

DISSOLVED OZONE METER MOZ-44P and the CZT-43 electrode

Operation and Maintenance Manual

MOZ 44P ozone meter provides continued direct measurement of the level of dissolved-in-water ozone. It is made to operate with direct-diffusing membrane electrode CZT-43, also called MOZ electrode. Two independent isolated channels close contacts at two pre-set levels. Usually one is used for controlling the process while the other for alarm, should the measured level reach outside the tolerable values. The measured value can be transmitted to remote location through standard 4-20mA current loop.



Product Specifications:

Type of display	LCD ranged 0.01 - 10.0 mg/l
Basic accuracy	+/-0.5% through the whole range
Tolerances from temperature changes	+/- 1% at each 10 ⁰ C away from 20 ⁰ C
Tolerances from Voltage changes	+/-0.2% within -15% to +10% from nominal
Settings of output channels	by screwdriver slot at the front panel
Hysteresis of switching action	0.1 mg/l at any given setting
Status of output channels	amber LED on the front panel indicate when reading is over the preset limit.
Maximum load on output channels	120V/50-60Hz, max. 0.1A
Output current loop settings	By a switch at the back, 4-20mA or 0-20 mA.
Power requirements	2 Watts (VA) at 120V/230V, 50-60 Hz, +10/-15% .
Enclosure	IP 00 - standard 1/4DIN. It is made for mounting into larger panels that meet all safety requirements.
Dimensions	96 x 96 x 94 mm (3.8 x 3.8 x 3.7")
Operating temperature	0 - 45 ⁰ C

Relative Humidity R.H.

max. 85%

Storage

Dry and clean room, temp. -25°C to 55°C

Adjusting the limits:

All settings are adjusted with slot-screwdriver.

LOW LIMIT

Push the pushbutton above the setting slot - to display the preset value. Adjust to the level of ozone that is the minimum acceptable in your application. For instance: 0.4-mg/l for a bottling plant. Amber LED lamp will be lit when ozone level reaches the limit. It can also be wired as alarm.

HIGH LIMIT

Push the pushbutton above the setting slot, to display the preset value. Adjust to the level of ozone that is the required level in your application. For instance: 0.5 mg/l at a water bottling plant. Amber LED lamp will lit when the ozone level reaches the limit. It can be wired to start/stop the ozone generator.

For the calibration with CZT-43 (MOZ) electrode follow the installation of the electrode further below first, if the electrode is not yet installed:

The stream of water along the tip of the electrode shall be at least 6 cm/s (2"/sec.)
The membrane must be clean, free of bio-fouling, iron and other ozone-consuming elements. The pressure inside the base must not exceed 3 psi (0.2 bars).

ZERO ozone reading

Immerse CZT-43 in ozone-free (distilled) water and adjust ZERO slot until the display reads 0.00 mg/l.

SLOPE (amplifier)

Dissolve more than 0.2 mg/l of ozone into a water sample - measured with another (reference) device. Adjust to match the reading with the reference device.

Maintenance

No maintenance is required

DISSOLVED OZONE ELECTRODE CSZT-43

also called MOZ electrode

Introduction:

The direct diffusing ozone sensor - electrode is very different from the standard ORP electrodes. The ORP electrodes measure tiny voltage potentials caused by ozone in water. In plastic tanks and pipes, and namely in low dissolved ions situations, the static charges interfere with the reading. ORP electrodes are also a subject to easy poisoning of its electrolyte, and depletion from metal ions in the process water. They are also vulnerable to ground fault current and electromagnetic interference (EMI) from power lines and telecommunications. CSZT-43 sensor does not have many of the above problems but it is more expensive.

The direct diffusing ozone sensor CZT-43 is a polarographic sensor of Clark's type. The cathode is made of a polarized platinum, while the anode is in a form of non-polarized argentochloride plated on a silver base. Both electrodes are submersed in an electrolyte and separated from the tested water by a membrane. The membrane allows ozone to penetrate through while it disallows ions of majority of contaminants. The chemical reactions of ozone at the electrodes result in electrical current that is directly proportional to the amount of dissolved ozone supplied. Ozone is consumed in the reaction thus there must be a constant supply of sampled water to the electrode.

How to activate the electrode.

1. Unscrew the **membrane head MHZ11**. **Do not touch the inside glass tip of the electrode while the head is open.** Apply 12 drops of the **electrolyte ES43C2** right into the membrane.
2. Hold the electrode in vertical position and slowly attach and screw the membrane head slowly from the bottom about half way onto the body of the electrode. This way any excessive electrolyte will overflow through the thread. Tap gently on the electrode with your finger for the air bubbles to escape, and continue to screw **very slowly** the head all the way to the end so that the excess of electrolyte can escape through the thread. Once the head reaches the end, the saddle inside the head reaches the seal and this way the electrolyte can not leak or dilute through the thread. **Do not seal the thread with Teflon tape.** The tape would cause the membrane to burst.
3. After connecting the sensor, its polarisation takes about 15 minutes before it reads with full accuracy. If the electrolyte or the inside surfaces were contaminated in any way, ozone will first clean the electrolyte and this may take few hours.
4. When fully closed, the glass top of the electrode will come out about 0.5 mm (0.02") pushing against the Teflon membrane. This may show convex in the centre of

the membrane - and this is correct. The membrane must be all stretched in order to function properly and it will not burst. It can only burst if the thread is sealed with Teflon.

Installation of the electrode:

1. Screw the electrode into the 1" NPT thread in the mounting base. The mounting base must be installed such way it does not air-lock and it does not trap air bubbles from the sampling line.
2. The mounting base has two 1/4" O.D. stainless steel nipples to connect the lines. Install the base on a vertical wall with the stainless steel nipples facing up and down. Connect the sampling line at the bottom nipple and secure with a clamp. Connect the upwards facing nipple into the return line.
3. The pressure in the line must not be more than 0.2 bar (3 psi). Make sure that the return line discharges into a low pressure point (waste drain line or into an ambient pressure tank). The flow speed control valve must always be mounted in the pressure side, to prevent any pressure build up in the base. Any pressure higher than 0.2 bar causes sever inaccuracy in the reading.
4. The electrode requires a speed of water flow at 5-6 cm/sec. (2"/sec). Typically, a 1/4" sampling line is sufficient for up to 8 meters (20 ft.) distance. The best way to find the proper speed is by opening the sampling water supply in small increments until the reading does not rise any more.
5. **Keep the electrode wet at all times.**

Maintenance of the electrode:

1. If the electrode was left dry for few days, the electrolyte may have dried out and the electrode may be damaged permanently. If this happen, submerse the electrode in distilled water for three hours, them gentry try to loose the thread and unscrew the head with two fingers. If this attempt is not successful, do not increase the torque because you could loose the thread in the head and break the glass inside. Instead, wrap the head into a cloth and grab it into small pliers. **Do not touch the inside glass tip of the electrode while the head is open.**

With extreme caution (the open tips are very fragile) submerse in distilled water for two more hours. Then try to wash away sediments by gently moving the electrode in the distilled water. Check the surfaces. If clean, refill the electrolyte.

There is no guarantee this process will work and there is no warranty on broken glass tips or dried out electrode.

2. If the surface of the membrane is dirty, clean it carefully with a wet cotton swab. If this is not successful, install new head.

3. **If you have to dry out the electrode for storage purposes**, move it out from base, remove the head, wash for at least 2 minutes in a stream of distilled water.
4. The membrane ages, and it is best to replace in 1-5 years; this time depends on the water purity. This life span is much better than one typical for the ORP electrodes and it can be in most cases restored for only a minimum cost.
5. If the electrode loses its ability to reach top value of expected reading, the electrolyte may have been depleted. The depletion also depends on the level of ozone dissolved in the water. One refill may last many years.

Accuracy of measurement.

The accuracy of the measurement depends on:

- The water pressure in the base of the electrode must not exceed 0.2 bars (3 psi)
- The water flow in the base must be at least 5-6 cm/sec (2" per sec.)
- The electrolyte must not be depleted.
- The head Teflon membrane must not be dirty. This electrode is not suitable for highly contaminated waters such as wastewater.
- The electrolyte must not be contaminated. Ozone removes such contamination but it may take a long time to get to the normal reading.
- The base must be filled with water and free of any air - see the mounting instructions.
- The MOZ controller must be properly set.

When two MOZ electrodes are mounted side-by-side for comparison, they are unlikely to read the exact same values. This is because the circuits are complex, and they cannot be identical. See what values are practical for your application and you will find the accuracy to be satisfactory. Once you establish what value is best for your application, the electrode will provide very stable, thus very suitable for controlling the process. For instance in cooling towers the reading depends heavily on the exact distances between the basin, point of measurement, and the heat exchanger. Proper value will be found around 0.02 - 0.10 mg/l and it is based on observations - see specific cooling tower installation manual. In water bottling plants the required level is 0.4 - 0.6 mg/l and this span is well within the accuracy of the electrode.

If you have a problem to establish proper reading in an installation, please describe in details how is your MOZ electrode connected in the process, and also describe the whole process so that we can evaluate all possible circumstances. The MOZ electrode has been proven for many years to provide reliable measurement of ozone in various applications.

Contact Ozone Solutions, Inc. if any questions. (712) 722-0337