PENTAIR

OZONE CONE

INSTALLATION AND OWNER'S MANUAL

IMPORTANT SAFETY INSTRUCTIONS

READ AND FOLLOW ALL INSTRUCTIONS

SAVE THESE INSTRUCTIONS

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SECTION 1: PREFACE

1.1 Document Scope

This manual has instructions for installation, operation, and maintenance of all standard models of Ozone Contact Cone products produced by Pentair.

⚠WARNING ***Read all instructions and warnings prior to installing or operating this product. Call 877 347 4788 for additional free copies of this manual.***

1.2 Symbols

The following are the safety and hazardous materials symbols used within the manual:

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⚠ This is the safety alert symbol. When you see this symbol on your system or in this manual, look for one of the following signal words and be alert to the potential for personal injury.

⚠DANGER	Warns about hazards that can cause death, serious personal injury, or major property damage if ignored.
⚠WARNING	Warns about hazards that may cause death, serious personal injury, or major property damage if ignored.
⚠CAUTION	Warns about hazards that may or can cause minor personal injury or property damage if ignored.
NOTE	Indicates special instructions not related to hazards.

Carefully read and follow all safety instructions in this manual and on equipment prior to using. Keep safety labels in good condition; replace if missing or damaged.

All information associated with a Danger, Warning and Caution icons should be read carefully and well understood prior to operation of the System. Dangers shall precede Warnings, which in turn shall precede Cautions. Dangers, Warnings and Cautions precede the step for which they are intended.

1.3 Abbreviations and Units

ASME ....American Society of Mechanical Engineers
bar .....metric unit of pressure (100,000 Pa)
CGA..... Compressed Gas Association
gpm ..... gallons per minute
kg..... kilogram
lbs..... pounds
lpm .....liters per minute
m^3 ..... cubic meter
mg/L.....milligrams per liter
O_2.....oxygen
O3C .....Ozone Absorption Cone
OCP.....oxygen control panel
ppm .....parts per million
PPC ..... pressurized packed column
PRV ..... pressure relief valve
psi..... pounds per square inch
TGP .....total dissolved gas pressure
VFD.....variable frequency drive

1.4 System Contacts

For all issues pertaining to this product, please contact:

Pentair
Address: 2395 Apopka Blvd
Apopka, FL 32703 USA
Toll free: (877) 347-4788
Tel: (407) 573-7269
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SECTION 2: GENERAL DESCRIPTION OF SYSTEM

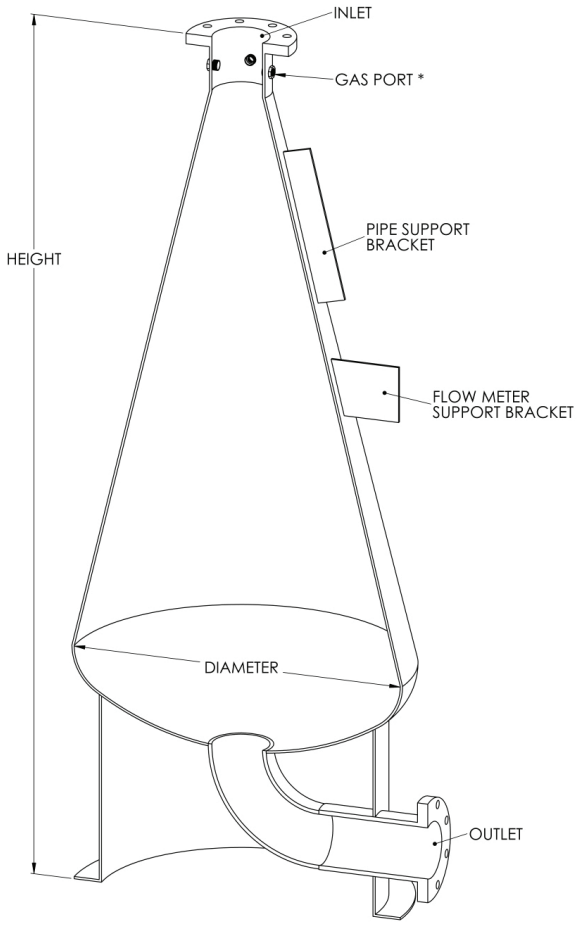

Figure 1: Typical Ozone Cone

*Three gas ports are standard for use with gas inlet, pressure gauge, and/or pressure relief valve.

MODEL	DIAMETER (in)	HEIGHT (in)	SHIP WEIGHT (lbs)
730132	12	38.0	54
730133	18	52.0	71
730134	24	66.0	106
730135	30	80.5	142
730136	36	94.0	219
730137	42	108.0	309
730138	48	122.0	414
730139	54	136.5	462
730140	60	150.0	695
730141	72	178.5	1,110

SECTION 3: THEORY OF OPERATION

The Ozone Absorption Cone (O3C) also known as a Speece Cone is used to add ozone to the process water. Process water enters into the O3C through the Liquid Inlet (LI) along with ozone gas through the Gas Port (GP). Both the LI and GP are located at the top of the O3C where the water flows down through the Cone forcing the ozone gas downward.

This O3C must be installed by a licensed professional in accordance with all applicable codes and standards for the jurisdiction in which it is installed. In addition, all plumbing attached to or used with this O3C must be installed by a licensed, professional plumber.

The process water and ozone gas flow velocities reduce as they travel down the cone to the point that the upward bubble velocity is greater than the process water allowing the gas bubbles to shear and dissolve in to the water. Ozonated process water exits through the Liquid Outlet (LO).

SECTION 4: SAFETY

⚠WARNING This section of the manual contains general safety warnings and must be read, understood and applied during installation, operation and maintenance of the O3C. Failure to obey the warnings and instructions herein could result in death or serious bodily injury to personnel and damage to the equipment. The safety information contained in this manual is intended to be read thoroughly. However, the information contained herein is not a substitute for the development of facility specific safety policy and procedures. Nor is this information intended to replace or supersede local regulations and standards for worker safety. It is the responsibility of the facility's management to ensure that the staff is trained in safe practices, including those contained within those beyond the scope of this manual.

Inspect the O3C regularly for cracks or other damage. Cracks and damage can result in leakage or rupture failure. If damage is found, immediately shut down the system until the damage has been fully inspected and repaired. Do not continue to operate the system.

⚠DANGER  **Ozone is a colorless gas with a strong odor. Ozone can be hazardous and can cause severe respiratory toxicity. Breathing ozone can damage the lungs and cause chest pain, coughing, shortness of breath and throat irritation. Higher exposures can cause fluid build-up in the lungs (pulmonary edema). Ozone can also worsen chronic respiratory diseases such as asthma and compromise a person's ability to fight respiratory infections. Ozone may cause lung cancer. In the event of ozone leakage, move to fresh air immediately.**

4.1 Ozone Equipment Safe Practices

⚠DANGER  **Ozone is a strong oxidant and may accelerate or initiate combustion or cause explosions. Ozone must be contained within ozone-resistant tubing and pipes. In the event of a leak, the system should be shut down immediately until the damage has been fully inspected and approved. Evacuate the area until ozone levels subside.**

- OSHA regulations require employers to determine the types of personal protective equipment for each hazard and to train employees on how and when to use protective equipment.
- In the event of an ozone leak, the system must be turned off immediately. Failure to do so can result in an explosion or fire.
- Do not allow smoking within fifty feet of ozone equipment.
- Store ozone equipment in clean, dry locations away from direct sunlight.
- Make sure any cleaning, repair or filling of ozone equipment is done by qualified, correctly trained personnel.
- Make sure staff using ozone equipment are adequately trained in its operation, in ozone safety and have knowledge of the manufacturer's instructions for use.
- Do not store combustible products within fifty feet of equipment.
- In the event of exposure to ozone, wash thoroughly and immediately after exposure.

4.2 Avoid Stepping on Plumbing and Piping

⚠DANGER  **Hazardous Pressure. The O3C utilizes compressed gases. Stepping on plumbing connected to the O3C can result in an explosion which can cause death or serious bodily injury. All persons should avoid standing on or any and all contact with plumbing or piping associated with O3C.**

4.3 Oxygen Purity

⚠CAUTION Use only liquid oxygen and not generated oxygen. Use of generated oxygen can lead to high nitrogen levels in the water and can result in fish deaths.

SECTION 5: INSTALLATION

⚠WARNING The O3C and all hangers, anchors and supports used with the O3C must be installed by a licensed professional in accordance with all applicable codes and standards for the jurisdiction. In addition, all plumbing attached to or used with the O3C must be installed by a licensed, professional plumber.

The O3C is typically provided with (2) ¾ x ¼ 316SS bushings (for Gas Port and Pressure Gauge (not included)), (1) ¾ x ½ 316SS bushing (for Pressure Relief Valve (not included)) and Mounting Bracket (for Flow Meter (not included)).

5.1 Installation Requirements

5.1.1 The O3C is to be installed on a level support pad or floor.

5.1.2 Pad or floor to be designed to carry the total operating weight of the O3C including the vessel and water along with any other design conditions.

5.1.3 When required for stability, wind load or seismic loads, the O3C shall have adequate hold down anchors installed.

5.1.4 Support surface to be smooth and free of any debris or occlusions that may damage the bottom of the O3C.

5.1.5 All valves and piping must be independently supported. Pipe support specifications must ensure proper support under all potential operational and environmental conditions. All hangers, anchors and supports must be capable of supporting the piping and contents of the piping used with the O3C.

5.2 Setting the O3C

5.2.1 Set the O3C on pad or the floor taking care to orientate the fittings

5.2.2 Grout bottom flange to level O3C if necessary.

5.2.3 If required, install anchors.

5.2.4 Always utilize an anchor with a nut and jam nut. Lightly tighten nut and then install jam nut. This will allow for thermal expansion or contraction (316SS hardware is recommended).

5.3 Connections

5.3.1 The liquid inlet and outlet ports are both flange connections. Make sure to use a gasket between the flanges and the inlet and outlet ports on the O3C. Tighten the flange bolts in an alternating pattern to the specified torque.

5.3.2 A check valve shall be installed in between the system pump and the ozone cone to prevent flow out of the O3C which can cause a vacuum negative pressure within the unit during shutdown. The O3C is not designed to withstand vacuum negative pressures.

5.3.3 A valve shall be installed downstream of the O3C outlet port to allow for pressure control in the unit.

5.3.3.1 This valve shall be installed as closely to the culture tank as possible in an effort to keep the pressure in the line and prevent the dissolved ozone from coming out of solution.

5.3.3.2 The ozonated process water shall enter the culture tank below the water surface. If the ozonated process water is added above the culture tank water surface the super saturated ozone will off-gas when it splashes into the tank.

5.3.3.3 Ozone gas monitors shall be installed in the facility to alert staff of dangerous ambient ozone levels.

SECTION 5: INSTALLATION

5.3.4 Only use ozone compatible/safe materials with the ozone line, accessories and connections.

5.3.5 Connect gas line with a flow meter and mount flow meter to support bracket.

5.3.5.1 Install a check valve and shutoff valve between the inlet gas fitting and the flow meter. Make sure the check valve is installed in the proper orientation such that it allows ozone flow into the cone but prevents water backflow toward the flow meter. The shut off valve is useful in the event the flow meter needs to be removed for cleaning or servicing.

5.3.6 Install pressure gauge into the pressure gauge port.

5.3.7 Install pressure relief valve into the pressure relief port.

5.3.8 Make certain that flow meter is calibrated.

⚠CAUTION 5.3.9 Check all ozone gas connections for leaks. If ozone is detected shut down the ozone generator until the leak is repaired.

SECTION 6: O3C STARTUP

6.1 Use caution when using ozone as it can be harmful to humans and aquatic animals at low concentrations. Exposure to high enough concentrations can lead to death.

6.2 Make sure all valves on downstream side of the outlet port of the O3C are open prior to starting the pump to reduce the risk of over pressurizing the unit during startup (MAX 15 PSI, 1 bar).

6.3 Slowly start the water flow to the O3C. Make sure to monitor the O3C pressure gauge to assure the vessel pressure does not exceed 15 PSI (1 bar).

6.4 Bring the flow to the required flow rate.

6.5 Start the ozone flow to the O3C by first slightly opening the flowmeter valve and then opening the shut off valve.

6.5.1 Adjust the ozone flow to the O3C with the ozone flowmeter valve.

6.6 To adjust the pressure in the O3C use the valve downstream of the cone not to exceed 15 psi (1 bar).

6.6.1 Closing the valve will increase the pressure in the O3C

6.6.2 Opening the valve will decrease the pressure in the O3C

SECTION 7: NORMAL OPERATION

⚠ DANGER DO NOT ALLOW PRESSURE TO EXCEED 15 PSI (1 bar)! Running above 15 psi (1 bar) can cause death, serious personal injury, or major damage to the O3C.

7.1 If the culture tanks require higher dissolved ozone (DO3) concentration:

7.1.1 If possible increase the process water flow through the O3C to the culture tanks

7.1.2 If the DO3 concentration in the culture tank is still lower than desired increase the ozone flow to the O3C

7.1.2.1 If undissolved ozone gas is flowing into the culture tank from the O3C outlet pipe then the pressure on the O3C needs to be increased to force the ozone gas into solution. This can be done by closing the O3C outlet valve until no visible bubbles are entering the tank.

7.2 If the dissolved ozone concentration is too high in the culture tanks:

7.2.1 Decrease the flow of ozone to the O3C

7.2.2 Decrease the pressure and water flow to the O3C to conserve energy input to the process water pump.

7.2.2.1 Note: Be cautious decreasing the water flow to the culture tank as it will influence (typically negatively) other aspects of water quality within the culture tank.

SECTION 8: SHUT DOWN

8.1 If gas control is not automatic, turn off gas supply before shutting down system.

⚠ CAUTION OXYGEN GAS IS EXPLOSIVE—USE CAUTION!

8.2 To shut down the O3C, drain all water from the unit using Liquid Outlet.

8.3 Leave liquid outlet valve open to ensure pressure cannot build up in the O3C.

⚠ CAUTION ***8.4 If the system is shut down for any length of time, the stagnant water can become anaerobic, which can kill fish. The O3C vessel must be drained each time the system is shut down for any length of time. Failure to properly drain the vessel after a shutdown can result in fish deaths.***

SECTION 9: MAINTENANCE

9.1 Daily visual inspection of the O3C is recommended. The following items should checked and noted:

1) All connections are dry and free of leaks.

2) O_3 flow meter working correctly.

3) O_3 connections are not leaking.

9.2 Pressure relief valves should be tested semiannually to confirm correct relief pressure.

SECTION 10: TROUBLESHOOTING

10.1 Problem: Low or no flow to the tank

10.1.1 Confirm water pump is operating correctly without obstruction and valve is open to the desired position.

10.2 Problem: Low oxygen level

10.2.1 Review 10.1 and confirm issues do not persist with pump or valve position

10.2.2 Ensure gas is on and gas supply is adequate. Check gas flow meter to confirm correct setting.

NOTES

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