



# OXYGEN 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 Oxygen 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:

### READ AND FOLLOW ALL INSTRUCTIONS— SAVE THESE INSTRUCTIONS

**⚠** 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<sup>3</sup> ..... cubic meter  
mg/L..... milligrams per liter  
O<sub>2</sub>.....oxygen  
O2C .....Oxygen 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  
Email: PAES.General@Pentair.com  
Web: www.PentairAES.com

## SECTION 2: GENERAL DESCRIPTION OF SYSTEM

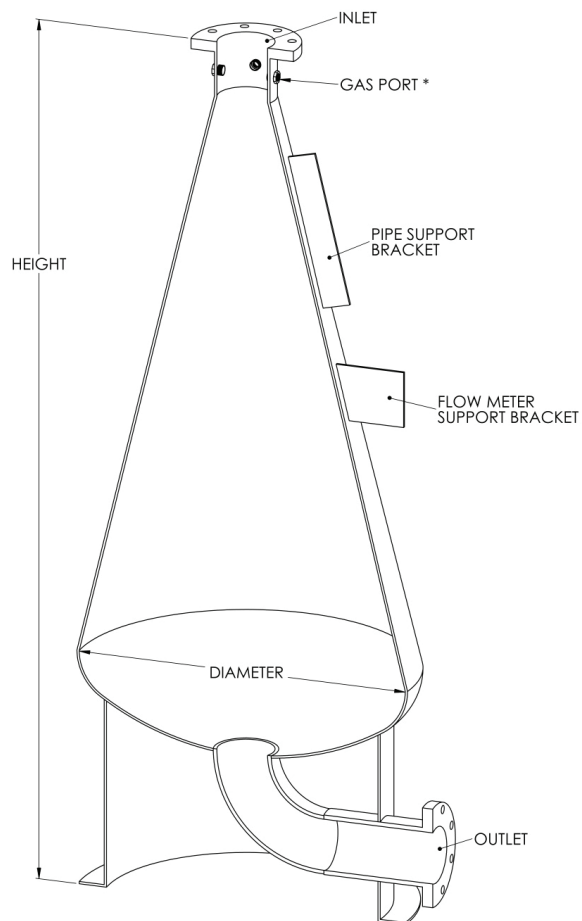


Figure 1: Typical Oxygen Cone

\*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)
730122	12	38.0	54
730123	18	52.0	71
730124	24	66.0	106
730125	30	80.5	142
730126	36	94.0	219
730127	42	108.0	309
730128	48	122.0	414
730129	54	136.5	462
730130	60	150.0	695
730131	72	178.5	1,110

## SECTION 3: THEORY OF OPERATION

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The Oxygen Absorption Cone (O2C) also known as a Speece Cone is used to add oxygen to the process water. Process water enters into the O2C through the Liquid Inlet (LI) along with oxygen gas through the Gas Port (GP). Both the LI and GP are located at the top of the O2C where the water flows down through the Cone forcing the oxygen gas downward.

**This O2C 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 O2C must be installed by a licensed, professional plumber.**


The process water and oxygen 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. Oxygenated 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 O2C. 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 O2C 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.

### 4.1 Oxygen Equipment Safe Practices

**⚠ DANGER**  Oxygen may accelerate or initiate combustion or cause explosions. Oxygen must be contained within oxygen-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 oxygen levels subside.



- Do not allow smoking within fifty feet of oxygen equipment.
- 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 oxygen leak, the system must be turned off immediately. Failure to do so can result in an explosion or fire.

- Store oxygen equipment in clean, dry locations away from direct sunlight.
- Make sure any cleaning, repair or filling of oxygen equipment is done by qualified, correctly trained personnel.
- Make sure staff using oxygen equipment are adequately trained in its operation, in oxygen safety and have knowledge of the manufacturer's instructions for use.
- Breathing pure oxygen at high pressures can cause nausea, dizziness, muscle twitching, vision loss, convulsions and loss of consciousness.
- Breathing pure oxygen for a long period of time can irritate the lungs, causing coughing and/or shortness of breath. Higher exposures may cause a buildup of fluid in the lungs (pulmonary edema), a medical emergency.
- Contact with liquid oxygen can cause severe skin and eye irritation and burns as well as frostbite. Wear protective clothing; avoid skin contact.
- On skin contact with liquid oxygen, immediately submerge the exposed body part in warm water.

### 4.2 Avoid Stepping on Plumbing and Piping



**⚠ DANGER** Hazardous Pressure. The O2C utilizes compressed gases. Stepping on plumbing connected to the O2C 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 O2C.

### 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 O2C and all hangers, anchors and supports used with the O2C 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 O2C must be installed by a licensed, professional plumber.

The O2C is typically provided with (2)  $\frac{3}{4} \times \frac{1}{4}$  316SS bushings (for Gas Port and Pressure Gauge (not included)), (1)  $\frac{3}{4} \times \frac{1}{2}$  316SS bushing (for Pressure Relief Valve (not included)) and Mounting Bracket (for Flow Meter (not included)).

### 5.1 Installation Requirements

- 5.1.1 The O2C 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 O2C including the vessel and water along with any other design conditions.
- 5.1.3 When required for stability, wind load or seismic loads, the O2C 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 O2C.
- 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 O2C.

### 5.2 Setting the O2C

- 5.2.1 Set the O2C on pad or the floor taking care to orientate the fittings correctly.
- 5.2.2 Grout bottom flange to level O2C 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 All valves and piping to be supported independently.
- 5.3.2 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 O2C. Tighten the flange bolts in an alternating pattern to the specified torque.
- 5.3.3 A check valve shall be installed in between the system pump and the oxygen cone to prevent flow out of the O2C which can cause a vacuum negative pressure within the unit during shutdown. The O2C is not designed to withstand vacuum negative pressures.
- 5.3.3 A valve shall be installed downstream of the O2C outlet port to allow for pressure control in the unit.
  - 5.3.4.1 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 oxygen from coming out of solution.
  - 5.3.4.2 The oxygenated process water shall enter the culture tank below the water surface. If the oxygenated process water is added above the culture tank water surface the super saturated oxygen will off-gas when it splashes into the tank.
- 5.3.5 Only use oxygen compatible/safe materials with the oxygen line, accessories and connections.

## SECTION 5: INSTALLATION

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

5.3.6.1 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 oxygen 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.

5.3.7 Install pressure gauge into the pressure gauge port.

5.3.8 Install pressure relief valve into the pressure relief port.

5.3.9 Make certain that flow meter is calibrated.



5.3.9 Check all oxygen connections for leaks. If high oxygen levels are detected shut down until the leak is repaired.

## SECTION 6: O2C STARTUP

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6.1 Use caution when using oxygen as it can be harmful to humans and aquatic animals at high concentrations.

6.2 Make sure all valves on downstream side of the outlet port of the O2C 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 O2C. Make sure to monitor the O2C 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 oxygen flow to the O2C by first slightly opening the flowmeter valve and then opening the shut off valve.

6.5.1 Adjust the oxygen flow to the O2C with the oxygen flowmeter valve.

6.6 To adjust the pressure in the O2C 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 O2C

6.6.2 Opening the valve will decrease the pressure in the O2C



## SECTION 7: NORMAL OPERATION

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**⚠ 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 O2C.

7.1 If the culture tanks require higher dissolved oxygen (DO) concentration:

7.1.1 If possible increase the process water flow through the O2C to the culture tanks

7.1.2 If the DO concentration in the culture tank is still lower than desired increase the oxygen flow to the O2C

7.1.2.1 If undissolved oxygen gas is flowing into the culture tank from the O2C outlet pipe then the pressure on the O2C needs to be increased to force the oxygen gas into solution. This can be done by closing the O2C outlet valve until no visible bubbles are entering the tank.

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

7.2.1 Decrease the flow of oxygen to the O2C.

7.2.2 Decrease the pressure and water flow to the O2C 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

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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 O2C, drain all water from the unit using Liquid Outlet.

8.3 Leave liquid outlet valve open to ensure pressure cannot build up in the O2C.

**⚠ 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 O2C 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

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9.1 Daily visual inspection of the O<sub>2</sub>C is recommended. The following items should be checked and noted:

- 1) All connections are dry and free of leaks.
- 2) O<sub>2</sub> flow meter working correctly.
- 3) O<sub>2</sub> connections are not leaking.

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

## SECTION 10: TROUBLESHOOTING

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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

[illegible]



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