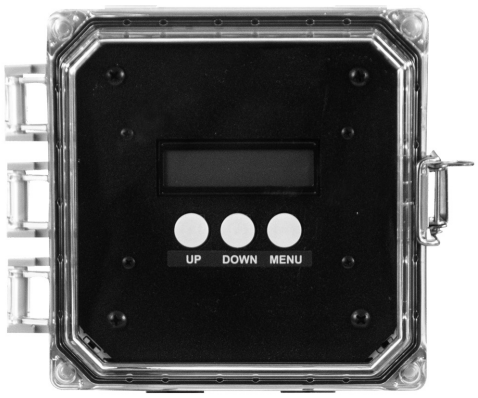
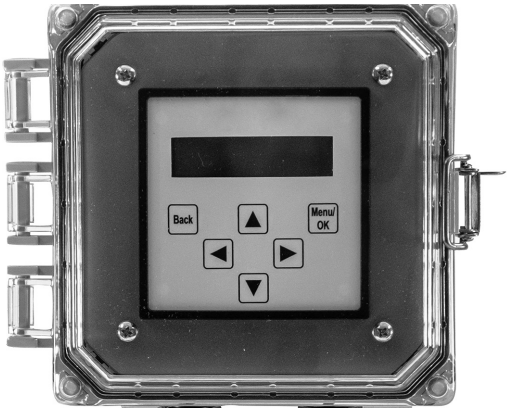
SAFE WATER TECHNOLOGIES, INC.

OPERATION MANUAL

UV MONITORING SYSTEM OPTIONS





STANDARD UV MONITORING SYSTEM

OPTIONAL UV MONITORING STATION

NOV 2020

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SAFETY INSTRUCTIONS

In order to protect end users and operators from injury, safety precautions must be followed. This Operation Manual outlines important safety issues.

1) INFORMATION

Please read this manual prior to installing, starting up, and operating the equipment. The equipment uses the latest in UV technology, and has been designed to make operation and maintenance easy.

The quality of the liquid entering the UV system needs to be monitored. Based on water quality, the UV system will need to be cleaned on a periodic basis. Maintenance of the UV system will require replacement parts. It is suggested that key spare and replacement parts be kept on hand. For best operation, always use manufacturer recommended replacement parts. Other replacement parts could result in damage to the system and void the warranty.

2) SAFETY PRECAUTIONS

Read and follow all safety precautions to guard against injury. Basic safety precautions must be observed. Keep on hand for future reference.

CAUTIONS:

- UV lamps and their quartz sleeves can become razor sharp if broken. Take care when installing and removing the quartz sleeves.

- Only hand-tighten compression fittings. Do not use wrenches or other tools.

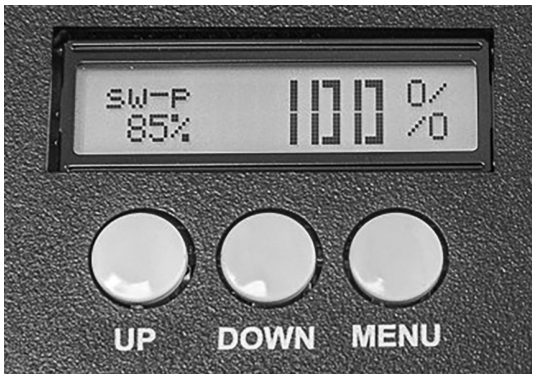
- UV light is extremely harmful to eyes and skin and will cause burns. Do not look directly or indirectly at the UV light. Do not expose your skin for any prolonged time. Use protective clothing and eyewear (make sure it is UV resistant) when servicing equipment. If accidentally exposed to UV light for an extended period, immediately seek medical attention. Symptoms for eye exposure include burning, itching, and redness. Symptoms for skin exposure are similar to sun burn.

- Use cotton gloves when handling lamps and quartz sleeves. Skin oils will adhere to the lamps and sleeves and prevent UV light from properly emanating. If the sleeves become dirty, wipe them with a lint-free cloth and denatured alcohol.

3) UV MONITORING SYSTEM OPTIONS

GENERAL SYSTEM INFORMATION

SWT's UV water treatment systems are equipped with either the optional Standard UV Monitoring System or the optional UV Monitoring Station. These UV monitoring systems are manufactured with sophisticated electronics and use the latest in UV technology.



The Standard UV Monitoring System is an industry leading system that monitors the UV irradiance of your ultraviolet unit's performance. It consist of a digital display with a push button operation, a sensor probe, and sensor cable.

The optional UV Monitoring Station is an industry leading system to monitor many aspects of your ultraviolet unit's performance. Monitoring system performance to ensure the required UV radiation is being generated is key to providing proper disinfection. The Monitoring Station is composed of the monitoring terminal, multipurpose sensor probe, and sensor cable.

4) STANDARD UV MONITORING SYSTEM OPERATION

a) General System Information

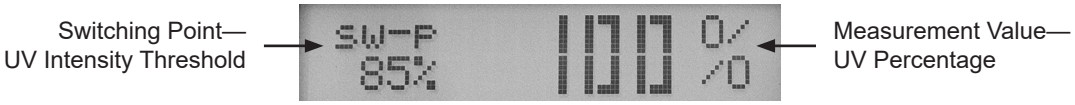
The Standard UV Monitoring System will monitor and measure certain aspects of your ultraviolet unit's performance. Monitoring system performance to ensure the required UV radiation is being generated is key to providing proper disinfection. The monitoring system consists of a digital display with a push button operation, a sensor probe, and sensor cable.

The Standard UV Monitoring System monitors signals from the sensor probe. The front panel contains the operational buttons and a display. The system is capable of monitoring lamp runtime hours and relative UV lamp intensity.

b) Standard UV Monitor Display Information

NOTE: For a complete menu of all monitor functions, please refer to the Standard UV Monitoring System Display Flow Chart in this manual.

The UV monitor consists of a digital display and is controlled by the three navigational push buttons. The UP—DOWN—MENU push buttons are for setting and activating both the control functions and display functions of the monitor.



1. Measurement Value Display

Under normal operating conditions, the measurement value display will read UV Intensity as a percentage and the UV intensity threshold switching point.

2. Navigational Buttons

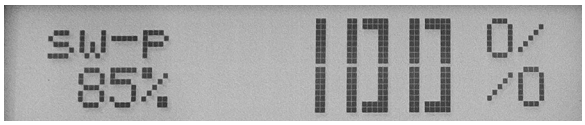
The Standard UV Monitoring System is controlled by the three navigational push buttons on

the front display. These buttons include: UP, DOWN, MENU.

To begin navigation, press the MENU button, then use the UP and DOWN buttons to scroll through and set the various functions. When setting a value, press the MENU button to move the cursor one digit to the left then use the UP/DOWN buttons to select the desired value. To set the monitor functions, press and hold the MENU button.

3. Display and Control Functions

1) Measurement Value Display

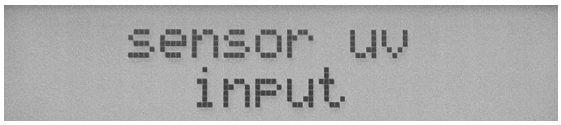


Displays the alarm set point and current UV reading.

2) Password

Must be activated to set.

3) Sensor UV

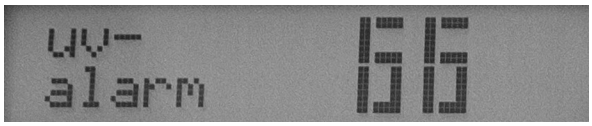


Sets the required input UV measurements

4) Lifetime Hours

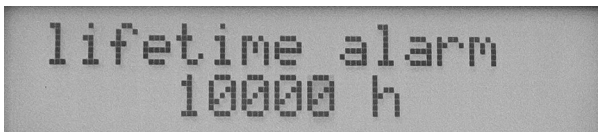
Keeps track of the number of hours the lamp(s) have been operational.

5) UV Alarm



Warns when the UV intensity has fallen below the alarm set point.

6) Lifetime Alarm



Monitors lamp operating hours.

7) Iout Adjust

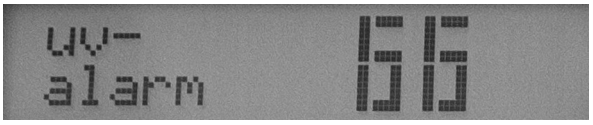
Sets the 20mA current output.

c) Standard UV Monitor Operation

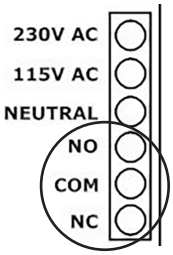
General System Information

The Standard UV Monitoring System is equipped with a sensor probe that will monitor UV output. UV light output measured from Lamp #1 by the UV sensor probe is transmitted to the monitor where it is processed and used to display UV lamp intensity as a percentage value from 0 to 100%. There is an alarm associated with UV intensity to warn when the UV intensity has fallen below a safe level.

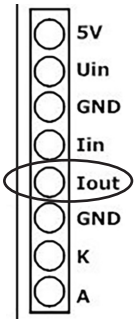
When new lamps are installed, the monitoring system will need to be calibrated to show the UV intensity at 100%. As the lamp(s) age and UV intensity falls, the UV display will reflect the lowered UV intensity.



If the UV intensity falls below the main alarm level (85%), the display will indicate "UV Alarm."



There is also a 5A 250V relay with normally open, common, and normally closed dry contacts for the alarm condition that will switch states when the UV alarm is activated.



The monitor is capable of remote monitoring of the UV intensity signal via a 4-20mA output.

1. **Sensor UV Setup**

   The Standard UV Monitoring System can be used with several different sensors and as such, proper settings need to be entered for the sensor type. This will be done by the manufacturer before the unit is shipped, but instructions are included here in case settings are lost or erroneously set to default.

   The type of input for the sensor needs to be entered. Follow these menu prompts:

   Menu > scroll up/down to sensor uv > press (MENU) > scroll up/down to input uv > press (MENU) > scroll up/down to diode > press and hold (MENU) to set > scroll up/down to return

2. **Initial Calibration**

   The monitor displays relative UV intensity in real time. Measured UV intensity is affected by lamp aging, water quality, sleeve conditions, and sensor window conditions, and as such, is a monitor of not only lamp conditions, but also a change in water quality, or fouling of sleeves and other UV transmission parts.

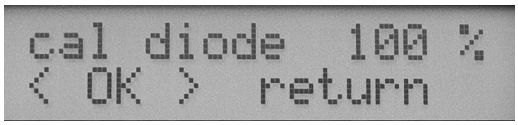
   The monitor can only be calibrated when the power switch is in the ON position and lamps are operational. Lamps must warm up for three minutes prior to any calibration. (See caution below as this process may possibly take longer.) When performing the initial calibration, the lamps must be new.

   The sensor probe has a diode that is sensitive to UV light. The greater the intensity of the lamp, the larger the signal sent out from the probe will be. The sensor probe is highly accurate and the measurement is in real time. Lamp intensity can vary with temperature and other conditions, so expect some fluctuation in the value as you are viewing the display.

   CAUTION: Allow at least three minutes for the lamp to come to full intensity. Depending on your specific water conditions, the lamp may only reach 95 to 99% of full intensity in the three minute warm-up period. It is possible for this process to take as long as an hour to reach full intensity.

   Menu > scroll up/down to sensor uv > press (MENU) > scroll up/down to calibr value > press (MENU) > set cal diode >

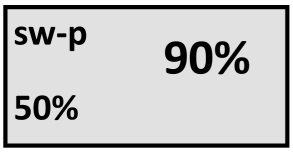
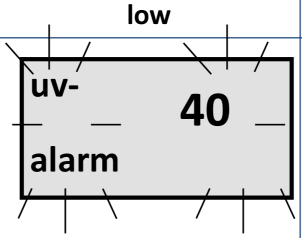
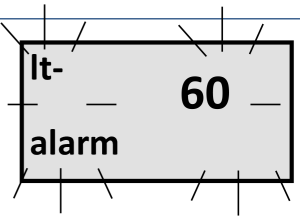
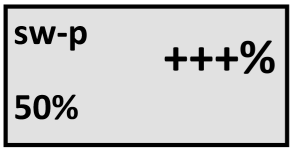
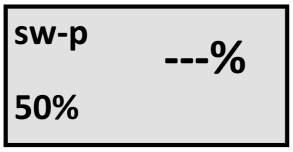
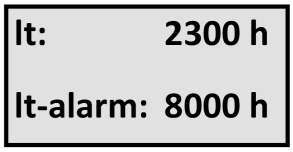
   Screen will now display as...

   Select <OK> then cal diode? select <OK> to confirm and the monitor is now calibrated to 100% > Press (MENU) again to return to the previous sub-menu.

3. **Recalibration at 100 hours**

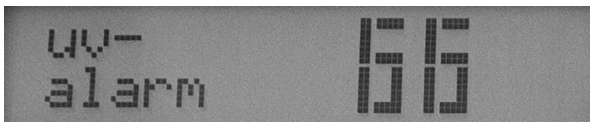
   UV lamps lose intensity at a higher rate than normal before they stabilize at around 100 hours. Recalibrate the cal diode=100% at the end of 100 hours as per the instructions above.

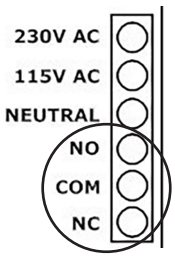
Relative UV Sensor Display View Chart		
Normal Mode of Operation	**UV irradiation is too low**	**Allowed life-time is exceeded**
		
Overload	**Sensor Fault**	**Lifetime Display—shown during 5sec after pressing the button "UP"**
		

4. UV Monitor Alarm Operation

1) UV Main Alarm Operation

As a standard, SWT's UV units are sized to a UV lamp end of lamp life at 85% of original intensity and conforms to common industry standards and practices for UV units with lamps that have a long life coating. Therefore, the UV alarm is set to alarm at 85% of original measured intensity. If the UV intensity falls below 85%, the unit is in danger of not producing the stated dosage for the flow rate and water type. When the UV intensity falls below the alarm set point, the display will read "UV Alarm" and the dry contacts on the alarm relay will change states.

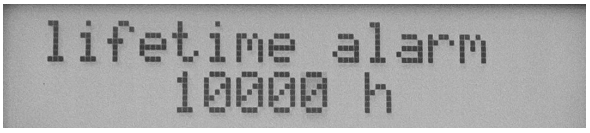




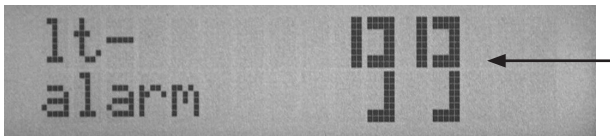
There are special cases where the UV alarm may be set at a different value, but these will be the exception rather than the rule.

2) Lifetime Alarm Operation

The lifetime alarm monitors lamp operating hours. UV lamps are generally replaced at the end of 10,000 hours, or 415 days. The lifetime alarm is set for 10,000 hours.



If the lamps are changed every 10,000 hours, lamp intensity should not have fallen below 85% and the unit should not fall into an alarm state. When lamp hours have exceeded the alarm set point, the measurement value display will read "lt alarm."



5. UV Monitor Alarm Calibration

1) UV Alarm Calibration

The UV alarm is factory set to 85%, which is end of lamp life for dosage calculations, and should not be changed. To change the UV alarm, follow these menu prompts:

Menu > scroll up/down to uv alarm > Press (MENU) > (5-90% / 0(off) (Default Value=(85%)) > scroll up/down to select > press and hold (MENU) to set

2) Lifetime Alarm

The lifetime alarm is factory set to 10,000 hours which is considered end of lamp life. Changing lamps at the recommended interval should prevent the unit from going into an alarm state due solely to intensity falloff of the UV lamp. To change the lifetime alarm, follow these menu prompts:

Menu > scroll up/down to lifetime alarm > Press (MENU) > (1—30000h / 0(off)) (Default Value=(10000h)) > Press (MENU) to move cursor to the left by 1 digit > scroll up/ down to select > press and hold (MENU) to set

3) Current Output (Iout Adjust)

The Standard UV Monitoring System is equipped to output a 4-20mA signal for remote monitoring of UV intensity. 20mA is set to reflect a value of 100% and the mode is set to 4-20, so that 4mA represents a value of 0. This value is set by the manufacturer before the unit is shipped, but instructions are included here in case settings are lost or erroneously set to default.

Follow these menu prompts to set maximum value at 100%:

Menu > scroll up/down to iout adjust > Press (MENU) > (10—500% (Default Value=100%)) > Press (MENU) to move cursor to the left by 1 digit > scroll up/down to select > press and hold (MENU) to set

4) Lamp Change Out Reset Instructions

Always follow your owner's manual for instructions on changing out your UV lamps. After any lamp change out, a number of settings will need to be reset.

a) Lifetime Counter

The lifetime counter tracks the number of hours on the lamps. When changing lamps, this value needs to be reset. To reset this value, follow these menu prompts:

Menu > scroll up/down to lifetime > Press (MENU) > scroll up/down to select (reset<return>) > scroll up/down to select (lifetime reset? <OK> return) > press and hold Menu to reset.

This will reset the lamp hours to zero (0).

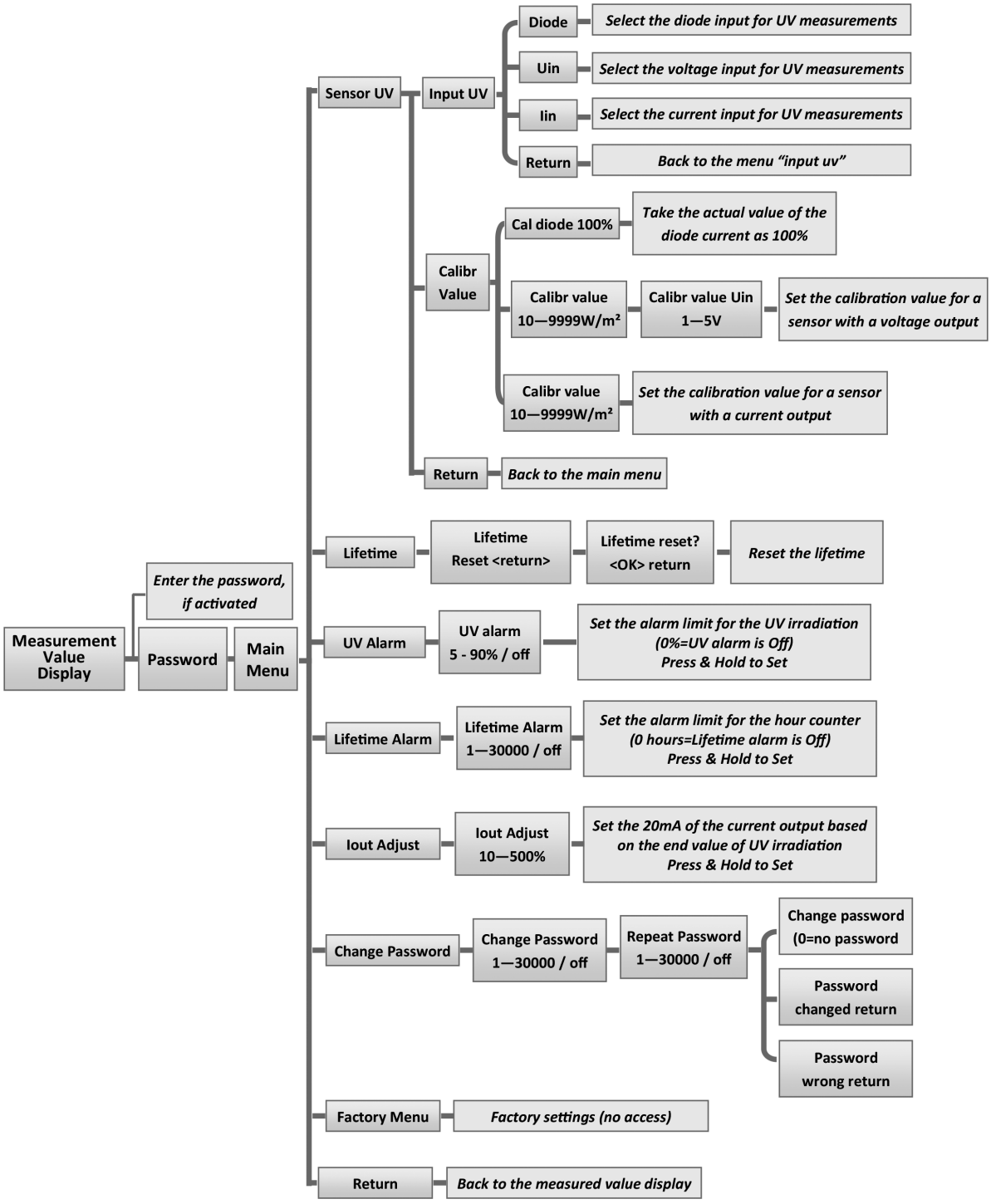
Lifetime reset can be checked from the main menu by pressing the UP button.

Refer to the Relative UV Sensor Display View Chart

b) Calibration

When lamps are changed, calibrate according to the initial calibration instructions. After 100 hours, when lamps have stabilized, recalibrate.

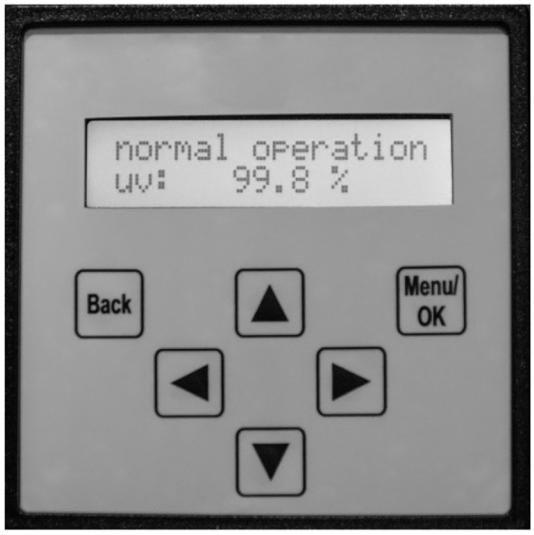
d) Standard UV Monitoring System Display Flow Chart



5) UV MONITORING STATION OPERATION

a) General System Information

The UV Monitoring Station is an industry leading system to monitor many aspects of your ultraviolet unit's performance. Monitoring system performance to ensure the required UV radiation is being generated is key to providing proper disinfection. The Monitoring Station is composed of the monitoring terminal and a multipurpose sensor probe.



The monitoring terminal is a self-contained unit that monitors signals from the sensor probe and offers a real-time digital readout of several vital aspects on the performance of the UV system. The front panel contains the operational buttons and a two line display with multicolored backlights for the display of measured values and the operating states. The terminal is capable of monitoring total runtime hours, lamp runtime hours, lamp intensity, relative UV percentage, temperature, and in some models, real-time dosage.

Wetted Sensor Probe

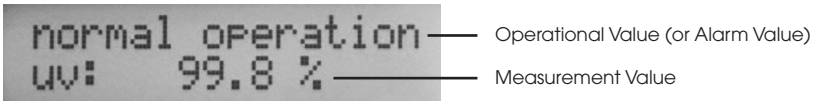
Non-Wetted Sensor Probe and Viewing Window

The monitoring terminal receives signals from one of two sensor probes (model dependent). Depending on the model, the system is either fitted with a wetted sensor or fitted with a non-wetted sensor and viewing window. PVC models use the non-wetted sensor probe and viewing window.

b) Monitoring Station Display

NOTE: For a complete menu of all monitor functions, please refer to the UV Monitoring Station Display Flow Chart in this manual.

The Monitoring Station display consists of two lines. The top line displays the Operational/Alarm Value and the bottom line displays the Measurement Value. The background of the display will change colors and is dependent on the system's current operating condition.



1. Operational Line Display

Under normal operating conditions, the Operational Line Display will read "normal operation" and the background color is blue.

There is a UV pre-alarm setting. Under pre-alarm conditions, the Operational Line Display will read "uv pre-alarm" and the background color will turn yellow-green.

There are various alarm settings available. Under alarm conditions, the Operational Line Display will read "(appropriate) alarm" (be it UV alarm, temp alarm, or lamp lifetime alarm) and the display background color will turn red.

2. Measurement Value Display

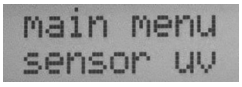
The Measurement Value Display is shown under the Operational Line Display and shows the value of the measurement currently being displayed.

3. Display Navigation

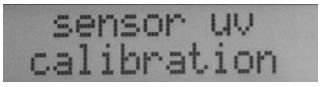
The monitoring terminal is controlled by using the navigational buttons on the front display. These buttons include: Back, Menu/Ok, and directional arrows. To begin navigation, press the Menu/OK button, then use the up and down arrows to scroll through the various categories. All navigational arrows allow the user to scroll or input specific values. The back button will take you back to the previous menu option.

For a complete list of all menu functions, refer to the UV Monitoring Station Display Flow Chart.

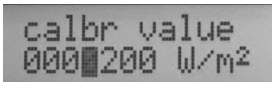
Please note that when you select a category from the main menu, the top line of the display will read main menu and the bottom line will display the sub-menu option chosen.



Once you select a sub-menu option, the display will now place that sub-menu value on the top line with the sub-categories to choose from on the bottom line.



Once you choose a sub-category, the display will place that sub-category on the top line with the different options to chose from on the bottom line.



4. Display Scrolling

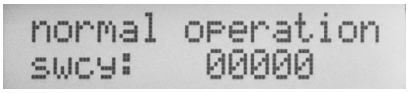
The Monitoring Station display continuously scrolls through the various operations and appear in the following order:

1) Total Hours
2) Switching Cycles
3) UV Percentage
4) Lamp Intensity in W/m²
5) Temperature in °F or °C
6) Lamp Lifetime Hours

1) Total Hours—(all:)

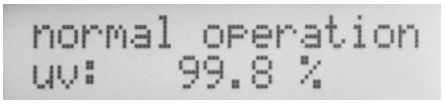
Display shows total runtime hours.

2) Switching Cycles—(swcy:)



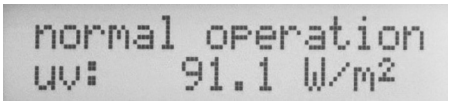
Display shows the number of on/off cycles during lamp lifetime.

3) UV Percentage—(uv:)



Display shows relative UV intensity compared to a new lamp.

4) Lamp Intensity—(uv:)



Display shows lamp intensity in W/m².

5) Temperature—(temp:)

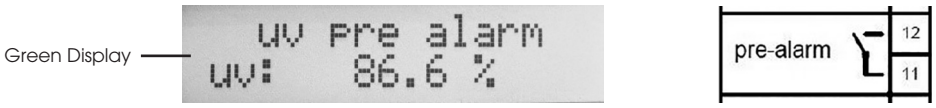
Display shows UV unit temperature in °F or °C.

6) Lifetime Hours—(lt:)

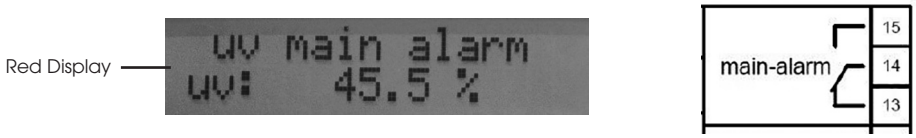
Displays lamp hours since last lamp change-out.

c) Monitoring Station Operation

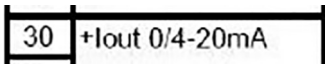
The Monitoring Station uses a multipurpose sensor probe that will monitor both UV output and unit temperature. UV light output measured from Lamp #1 by the UV sensor probe is transmitted to the monitoring terminal, where it is processed and used to display lamp intensity in watts per square meter (W/m^2). Additionally the terminal will display UV intensity as a percentage value from 0 to 100%. There are two alarms associated with UV intensity, a pre-alarm to warn when UV intensity is nearing the alarm value, and a main alarm when the intensity has fallen below a safe level. There is a relay associated with each alarm mode for remote signaling or control.



When new lamps are installed, the terminal needs to be calibrated to show the UV intensity at 100%. As the lamps age and UV intensity falls, the UV display will reflect the lowered UV intensity. When the UV intensity falls to the pre-alarm level (88%), the display will indicate a "UV Pre-Alarm" and the display background color will change from blue to yellow-green. There is also a 5A 250V relay for the pre-alarm condition that can be programmed to be either normally open or normally closed with dry contacts that will switch states when the UV pre-alarm is activated.



If the UV intensity falls below the main alarm level (85%), the display will indicate a "UV Main Alarm" and the display background color will change to red. There is also a 5A 250V relay with normally open, common, and normally closed dry contacts for the alarm condition that will switch states when the UV main alarm is activated.



The monitoring terminal also has a 4-20mA output for remote monitoring of the UV intensity signal.

1. Sensor Setup

The monitoring terminal can be used with several different sensors and as such, proper settings need to be entered for the sensor type. This will be done by the manufacturer before the unit is shipped, but instructions are included here in case settings are lost or erroneously set to default.

1) Input

The type of input for the sensor needs to be entered. Follow these menu prompts:

Main Menu > sensor uv > input > (Uin1)

2) Calibration

Calibration is covered in the next section "Initial Calibration." Skip calibration for now.

3) Unit

The unit for lamp intensity needs to be entered. Follow these menu prompts:

Main Menu > sensor uv > unit > (W/m²)

4) Offset

Offset is not needed in most cases. If your unit needs an offset, see page 22 "Offset" for directions.

2. Initial Calibration

The monitoring terminal displays UV intensity in real time. Measured UV intensity is affected by lamp aging, water quality, sleeve conditions, and sensor window conditions. As a result, UV intensity is an indicator of not only lamp conditions, but also a change in water quality, or fouling of sleeves and other UV transmission parts.

The monitoring terminal can only be calibrated when the power switch is in the ON position and the lamps are operational. Lamps must warm up for three minutes prior to any calibration. (See caution below as this process may possibly take longer.) When performing initial calibration, the lamps must be new.

The sensor probe has a diode that is sensitive to UV light. The greater the intensity of the lamp, the larger the signal sent out from the probe will be. The monitoring terminal will convert this signal to a real time measurement of intensity in W/m². The value displayed on the terminal is dependent on the wattage of the lamp and the distance of the lamp from the sensor. The sensor probe is highly accurate and the measurement is in real time. Lamp intensity can vary with temperature and other conditions so expect some fluctuation in the value as you are viewing the display.

CAUTION: Depending on your specific water conditions, the lamp may only reach 95 to 99% of full intensity in the three minute warm up period. It is recommended to monitor the lamp's intensity for a while as it is possible for this process to take as long as an hour to reach full intensity.

The sensor probes are calibrated and serialized for traceability. Your UV system is equipped with one of two types of sensor probes; the wetted sensor (P/N SNSR0004) or the non-wetted sensor and viewing window (P/N SNSR0005). First, determine which sensor probe is used in your unit for the proper calibration value. PVC models use the non-wetted sensor probe and viewing window. If your system is equipped with the non-wetted sensor probe and viewing window the sensor probe can be replaced without depressurizing the unit.

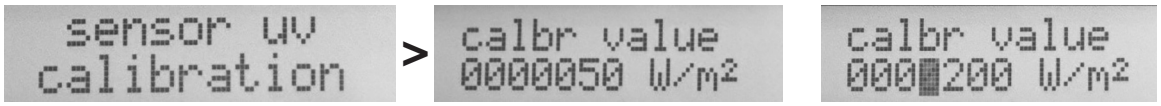
Wetted Sensor Probe

Non-Wetted Sensor Probe and Viewing Window

Calibration Values
Wetted sensor probe = 50W/m²
Non-wetted sensor probe = 200W/m²

To calibrate the UV Monitoring Station, it is necessary to tell the Monitoring Station the calibration value of the sensor being used. Use the following prompts to set the calibration value:

Press Menu/OK > scroll up/down to sensor UV > press (OK) > scroll up/down to calibration > press (OK) > calibration value.



Wetted Sensor Enter 50

Non-wetted Sensor Enter 200

1) Set the proper calibration by using the arrows to enter the value for your specific sensor (50 or 200 W/m²).

2) Next enter the value of the lamp intensity equivalent to 100% by the following prompts:

Press Menu/OK > Equivalent=100%.

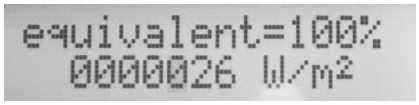


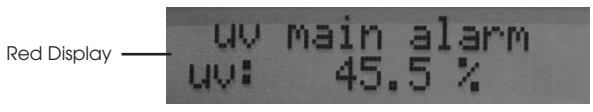
Photo shown is for representational purposes.

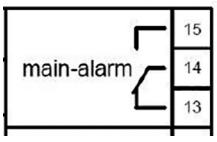
Once the equivalent is set, press the Back button twice to return to the main menu. Your UV Monitoring Station is now calibrated and the UV percentage should read at or near 100%.

3. Recalibration at 100 hours
UV lamps lose intensity at a higher rate than normal before they stabilize at around 100 hours. Recalibrate the Equivalent=100% at the end of 100 hours as per the instructions above.

4. Monitoring Station Alarms

1) UV Main Alarm



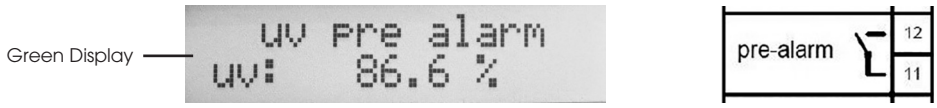


As a standard, all units are sized to a UV lamp end of lamp life at 85% of original intensity and conforms to common industry standards and practices for UV units with lamps that have a long life coating. Therefore, the UV main alarm is set to alarm at 85% of original measured intensity. If the UV intensity falls below 85%, the unit is in danger of not producing the stated dosage for the flowrate and water type. When the UV intensity falls below the alarm set point, the operational line display will read "UV Main Alarm" and the

background color of the display will turn red to indicate the alarm condition. In addition, the dry contacts on the main alarm relay will change states.

There are special cases where the UV main alarm may be set at a different value, but these will be the exception rather than the rule and an addendum will be added to the Owner's Manual.

2) UV Pre-alarm



The UV pre-alarm is set to alarm when the UV intensity falls below 88%. The purpose of the pre-alarm is to give warning that a main alarm condition is possible soon and action should be taken to avoid the alarm condition. When the UV intensity falls below the pre-alarm set point, the operational line display will read "UV Pre Alarm" and the background color of the display will turn yellow-green to indicate the alarm condition. In addition, the dry contacts on the pre-alarm relay will change from NO to NC or from NC to NO, depending on user programming preference.

3) Lifetime Alarm

The lifetime alarm monitors lamp operating hours. UV lamps are generally replaced at the end of 10,000 hours, or 415 days. The lifetime alarm is set for 10,000 hours. If the lamps are changed every 10,000 hours, lamp intensity should not have fallen below 88% and the unit should not fall into an alarm state or a pre-alarm state due to lamp intensity. When the UV intensity falls below the alarm set point, the operational line display will read "Lifetime Alarm" and the background color of the display will turn red to indicate the alarm condition.

4) Monitoring Station Alarm Calibration

Warm-up Delay

UV lamps need to warm up to operating temperature in order to produce full UV intensity. The warm-up delay is set to 180 seconds (3 minutes). The Monitoring Station will not go into an alarm or pre-alarm state for three minutes to allow the lamps to come up to full intensity. The UV pre-alarm is factory set to 88% and should not need to be changed. To change the warm-up delay, follow these menu prompts:

Main menu > alarm > OK > warm-up delay > OK > (0(off)-900s) (Default Value=(180s))

UV Pre-Alarm

The main alarm cannot be set higher than the pre-alarm. For this reason, it is best to set the UV pre-alarm first in case the pre-alarm value is showing a value less than the main alarm. The UV pre-alarm is factory set to 88% and should not need to be changed. There is also a UV pre-alarm delay. The UV pre-alarm delay is to keep the pre-alarm from cycling back and forth in cases where the UV intensity is on the pre-alarm threshold. The UV pre-alarm delay is factory set to 180 seconds (3 minutes) and should not need

to be changed. To change the UV pre-alarm or the pre-alarm delay, follow these menu prompts:

Main menu > alarm > uv pre-alarm > (0(off)-100%) (Default Value=(88%)) > uv pre al delay > (0(off)–240s) (Default Value=(180s))

UV Pre-alarm Relay

The UV pre-alarm has a two position dry contact relay that is programmable to Normally Open (NO) or Normally Closed (NC) according to user needs. To program the UV pre-alarm relay to Normally Open or Normally Closed, follow these menu prompts:

Main menu > alarm > relais pre-alarm > (NO-NC)

UV Main Alarm

The UV main alarm is factory set to 85%, which is end of lamp life for dosage calculations and should not be changed. There is also a UV alarm delay. The UV alarm delay is to keep the UV alarm from cycling back and forth in cases where the UV intensity is on the UV main alarm threshold. The UV alarm delay is factory set to 180 seconds (3 minutes) and should not need to be changed. To change the UV main alarm or the main alarm delay, follow these menu prompts:

Main menu > alarm > uv main alarm > (0(off)-100%) (Default Value=(85%)) > uv main al delay (0(off)–240s) (Default Value= (180s))

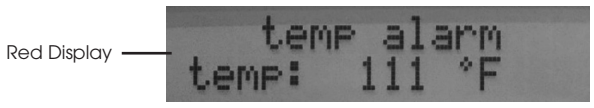
Lifetime Alarm

The lifetime alarm is factory set to 10,000 hours which is considered end of lamp life. Changing lamps at the recommended interval should prevent the unit from going into UV pre-alarm state or UV main alarm state due solely to intensity falloff of the UV lamp. To change the lifetime alarm, follow these menu prompts:

Main menu > alarm > lifetime alarm > (0(off)-30,000h) (Default Value=(10000h))

d) Temperature Sensor

The monitoring terminal is capable of sensing unit temperature when used with the multipurpose sensor probes. UV lamps have a certain operational temperature range, depending on the lamp type. Operation outside the normal operating range will result in reduced UV intensity. The purpose of the temperature sensor is to shut the unit off and alarm in case of an overheating condition that can result in reduced UV intensity or risk of fire.



1. Temperature Sensor Setup

The monitoring terminal can be used with several different sensors and as such, proper settings need to be entered for the sensor type. This will be done by the manufacturer before the unit is shipped, but instructions are included here in case settings are lost or erroneously set to default.

2. **Activation**
   The temperature function needs to be activated. Follow these menu prompts:

   Main Menu > sensor temp > activate > (on)

3. **Input**
   The type of input for the sensor needs to be entered. Follow these menu prompts:

   Main Menu > sensor temp > input > (Uin2)

4. **Unit**
   The unit for temperature needs to be entered. Follow these menu prompts:

   Main Menu > sensor temp > unit > (°C-°F)

5. **End Value Calibration**
   To calibrate end value, follow these menu prompts:

   Main Menu > sensor temp > calibration > (140°C or 284°F)

6. **Offset**
   To calibrate offset, follow these menu prompts:

   Main Menu > sensor temp > offset > (-60°C or -76°F)

7. **Temperature Alarm Calibration**

   1) **Temperature Alarm for UV Lamps**

      Standard Output and High Output Lamps
      There are three settings involved with the temperature alarm calibration: the alarm setting, the hysteresis setting, and the delay. The temperature alarm setting for high output lamps and standard output lamps is factory set for 105°F (40°C). This alarm setting value is the point where the monitoring terminal goes into alarm state, changing the state of relais3. The hysteresis setting controls the point at which the relay returns to the normal state. The temp alarm hys is set to 10°F (6°C). If the temperature at the sensor probe rises to 105°F (40°C), power will be shut off to the lamps and the run time meter, but not to the monitor. Because the lamps are shut off, UV intensity will be 0% and the unit will also go into UV main alarm state. If the 4-20mA output for remote monitoring is used, the UV reading at the remote location will be 0%. When the sensor probe cools to 95°F (34°C), the unit will switch back on. There is also a temperature alarm delay. The temperature alarm delay is to keep the temperature alarm from cycling back and forth in cases where the unit temperature is on the temperature threshold. The temperature alarm delay is factory set to 180 seconds (3 minutes) and should not need to be changed.

      To reset these values, follow these menu prompts:

      Main Menu > alarm > temp alarm > (105°F (40°C)) > temp alarm hys (10°F(6°C)) > temp alarm delay (180s)

Amalgam Lamps

There are three settings involved with the temperature alarm calibration: the alarm setting, the hysteresis setting, and the delay. The temperature alarm setting is factory set for 170°F (77°C) for stainless steel units. For PVC units, it is set at 105°F (40°C). This alarm setting value is the point where the monitoring terminal goes into alarm state, changing the state of relais3. The hysteresis setting controls the point at which the relay returns to the normal state. The temp alarm hys is set to 10°F (6°C). If the temperature at the sensor probe rises to the alarm setting value, power will be shut off to the lamps and the run time meter, but not to the monitor. Because the lamps are shut off, UV intensity will be 0% and the unit will also go into UV main alarm state. If the 4-20mA output for remote monitoring is used, the UV reading at the remote location will be 0%. When the sensor probe cools to 160°F (71°C), or 95°F (34°C) for PVC units, the unit will switch back on. There is also a temperature alarm delay. The temperature alarm delay is to keep the temperature alarm from cycling back and forth in cases where the unit temperature is on the temperature threshold. The temperature alarm delay is factory set to 180 seconds (3 minutes) and should not need to be changed.

For Stainless Steel Units: To reset these values, follow these menu prompts:

Main Menu > alarm > temp alarm > (170°F (77°C)) > temp alarm hys (10°F (6°C)) > temp alarm delay (180s)

For PVC Units: To reset these values, follow these menu prompts:

Main Menu > alarm > temp alarm > (105°F (40°C))> temp alarm hys (10°F (6°C)) > temp alarm delay (180s)

2) **Temperature Alarm Relay (Relais3)**

The temperature alarm relay is used to turn off the lamps during an overheat condition. The relay will either be used to provide power to the ballasts, or control a power relay coil that powers the ballasts. This relay is set at Normally Open (NO). Changing the relay setting will defeat the temperature monitoring function of the system. The correct relais3 value is NO. To check or reset this value follow these menu prompts:

Main Menu > alarm > relais3 > (NO)

8. **Current Output**

The monitoring terminal is equipped to output a 4-20mA signal for remote monitoring of UV intensity. 20mA is set to reflect a value of 100% and the mode is set to 4-20, so that 4mA represents a value of 0. This value is set by the manufacturer before the unit is shipped, but instructions are included here in case settings are lost or erroneously set to default.

Follow these menu prompts to set maximum value at 100%:

Main Menu > current output > maximum >(100%)

Follow these menu prompts to set mode to 4-20 (4mA=0):

Main Menu > current output > mode > (4-20mA)

e) Lamp Change Out Reset Instructions

Always follow the owner's manual for instructions on changing out your UV lamps. After any lamp change out, a number of settings will need to be reset.

1. **Lifetime Counter**

   The lifetime counter tracks the number of hours on the lamps. When changing lamps, this value needs to be reset. To reset this value, follow these menu prompts:

   Main menu > counter > lifetime > (reset<return>) Use the left arrow to select (<reset>return) and press OK to reset. This will reset lamp hours to 0.

2. **Switching Cycles**

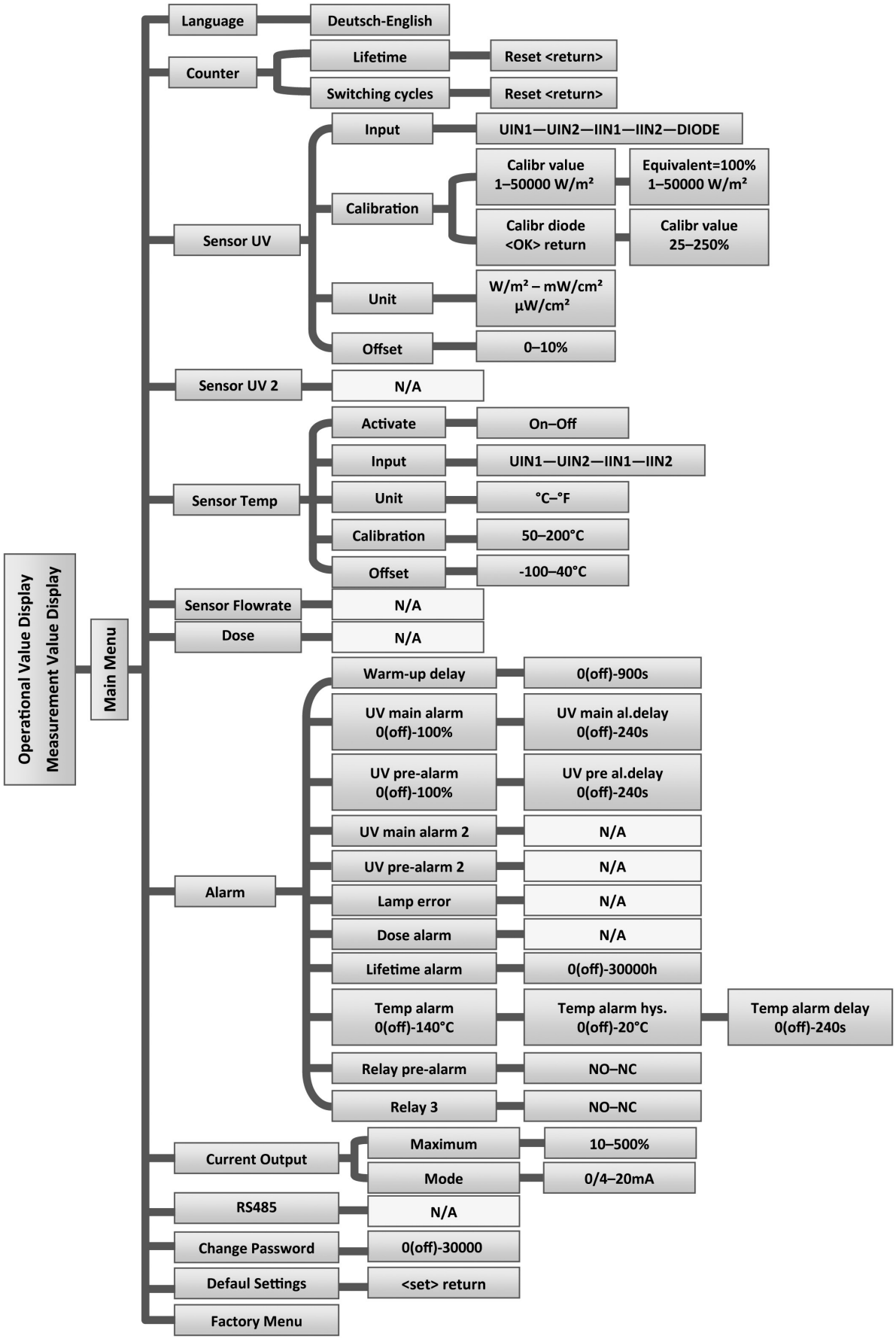
   Switching cycles monitors the number of on/off cycles during the lifetime of the lamps. When lamps are changed, this value needs to be reset to 0. To reset this value, follow these menu prompts:

   Main menu > counter > switching cycles > (reset<return>) Use the left arrow to select (<reset>return) and press OK to reset. This will reset switching cycles to 0.

3. **Calibration**

   When lamps are changed, calibrate according to initial calibration instructions above. After 100 hours, when lamps have stabilized, recalibrate.

f) UV Monitoring Station Display Flow Chart



TROUBLESHOOTING

Problem	Recommended Action
Display not working	• Make sure the power switch of the UV Monitor is in the ON position. • Verify the unit has power—115V or 230V. • Verify fuses are not blown. Remove replaceable 1.5 amp fuse from fuse holder and visually inspect or perform a continuity test of the fuse..
Low UV monitor reading (Less than 85% transmission)	• Check water quality. Ensure that color, turbidity, and iron content are within normal parameters. • Verify lamp output. • Ensure input voltage matches requirements. • Replace old or defective lamp(s). • Clean UV sensor lens. • Clean quartz sleeve(s). • If reading is at 0%, ensure UV sensor cable is connected.

If questions still remain after completing a troubleshooting procedure, please contact the manufacturer.