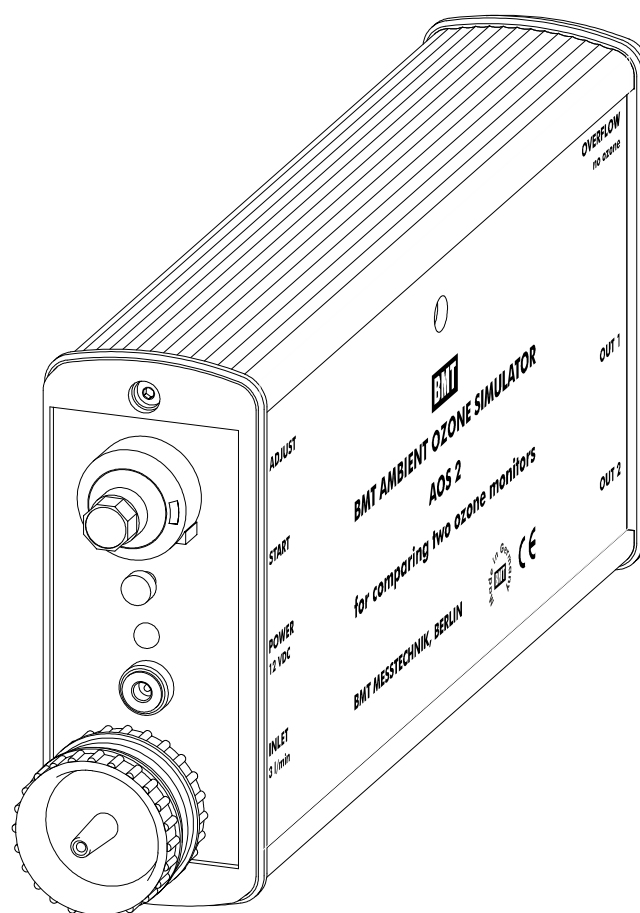


AMBIENT OZONE SIMULATOR AOS 2

Manual

Rev. 02/2020



Contents:

1	Description	2
2	Cautions & Warnings	3
3	Requirements and Operation	3
4	Setup and Measurement	4
	<i>Comparison of two photometric monitors</i>	4
	<i>Comparison with other type of ozone sensors</i>	5
5	Zero Check	6
6	Reproducibility of Concentration	6
7	Service & Maintenance	6

1 Description

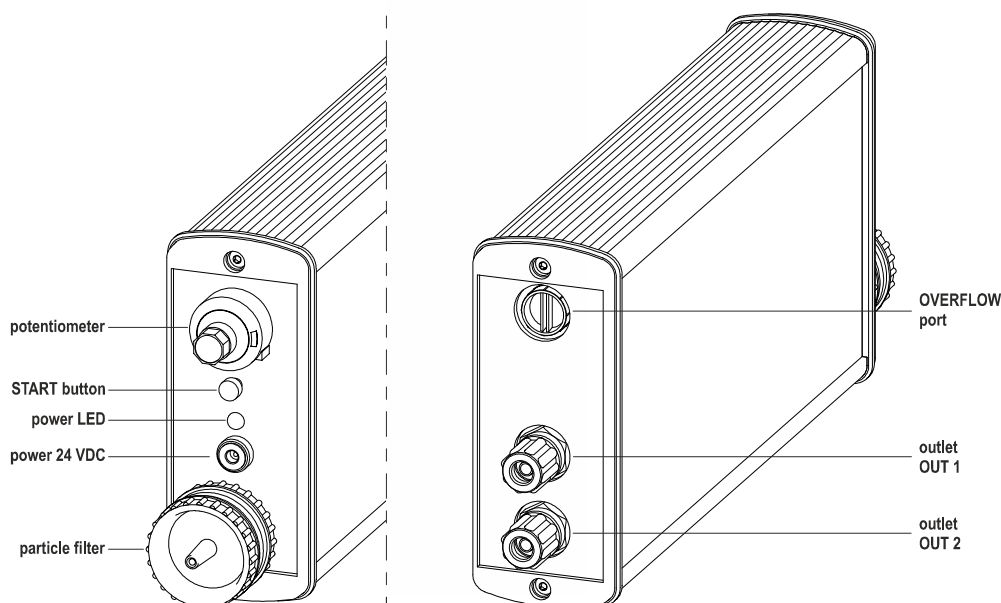
The AOS 2 is a simple and universal means for comparing two UV photometric ambient ozone monitors with each other, or comparing an electro-chemical ozone sensor with a UV photometric ozone monitor as a reference. In conjunction with a reference monitor it allows a simple functional check of an ambient ozone measurement device in the field, as well as a precise comparison of two UV-photometric monitors.

The small box contains an ozone producing UV lamp, its high voltage power supply, and an air pump moving more than three liters per minute of thoroughly filtered room air through the AOS 2. Ambient ozone monitors usually are breathing one liter per minute or less. Thus the simulator AOS 2 delivers more ozonated air than necessary for two monitors. The concentration is independent of the flow rate on the outlet ports.

The OVERFLOW outlet can be closed. Now the AOS 2 becomes an ozone blower: the reference monitor is connected with one outlet whilst the other outlet is blowing out about two liters per minute of ozonated air, the ozone content of which is measured and indicated by the reference monitor.

Warning: Ozone is a toxic gas. Care must be taken to insure that ozone concentrations exceeding 0.100 ppm_v (100 ppb_v) are not released into the atmosphere, or at least only for a short period of time.

With a 10-turn potentiometer the ozone content of the air leaving the AOS 2 can be set from about a few ppb_v to at least 1000 ppb_v. This ozonated air is leaving the instrument via a manifold with two separate outlet fittings: one outlet for the device under test, and the other outlet for the reference ozone monitor. The overflow of ozonated air is leaving the manifold via an integrated ozone destruct (OVERFLOW port).



In the instrument's front panel a small window is provided through which the UV lamp can be watched. This window has a radiation filter to remove any dangerous radiation.

When the AOS 2 is connected to the power line, the UV lamp starts automatically as long as the fine adjust is set about 10% or higher. At a lower setting the lamp can be manually started with the red push button "START".

2 Cautions & Warnings

Warning: The AOS 2 does not have a power switch! This means that it may produce ozone immediately once it is connected to power. Ozone is a toxic gas. Therefore:

Do not apply power without connecting or closing ports OUT 1 and OUT 2!

A small blinking LED indicates operation.

Warning: UV radiation present inside! Remove power before opening the AOS 2.

Warning: Ozone is a toxic gas. Care must be taken to insure that ozone concentrations exceeding 0.100 ppm_v (100 ppb_v) are not released into the atmosphere, or at least only for a short period of time.

Caution: Never operate the AOS 2 without the particle filter mounted to the inlet!

3 Requirements and Operation

The AOS 2 comes with a wall mount power supply (wide range input) with adapters for use in Europe, UK, USA, and Japan, a filter holder for the inlet of the AOS 2, a box with replaceable filter inserts, a few meters of 1/4" FEP tubing, and plugs for protection and change of operation mode.

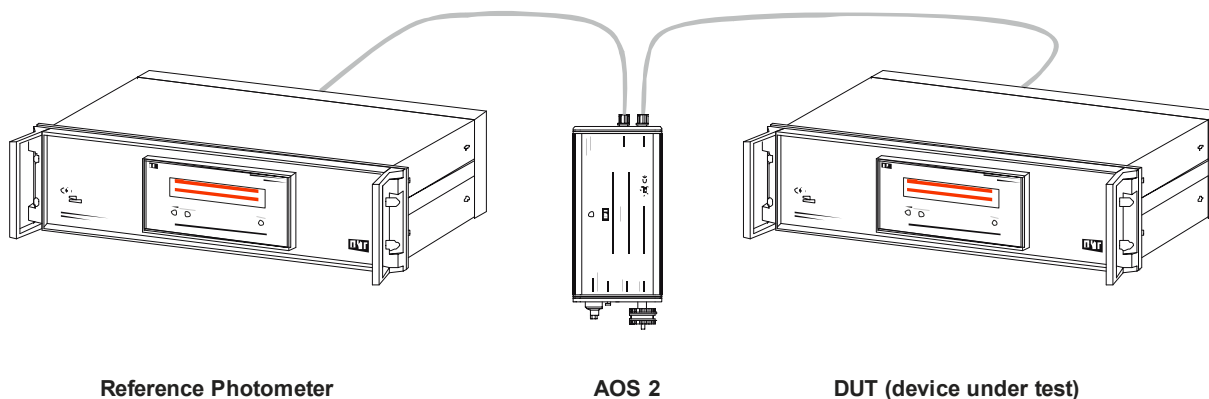
The gas source is the ambient air, filtered by a particle filter mounted on the inlet. The AOS 2 is equipped with an air pump delivering more than three liters per minute into the manifold that holds two output fittings for the ozone gas and an ozone destruct on the overflow port. Before you power-up the AOS 2, always make sure that none of the two fittings remain unconnected, in order to prevent ozone spilling into the room - see chapter Cautions & Warnings.

You will need one OZONE MONITOR BMT 932. It must be connected to one of the two ozone ports, acting as a reference monitor. Ozone-resistant tubing must be used, preferably made of FEP or PTFE. Acceptable sizes are 1/4" and 6mm OD. The other port should be connected to either another UV-photometric monitor for comparison to the reference monitor, or to a calibration cap for the comparison of other ozone sensors like electro-chemical sensors. A Calibration Cap is available from the manufacturer of the ozone sensor.

4 Setup and Measurement

Comparison of two photometric monitors

The pump inside the AOS 2 creates a flow rate of more than 3 l/min. The sum of the flow rate of the two monitors connected for comparison may not exceed this value. The excess gas flow of ozonated air is let into the ambient passing the ozone destruct on the OVERFLOW port..

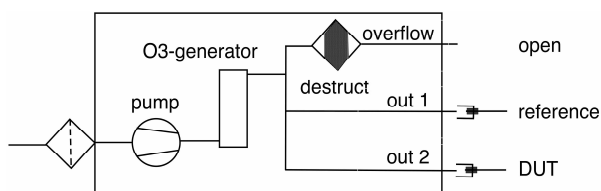


Remove the plug from the OVERFLOW port, if installed. Connect the reference monitor BMT 932 with OUT 1 of the AOS 2. Connect OUT 2 to the second BMT 932 that shall be checked (DUT, Device Under Test).

Make sure the particle filter is mounted to the inlet of the AOS 2. There is no need for an additional sample gas filter between the AOS 2 and the channel of the BMT 932, as long as the AOS 2 is operated with its particle filter.

Set both monitors to a single channel in MANUAL mode.

For the comparison, power up both monitors and allow for a warm-up of 10 to 30 minutes.



After warm-up of the monitors note the average readings, it should be a low value depending on the amount of ozone in your room. A value of 0.000 ppm_v is very unlikely.

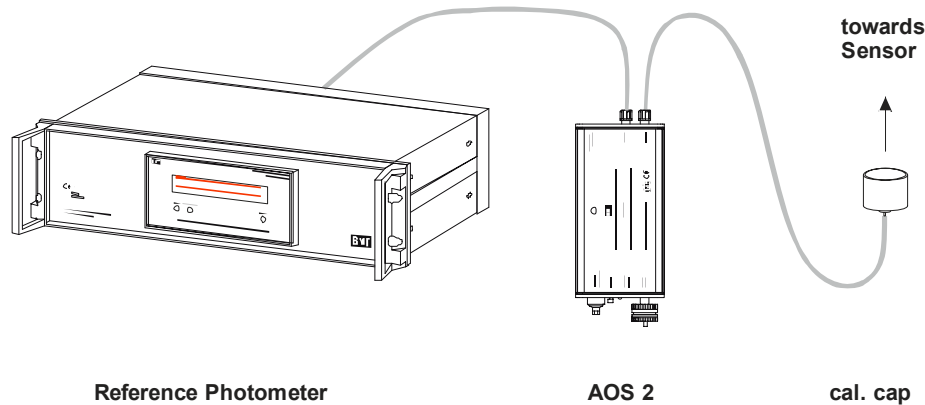
Then use the 10-turns potentiometer to set the AOS 2 to about 40% of its range, and start the ozone source by using the wall mount power supply. If the lamp inside does not show a dim blue light through the small window of the AOS 2, press the push button "START" once.

After a few measurement cycles of the monitors, you might want to adjust the potentiometer for a reading of around 0.6 ppm_v on the reference monitor, the exact value is not of importance. Watch both readings for a several measurement cycles (20s each) and note the average difference. Maximum average difference should stay within specification of the monitor (0.8 % of measurement plus 0.2 % of scale for the BMT 932).

You may repeat the procedure for different levels of ozone concentration, but due to the highly linear measurement by principle, this actually is not necessary. If a distinct nonlinearity is found by the comparison, dirt most likely is the reason. Check tubing and filters for contamination.

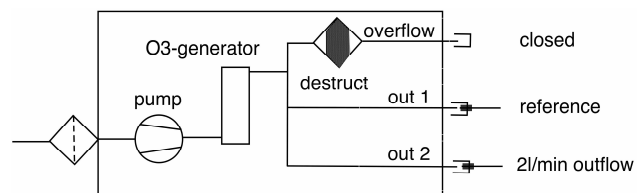
Comparison with other type of ozone sensors

The difference to the above method is the fact that the overflow port is closed and the excess ozonized gas flow of about 2 l/min is fed towards the sensor to be checked.



Connect the reference monitor BMT 932 with OUT 1 of the AOS 2. Close the OVERFLOW port with the plug delivered with the AOS 2. Connect OUT 2 to the Calibration Cap designed for the sensor that shall be checked (DUT, Device Under Test).

Make sure the particle filter is mounted to the inlet of the AOS 2. There is no need for an additional sample gas filter between the AOS 2 and the channel of the BMT 932 used for comparison, as long as the AOS 2 is operated with its particle filter.



Set the reference monitor to a single channel in MANUAL mode. Power up the monitor and allow for a warm-up of 10 to 30 minutes.

After warm-up of the monitors note the average readings, it should be a low value depending on the amount of ozone in your room. A value of 0.000 ppm_v is very unlikely.

Then use the 10-turns potentiometer to set the AOS 2 to about 40% of its range, and start the ozone source by using the wall mount power supply. If the lamp inside does not show a dim blue light through the small window of the AOS 2, press the push button "START" once.

After a few measurement cycles of the monitors, you might want to adjust the potentiometer for a reading of around 0.6 ppm_v on the reference monitor, the exact value is not of importance. Watch both readings for a several measurement cycles (20s each) and note the average difference. Maximum average difference should stay within specification of the sensor.

You may repeat the procedure for different levels of ozone concentration.

5 Zero Check

If you are in doubt about the zero reading of the ozone monitor with no ozone in the sample gas, you might want to perform a zero test. For this you need a TEST SCRUBBER. It removes any ozone present in the sample gas. Connect the TEST SCRUBBER instead of the AOS 2 directly to the monitor you like to test. Set the monitor to MANUAL mode on that channel. The displayed value should stay within ± 5 ppb_v around zero after a few measurement cycles.

If this is not the case, the scrubber inside the monitor should be replaced in order to find out if this cures the problem. If a new scrubber is not handy, exchanging the utility scrubber with the reserve scrubber inside the BMT 932 is an option (temporary ! If a scrubber alarm occurred, this does not work).

6 Reproducibility of Concentration

Please note that a precise ozone concentration at the output at a given flow rate is not reproducible by just using the same potentiometer settings. However, it is constant enough to precisely compare two ozone monitors after a few minutes of warm-up.

7 Service & Maintenance

Warning: UV radiation and ozone inside! Switch of and flush AOS 2 before opening!

There are no serviceable parts inside. If UV lamp has a life expectancy of many years. Most likely you will never have to replace the UV lamp.

If the AOS 2 becomes contaminated, you should send the AOS 2 in for repair. In order to avoid this, make sure that always a particle filter (provided on delivery) is connected whenever gas is flowing through the device. Also, replace the filter inserts if they become dirty.

For proper storage close the outlets and the OVERFLOW port with the plugs that have been delivered with the AOS 2.

Support for problems is available under service@bmt-berlin.de, or +49-3329-69677-0. Requests should at least contain the serial number of the bottom of the AOS 2, the reason for return and complete contact information.

Your notes

Your notes