be obtained and compared to the sample water to confirm measurement. |
| UVT Alarm | UVT value is below the operator setpoint. | Flow cell is dirty and needs to be cleaned OR a grab sample should be obtained and compared to the sample water to confirm measurement. |
| UVA Warning | UVA value is approaching the operator setpoint. | Flow cell is dirty and needs to be cleaned OR a grab sample should be obtained and compared to the sample water to confirm measurement. |
| UVA Alarm | UVA value is above the operator setpoint. | Flow cell is dirty and needs to be cleaned OR a grab sample should be obtained and compared to the sample water to confirm measurement. |

## 15.3 Secondary Data

The “Secondary Data” menu gives raw data on four variables: Lamp, Water, Temperature, and Humidity.

| MENU ITEM | ROTATION POSITION | WATER PATHLENGTH | IDEAL VALUE |
|---|---|---|---|
| Lamp 1 | 1 | N/A | 1500 – 3500 |
| Water 1 | 1 | 2 cm | 50 – 3500 |
| Lamp 2 | 2 | N/A | 1500 – 3500 |
| Water 2 | 2 | 1 cm | 50 – 3500 |
| Temperature | N/A | N/A | Above 0 and less than 50 degrees Celsius |
| Humidity | N/A | N/A | Less than 25% relative humidity |

Rotation position 1 means the lamp is oriented to measure flow cell at the 2 cm path length. Rotation position 2 means the lamp assembly has rotated 90 degrees to measure the path length of 1 cm. In positions 1 and 2, the lamp’s values should be identical as the distance between the lamp and sensor is constant.

If all six numbers display 0, this indicates the system did not start up correctly (refer to the diagnostic LED’s). If Lamp and Water numbers are 0 but humidity and temperature data appears to be correct then this indicates a communication problem with the sensor board located on the rotating assembly.

### 15.3.1 Lamp Numbers

Lamp numbers are not affected by sample water absorbance as they are a direct reading of the lamp output.

| CONDITION | VALUE | ISSUE / ACTION |
|---|---|---|
| Values fluctuate more than 20 points after monitor has warmed up. | Fluctuating | Problem with lamp or lamp sensor. |
| Current lamp may be brighter than previous one. | 4,000 and higher | Change lamp or wait for a 14-day burn-in period to see if lamp value falls below 4,000. |
| Lamp Low alarm appears. | 1000 - 1500 | Replace lamp. |
| New lamp | Significantly lower than 1,500 | Lamp may be faulty; possibly damaged during shipping. |

### 15.3.2 Water Numbers

Water numbers are dependent on the absorbance of the sample water stream.

| CONDITION | VALUE | ISSUE / ACTION |
|---|---|---|
| Lamp values within range. | Less than 100 | Sample is close to the bottom of the measurement range OR flow cell needs to be cleaned. |
| DI water in flow cell | Difference between Water 1 and Water 2 is greater than 100 points. | Flow cell has been fouled or has scaling and should be cleaned. |

### 15.3.3 Temperature and Humidity

The internal temperature should be kept below 50 degrees Celsius. The system will alarm if this temperature is reached. If this happens, it may indicate the monitor should be moved to a shaded or cooler location.

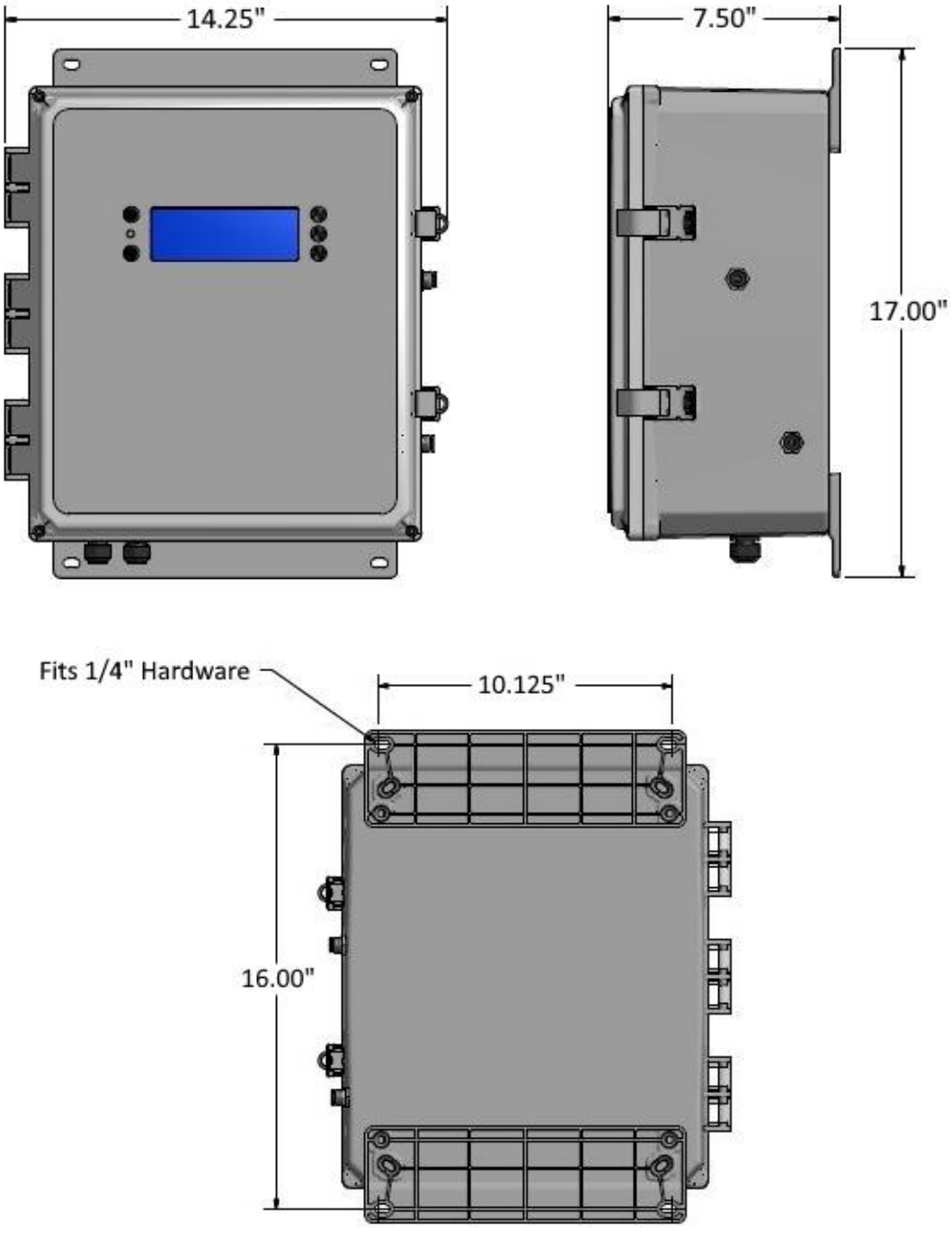
Humidity should be kept as low as possible especially when the sample water is cold as condensation can form on the flow cell which can severely affect accuracy. Please refer to the Dehumidifier section of this manual.

# 16 Parts

| PRODUCT NAME | DESCRIPTION | PART NUMBER |
|---|---|---|
| UV Lamp | UV Lamp for online monitors | 25190 |
| Dehumidifier | Rechargeable dehumidifier for online monitors | 25160 |
| Calibration Bottle | Plastic Calibration Bottle for UV254 analyzers | 25155 |
| Standard Power Supply | 24 VDC Power adapter and cable for UV254 analyzers | 25170 |
| NEMA 4/IP65 Power Supply | 1.6A NEMA 4/IP65 rated power supply for M series analyzers | 25175 |
| Ribbon Cable | Ribbon cable for UV254 analyzers | 25390 |
| Flow Cell 10mm x 20mm | 10mm x 20mm quartz flow cell for UVM5000 Organics Monitor and UV1 Organics sensor | 25150 |

# 17 Cabinet Dimensions and Clearance

The front, side, and back views of the cabinet are shown below to the nearest 1/8 inch. The back view gives the dimensions relevant for spacing of screws to mount the cabinet. Allow a clearance of 6 inches around the cabinet for unit connection.



# 18 Warranty

Chemtrac, Inc. warrants its equipment to be free from defects in material and workmanship for a period of one (1) year from date of shipment to the original purchaser. Upon receipt of written notice from purchaser, seller shall repair or replace the equipment (at option of Chemtrac, Inc.).

Chemtrac, Inc. assumes no responsibility for equipment damage or failure caused by:

1. Improper installation, operation, or maintenance of equipment.
2. Abnormal wear and tear on moving parts caused by some processes.
3. Acts of nature (i.e. lightning, etc.)

This warranty represents the exclusive remedy of damage or failure of equipment. In no event shall Chemtrac, Inc. be liable for any special, incidental, or consequential damage such as loss of production or profits.

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