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# Addendum Manual for the AS-500 Dissolved Ozone Monitor

This manual serves as an integration manual for the AV88 Analyzer and Analog Plus Sensor



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# **Introduction**

The AS-500 Dissolved Ozone Monitor incorporates the AV88 Universal Analyzer, and the Analog Plus Dissolved Ozone Sensor together to make the AS-500 Dissolve Ozone Monitor. The purpose of this manual is to serve as an integration manual to make installation and operation as simple as possible. For any questions not addressed in this manual please refer to the specific manuals on the AV-88 or Analog Plus.

# **Installation**

## **AV88 Universal Analyzer** – (refer to AV88 Universal Analyzer manual)

The mounting and wiring instruction for the AV88 Analyzer will be found in the specific AV88 Universal Analyzer manual. Mounting information is found on pages 6-9, while wiring information is found on pages 10-13.

## **Analog Plus Dissolved Ozone Sensor**– (refer to Analog Plus manual)

### **Wiring**

Most wiring information is found in the specific Analog Plus manual. There is an image found on page 10 illustrating the wire color designations.

If extending the standard 10-foot cable is necessary a junction box will be necessary to terminate the probe wiring. There is information on this found on page 10. A pre-assembled junction box is also available from Ozone Solutions.

### **Mounting**

Mounting the Analog Plus Dissolved Ozone Probe into the water stream is addressed on pages 12 – 15

It is important to note that the probe should never be dried out. If water will not be present in the process at all times the probe should be removed and the black protective cap should be reinstalled with a small amount of water in it.

One mounting position not discussed in the specific manual is tank mounting. The Probe can be installed directly into a contact, or holding tank as long as water will be flowing past it at all times. It is very important in this mounting that the probe is below the water level at all times to prevent drying out.

Water pressure on the Analog Plus should never be above 100 PSI. Maximum operating pressure is 20 PSI for best accuracy. While higher operating pressure will not damage the sensor, the ozone readings will lose accuracy.

# System Operation

## Menu Navigation

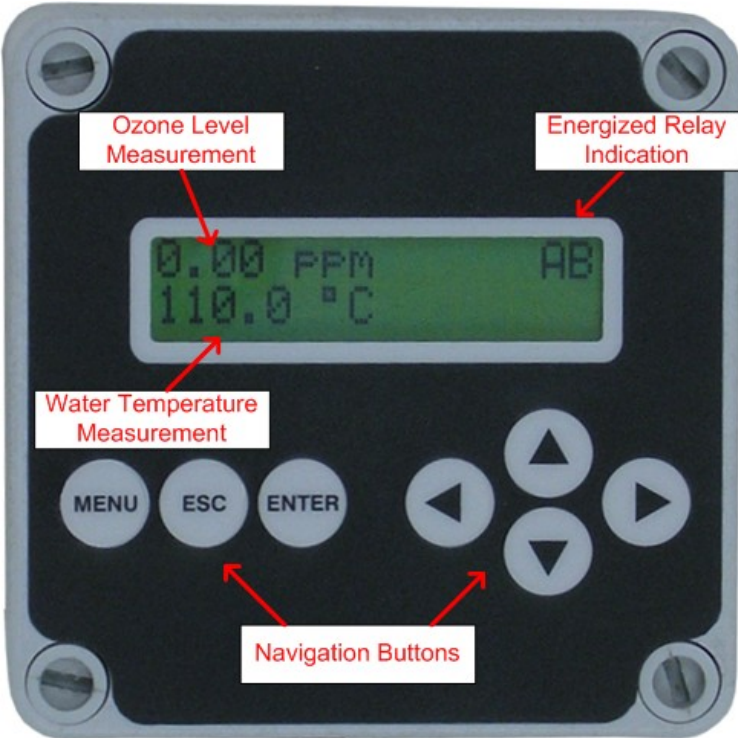
The menu structure is navigated using the ENTER, Up/Down, arrows and ESC keys.

- Use the Up/Down arrow keys to scroll through the list of Menu options
- Use the ENTER key to select an option
- Use the ESC key to move up in the structures

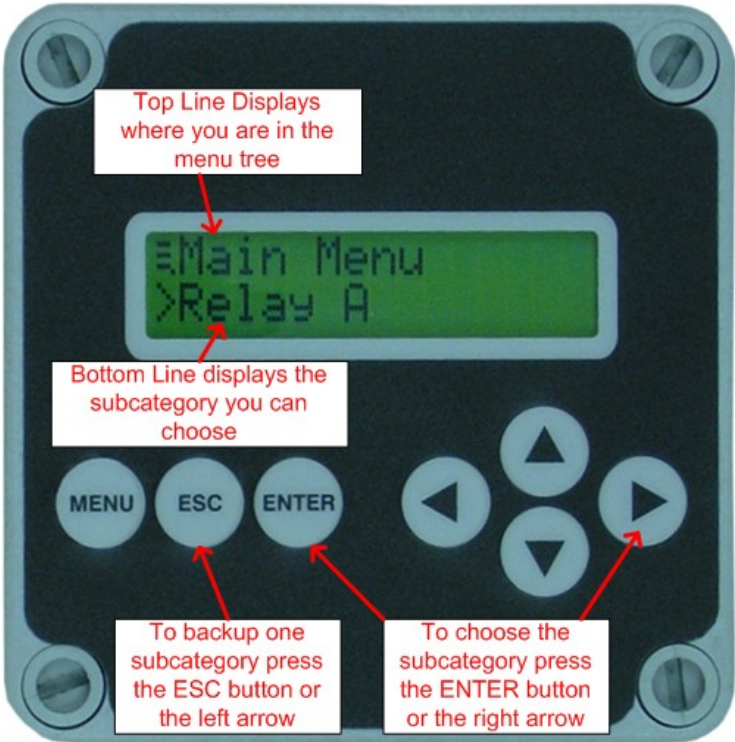
Main menu options are listed as follows:

<b>Main Menu Options</b>	<b>Functions</b>
Calibrate	Calibrate Span on the Ozone Sensor
Configure	Configure various functions of the AV88 Analyzer
Hold Outputs	
Analog Output 1	Set 4 mA and 20 mA Values, Calibrate and Test Outputs
Analog Output 2	Set 4 mA and 20 mA Values, Calibrate and Test Outputs
Relay A	Set Relay A Functions
Relay B	Set Relay B Functions
Help	Indicates AV88 Software Version

# AV88 Display Interface



# AV88 Menu Interface



# Calibration

## Overview

All sensors in any application to require periodic calibration to maintain accuracy and ensure that the measurement displayed on the screen is accurate. Over time sensors will drift or possibly fail during normal operation. Ozone sensors are especially sensitive to these variables as ozone is a very reactive gas that is very difficult to monitor accurately. It is very important to set up proper calibration protocol including frequency and standards to be able to use the AS-500 as a reliable ozone detection device in your process.

## Calibration Frequency

Calibration of the AS-500 should be done initially upon startup, and then at least monthly. More frequent calibration can be performed if better accuracy is desired.

## Calibration Standard

Calibration is performed with the K-7402 calorimetric vacuvial kit that came with the AS-500. If you do not have this kit available please contact Ozone Solutions. Refill kits are also available (part number R-7402).

If higher accuracy is desired a device to read the vial is available. This is called the Signal Analyte Meter (SAM). This is also available from Ozone Solutions.

*Note: The AS-500 must be turned ON, with the probe in the process submerged in water for at least 12 hours before calibration.*

## Zeroing

The AS-500 will typically read zero ozone when there is no ozone present automatically. There is no actual Zero process necessary on the AV-88 to perform.

Ensure the process is running as it will be running typically in operation. Ensure there is no ozone in the water at this time. Turn ON the AS-500 and let it stabilize for a consistent 12 hours. The AS-500 should stabilize at 0.00 PPM during this initial startup.

During the 12 hour period ensure the ozone level in the process water is indeed ZERO using the K-7402 calibration kit.

If the AS-500 ever fails to read 0.00 PPM when ozone is not present in the water the following steps can be performed:

1. Ensure there is indeed no ozone in the water using the K-7402 calibration kit. If there is no ozone in the water and the AS-500 still reads above Zero proceed to step two
2. Shut off power to the AS-500 for at least 10 minutes. Reconnect power to the AS-500 and let it warm up for 12 hours in zero ozone water. If the AS-500 still reads above Zero proceed to step three
3. Replace electrolyte solution in the Analog Plus ensuring that the electrolyte is not more than 1 year old. If the AS-500 still reads above Zero proceed to step four
4. Replace the membrane cap on the Analog Plus. If the AS-500 still reads above Zero contact Ozone Solutions for diagnosis assistance.

## **Span Calibration**

When ready to calibrate the sensor ensure the process is running at a steady state as it will be running typically in operation. While maintaining consistent ozone levels in the process, the AS-500 can be calibrated to this point using the following process.

The AS-500 only supports a 1 point span calibration. Due to this, choose an ozone level close to where your ozone system should normally be operating at, Or, choose the target ozone level for your ozone system. If your ozone system typically swings across a wide band of dissolved ozone levels choose an ozone level in the middle of this swing. If you are ready to calibrate the AS-500 and it has been ON for at least 12 hours follow the steps below.

1. Choose an ozone level at which your system should normally be operating. Maintain this ozone level as close as possible to get the best results through the calibration process
2. Using the K-7402 Calibration kit, verify the ozone level in the water. Ensure you verify the ozone level at least 2-3 times to eliminate inconsistencies.
3. When you are ready to calibrate the span point on the AS-500 enter the menu by pressing the MENU button the AV-88 Display. The screen should now display =Main Menu on the top of the LCD screen. Scroll through the options using the UP and DOWN arrows until you find the CALIBRATE menu. Press the ENTER button to enter this menu.
4. The screen should now display =CALIBRATION on the top of the LCD screen, scroll through this menu using the UP and Down arrows until you get to the 1-POINT CALIBRATION menu and press Enter.
5. The screen should now display the current ozone level on top and SENSOR READY? On the bottom of the screen. When you are certain that the ozone level in the water is correct press the enter button.

6. The screen will now display 1-POINT SAMPLE? On top and the level of ozone you are calibrating to on the bottom. The ozone level will always default to 10.00 PPM. Using the Up and Down arrows set the calibrating ozone level to the ozone level in the water and press ENTER.
7. The calibration process may take up to 60 seconds. When completed the new ozone level should be entered into the AS-500
8. If the AS-500 displays SLOPE TOO HIGH the level of ozone you are attempting to enter into the AS-500 is too great a change from the previous calibration point. You may need to calibrate the AS-500 a few times progressively moving toward the proper calibration point.
  1. Example: If you have a reading of 10 PPM on the AS-500 and the actual reading needs to be 1 PPM, you cannot enter 1 PPM on the first attempt. You must move the calibration curve down gradually. In other words, you should enter 8 PPM, then 6 PPM, 4 PPM, 2 PPM & then 1 PPM.

## Configure

The configure menu allows viewing and editing of sensor constants. Please see the chart below for specific parameters and options.

Configuration Type	Function
Sensor Filter	Filter Ozone Reading in Seconds. Set Zero seconds for no filter. 5-10 second filter should be optimum for most systems
Temp Filter	Filter Temperature Reading in Seconds. Set Zero seconds for no filter. 2-5 second filter should be optimum for most systems
Temp Units	Select Temperature Display in Celsius or Farenheit
Salinity	Select Salinity Compensation from 0 – 999.9 mS/cm (normally set to 0.0 mS/cm)
Pressure	Select Water Pressure from 539.2 – 792.4 mmHg

## Analog Outputs

Two 4-20 milliamp analog outputs are provided on the AV88 analyzer for data reporting. The analog outputs are not ozone sensor specific. The best instructions for the Analog outputs will be found in the specific AV88 manual on pages 40-43.

## Relay A, Relay B settings

The AV88 analyzer has 2 integrated relays that can be triggered a variety of ways for your specific purposes. In this section these functions and settings will be described in detail. To use the relays the FUNCTION, PARAMETER, and ACTIVATION must be set. Follow the instructions below to set these.

*NOTE: Each relay, Relay A, and Relay B can be set completely separate from each other. Setting on one relay will not in any way affect the other relay.*

### Relay Specifications

Two Form C relays are provided with Normally Open (NO) and Normally Closed (NC) contacts. Relays have a 1 Amp load rating. Relays can be set for 3 different functions, ALARM, CONTROL, and WASH. Both the Temperature and Ozone Sensors can be used to control the relays. When either relay is energized that letter will be displayed on the top left hand corner of the display as an A, or B.

### Set FUNCTION

Both relays can be used for three functions, ALARM, CONTROL, and WASH. The chart below will describe each function and help you decide which is right for you.

Function	Function Description
ALARM Function	Relay activation is determined by low and high limits of the chosen parameter
CONTROL Function	Relay activations is determined by a single set point
WASH Function	Relay activation is determined solely by a timer and is not a function of any measurement

### Set PARAMETER

The PARAMETER Menu allows for the relay to be controlled by either the measurement of the Ozone Sensor, or the Temperature Sensor.

Parameter	Description of the Parameter
Temperature	Uses the Temperature measurement to activate this specific relay
Sensor	Uses the Dissolved Ozone measurement to activate this specific relay

## Set ACTIVATION

The Activation menu and settings will be different for each Function. Please see the charts below to evaluate what Activation settings will be available and what these settings should be.

### ● ALARM Function

When the a relay is being used for the ALARM function that relay will only be energized when the selected parameter (either temp or ozone) is between the LOW and HIGH set points entered into the ACTIVATION Menu.

ALARM Function	Description of the Setting
Set Low Alarm	Low setpoint, the selected relay will be energized above this setting and de-energized below this setting
Set High Alarm	High setpoint, the selected relay will be energized below this setting and de-energized above this setting
Set Low Deadband	Deadband in PPM that can be set for the low alarm
Set High Deadband	Deadband in PPM that can be set for the high alarm
Set Off-Dely	Sets Off-Delay for both the high and low setting in seconds
Set On-Delay	Sets On-Delay for both the high and low setting in seconds

### ● CONTROL Function

When a relay is being used for the CONTROL function that relay will only be energized when the selected parameter (either temp of ozone) is above, or below the single set-point entered into the ACTIVATION Menu.

CONTROL Function	Description of the Setting
Set Phase	Allows you to choose whether the relay will be energized Above, or Below the selected Setpoint
Set Setpoint	The single desired setpoint the relay should be energized at
Set Deadband	Deadband in PPM that can be set for the relay
Set Off-Dely	Sets Off-Delay of the relay for both the high and low setting in seconds
Set On-Delay	Sets On-Delay of the relay for both the high and low setting in seconds

### ● WASH Function

When a relay is being used for the WASH function, that relay will only be energized on a timed intervals set in the ACTIVATION Menu.

WASH Function	Description of the Setting
Set Interval	Time interval that the relay is de-energized (set in seconds)
Set Duration	Time interval that the relay is energized (set in seconds)
Set Off-Delay	Time that can be set to delay the the de-energizing of the relay (set in seconds)

## **How to Contact Ozone Solutions**

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