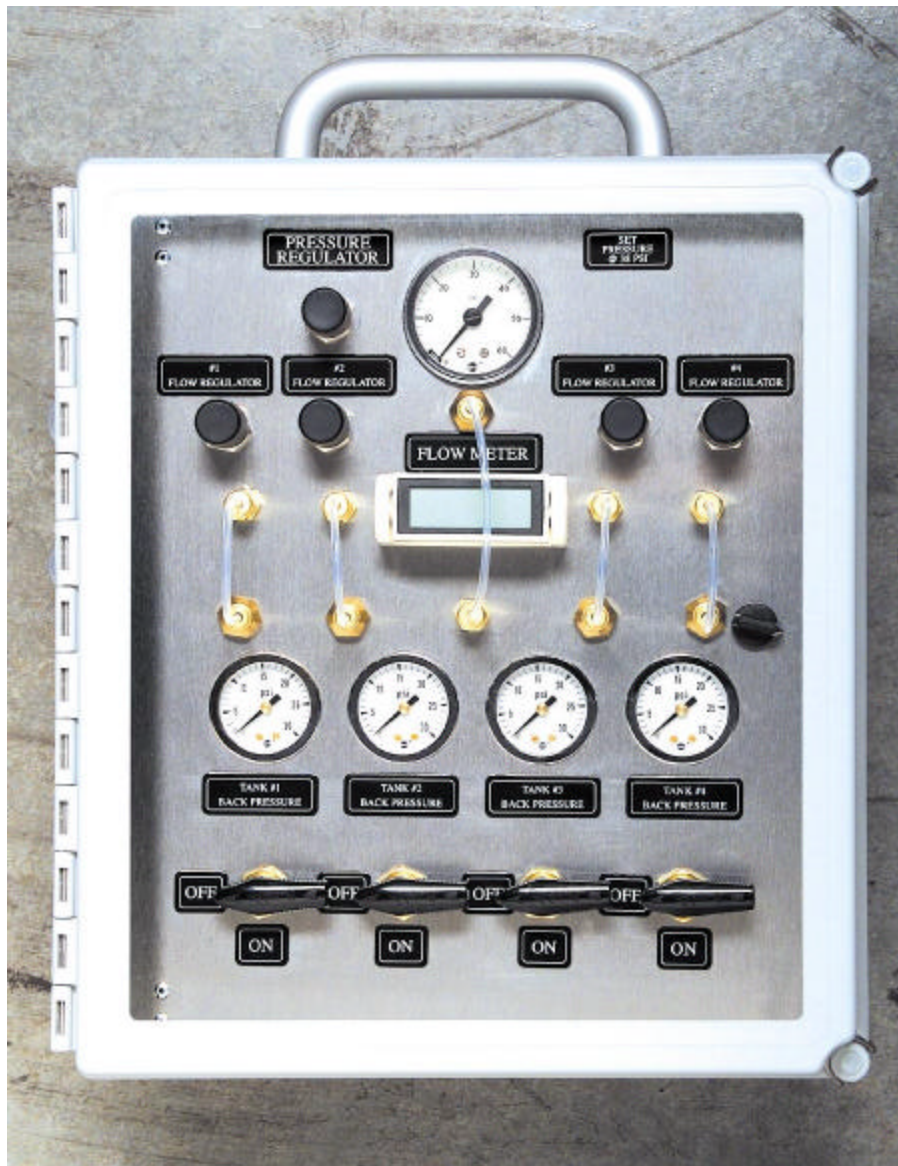


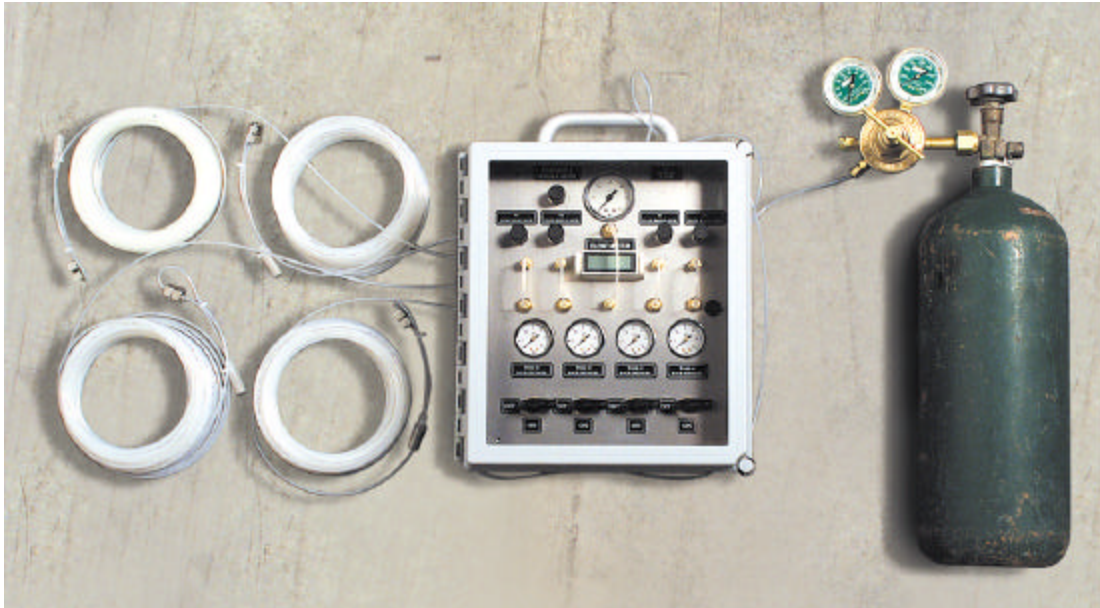
Westec 4-Channel Micro-Oxygenation Unit The “Ox Box”



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Introduction

This oxygenation device is intended for use by winemakers as a tool for use in the enhancement of their wines. This tool is not for every wine. The main intended uses are to augment and in some cases replace the use of barrels in the winemakers program.



Shipping List

1. 1- 4 channel Ox Box.
2. 5 - 10 μ Sintered Stainless Steel Sparge Stones.
3. 4 - P100 Upchurch Plastic Nuts (to connect tubing to stone).
4. 8 - 1/2" Stainless Steel Nuts (to act as weights - 2 per stone).
5. 10 - small cable ties (to configure each sparge and weight).
6. 10 - medium cable ties (use to hold tubing in place from tank to box).
7. 1- 8oz bottle of Snoop (soapy water for leak detection)
8. 4 - 10 mL / min flow restrictors (blue) for low flow applications.
9. 1 - 1/4" npt to 1/8" swag. Fitting (use to connect regulator to tubing).
10. 5 - 100' rolls of 1/8" tubing.

User Required Parts

1. Oxygen Tank
2. Single Stage Regulator
3. 7/16" wrench

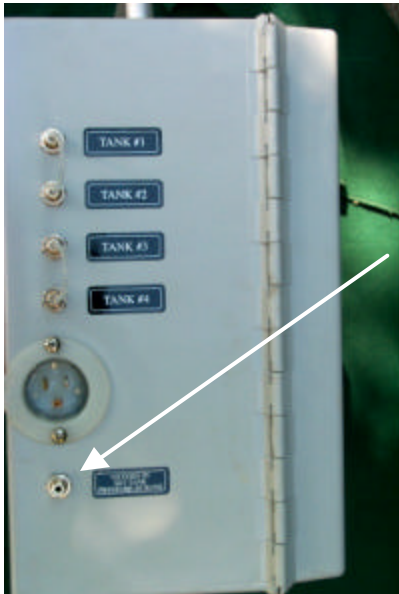
Installation

Oxygen Tank Hookup

In the bag of parts there will be a fitting, (Part #9 - 1/4" NPT to 1/8" Swagelok fitting). Remove the fitting which comes on the oxygen regulator (figure 1). Wrap the new fitting with Teflon tape and replace the fitting with Part #9 (1/4" NPT to 1/8" Swagelok). This fitting will allow direct connection of the provided 1/8" tubing to the Oxygen tank and regulator.



CAUTION! – Ensure the oxygen tank is properly secured!



Connect appropriate length of 1/8" tubing from tank regulator to the fitting on the outside of the Ox Box marked "**Oxygen In**".

Set the pressure on the regulator between 60 & 90 psi after you have connected the tubing to the box.

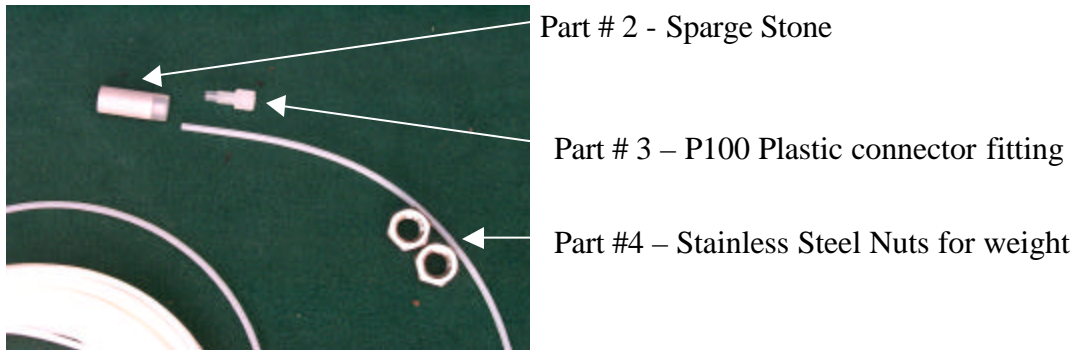
Mounting the Box

The ideal mounting position for the box would be above the top of the highest tank to be micro oxygenated. This will ensure that wine will not siphon back down the tubing should the oxygen tank run out or be shut off by mistake.

If mounted outside it is best to provide some protection from wind, rain and sun. The tubing provided will become brittle upon extended exposure to the sun and should be checked yearly.

Sparge Stone Setup

Place two 1/2" Stainless Steel Nuts (Part #4) on the 1/8" tubing (Part #10).



These will act as weights to let the sparge stone sink to the appropriate depth. Place one plastic fitting (Part #3) onto the end of the 1/8" tubing, ensure approximately 1/4" is pushed through the fitting. Take one 10μ sintered stainless steel sparge stone (Part #2) and screw it onto the fitting. Form a loop about 6" to 8" in size with the SS nuts at the bottom and the sparge stone oriented upward (see Figure 2). Use either the SS wire provided or a small cable tie between the stone and the fitting to form the loop. Then place a second tie about half way between the stone and the SS nuts to keep the loop tight (see attached diagram). Forming this loop will ensure the sparge stone will stay off the bottom of the tank and out of any wine lees.



Measure the length of tubing needed by lowering the sparge tip and tubing outside the tank to a point 1-3 feet above the base of the tank to the point of entry at the top of the tank. Mark that point with a Sharpie or piece of tape. The deeper the stone is placed the better the ability to dissolve the oxygen due to the increase in the head pressure. However, you should place the stone a minimum of 1 foot above the tank floor to ensure that it stays above settling lees.

NOTE: It is sometimes best to wait to attach the sparge stone until after the means for transitioning the tubing into the tank has been decided and executed.

Transitioning the tank

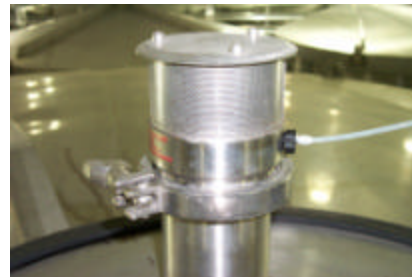
There are a number of ways winemakers have used to transition the tubing from inside to outside the tanks. The first uses a 2" tri-clover fitting if available and a silicone fermentation bung with the large round flap covering four holes. Using this to plug the 2" fitting after feeding the tubing through one of the four holes and wrapping Para-film at the point marked to keep the sparge stone at the proper position. This allows a good seal for sanitation and pressure relief through the bung if necessary.



Other methods might use a silicone cork drilled to pull the tubing through and fit into a secondary outlet in the tank.

Another common way, if the tank has a modern tri-clover fitted vent, is to remove the vent and place a tri-clover tee on the tank in its place.

Attach a tri-clover elbow on the side and re-attach the vent to the top of the elbow. Now the top of the tee is available to pass the tubing with the attached sparger using the technique described above.



The best method to use is if the tank has a Shea Vent system, stainless steel vent with a 3/8" npt plastic plug on the side. Drill an 1/8" hole in the plastic plug and feed the tubing through. Once to the proper depth wrap both sides of the plug with parafilm to prevent the tubing from movement and seal the hole.





Run sparge lines from fittings on the side of the box to the desired tank. Fittings for Tanks 1 thru 4 are labeled appropriately on the side of the box.



Collet

Instant tube fitting body

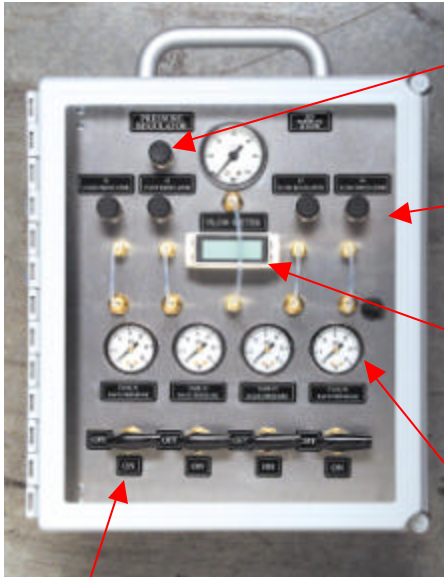
Connecting tubing

To connect tubing first cut the 1/8" tubing cleaning at 90° angle. Push the tubing firmly into the collet until it seats into the body of the fitting.

To disconnect the tubing from the fitting press the collet in and hold while gently pulling the tubing. Ensure the collet is pressed in and refrain from using extreme force to remove the tubing or the tubing may break off in the fitting.

Ox Box Setup

After connecting the oxygen supply to the Ox Box set the fine pressure regulator (inside the box) to 38 psi. The flow meter is calibrated for optimal performance at this pressure.



Precision pressure regulator set to 38 psi.

Flow controllers – they will control flow rates between 0 and 90 mL/minute with the standard (green) flow restrictor. And between 0 – 15 mL/ minute with the optional blue flow restrictor (provided but not installed).

Flow Meter - capable of detecting flows between 0 and 50 mL/minute to 1 decimal place accuracy.

On/Off Valve for each channel or Tank

Back Pressure gauge – Measures backpressure due to height of wine over the sparge stone. Will only measure back pressure when sparging. A 5 psi increase in back pressure over the starting equilibrium pressure indicates fouling of the sparge stone.

Setting Flow Rates

Use the Excel spreadsheet calculator or Chart provided on the floppy disk to convert your desired Oxygenation Rate from milliliters of Oxygen/Liter of wine/Month to a flow rate in milliliters per minute. Input the tank size and desired oxygenation rate into the spreadsheet and it will calculate the flow rate needed to set in the Ox Box. Or Use the chart and read down the left column to the desired mL O₂/L/month then move across the chart to the volume in gallons of the tank to be treated. Adjusting the flow controller and reading the resulting flow on the digital readout from the flow meter will set the flow rate in mL/min.

Calculation of Flow Rate for Constant Micro Oxygenation

Tank Size in Gallons	12000
Desired Rate of Oxygenation (mL O ₂ / L / month)	1

Flow rate in mL/min to set **1.05**

Calculation of Flow Rate for Periodic Micro Oxygenation

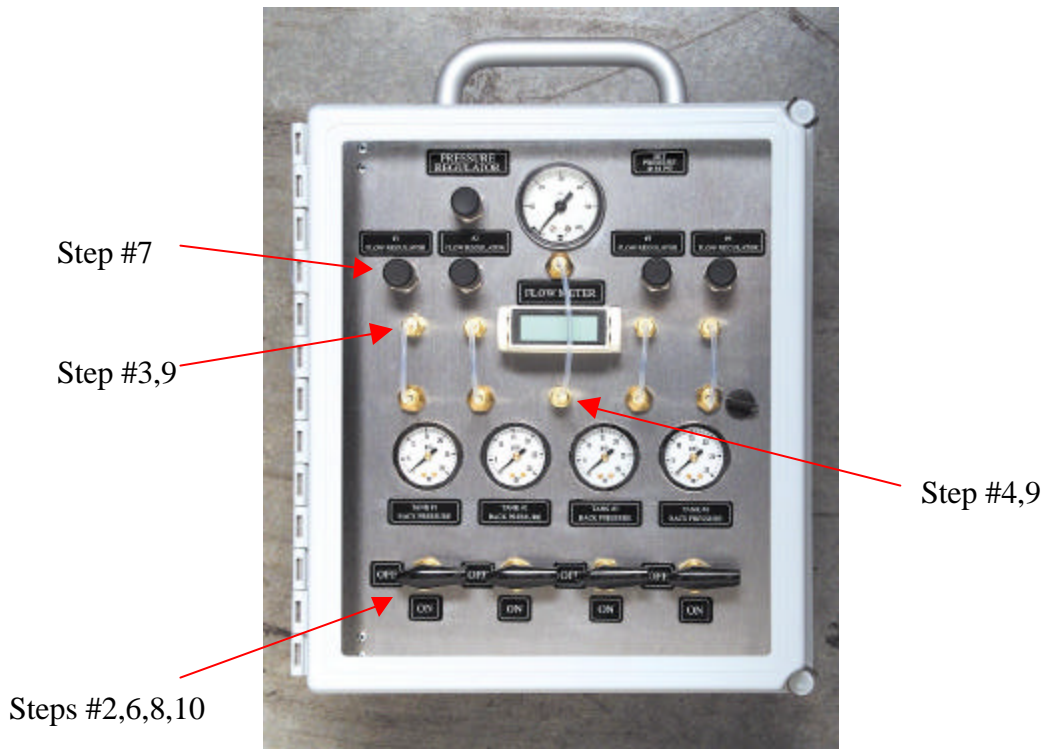
Tank Size in Gallons	2500
Desired Rate of Oxygenation (mL O ₂ / L / month)	1
Days per month to microoxygenate	8
Hours per day desired to sparge	8

Flow rate in mL/min to set **2.46**

Instructions for use: Just fill in the tank size in gallons and desired parameters to calculate the flow rate needed in mL/minute.

Depending on the size of tank to be oxygenation there can be a choice between constant sparging and periodic sparging of the wine. If the tanks are less than 4000 gallons it may be required to do periodic sparging to achieve the desired rates of micro-oxygenation. The "Ox Box" is only able to control down to flow rates of about 0.5 mL/Min. Using the Excel Calculator you can easily determine that smaller tanks at low oxygenation rates (mL O₂/Liter of Wine/Month) it will require flow rates below 0.5 mL/min. You can then use the second calculator to determine the flow rate required to a set a periodic sparging schedule. For instance, if a micro oxygenation rate of 1 mL/L/month is required in a 2,500 gallon tank the constant rate would be well below 0.5 mL/Min. Using the second calculator enter 2,500 gallons for the tank size, the required micro oxygenation rate, the number of days per month to sparge (in this case 8 or twice per week), the number of hours to sparge on each of the days and the rate to set the Ox Box is calculated.

Step by Step Procedure



1. Plug in Flow meter and allow to warm up for 10 minutes.
2. Turn channel #1 On/Off valve to the **Off** position
3. Disconnect channel #1 jumper tube from fitting using 7/16" wrench. (Note the bottom fitting will not loosen)
4. Disconnect flow meter jumper tube from bottom fitting and reconnect and tighten on channel #1 bottom fitting (**approx. 1/8 turn past finger tight, DO NOT OVER TIGHTEN**)
5. Connect channel #1 jumper tube to bottom flow meter fitting and tighten (**approx. 1/8 turn past finger tight, Do Not Over Tighten**), this puts the flow meter inline with the Tank #1 Flow Controller.
6. Turn channel #1 On/Off valve to **On** position
7. Set desired flow by turning flow controller knob and monitoring digital readout from flow meter (Make sure you have allow enough time for the flow to be exiting the sparge stone and the flow rate is stable).
8. Turn channel #1 On/Off valve to the **Off** position.
9. Reconnect jumper tubes to their former positions, this takes the Flow Meter out of line with Tank #1
10. Turn channel #1 ON/Off valve to **On** position.
11. **Unplug Flow Meter - This should only be on while setting flows.**
12. To set Channel 2, 3 or 4 flow rates - Follow procedure described in Step 5 for the desired Channel.

Where to Start and What to Monitor

There is defined guide when utilizing micro-oxygenation. However, we can try to provide some direction. Five main areas will influence rate and timing of micro-oxygenation. First, how big or weak is the wine, tannin and color? Second, what will this wine be used for and when will it be needed? Third, how turbid is the wine? Fourth, what is the temperature and can it be controlled? Lastly, is the wine reduced, e.g. does it smell of hydrogen sulfide or methyl or ethyl mercaptan?

Usually we advise eliminating reduction first, this will allow the fruit character of the wine to come through giving the winemaker a better feel for the wine. This process will usually take no more than 3 to 5 days at higher micro-oxygenation rates (5 –10 mL/L/month). However, this will depend on turbidity and temperature. If the wine is very turbid there may be no effect on reduction. The wine should be clean settled and racked before micro-oxygenating. It is better to wait a few more days or a week to settle and rack than try to micro-oxygenate a turbid wine. Filtrating or centrifuging the wine will certainly clean up the wine but it is not necessary.

Temperature will also play a role, warm temperature cause faster reaction rates. One must be careful when oxygenating at lower temperatures since reaction rates are lower and the ability of the wine to dissolving oxygen increases. So at lower temperatures 50-55°F the rate of oxygenation may need to be lowered to ensure that all oxygen sparged into the wine reacts and does not increase dissolved oxygen (DO).

Once reduced characters have been eliminated, the rate of micro-oxygenating should be turned down to match expectations for the wine. These expectations will be based on when that wine will be needed for blending or bottling. In addition, how “big” the wine is will need to be taken into account when setting flows. Longer period of time, lower rates; lighter wines, lower rates; short timeline, high rate, etc.

What to Measure

Free SO₂ is the easiest and most important measurement that can be performed while micro-oxygenated. Free SO₂ levels should not be allowed to drop below 10 ppM. This will help ensure protection of the wines. High levels of free SO₂, above 40 ppM, have not been found to inhibit the process. Measurement of total SO₂ has also been found to be a useful indicator of potential overdosing of O₂. Free SO₂ levels will drop with time and amount of O₂ being added to a wine. However, total SO₂ should not drop drastically. If

drops in total and free SO₂ are seen the rate of oxygenation is most likely too high for that wine and should be lowered or shut off.

Measurement of dissolved oxygen (DO) can be useful as a safeguard to indicate DO build up. If the rate of oxygen addition matches what the wine can absorb and react then no increase DO should be seen.

Tasting is by far the most important means of monitoring a wines' progress. One easy method to determine proper rate of oxygenation is to take a sample of wine and fill a wine glass half full, cover it with a watch glass and allow it to set overnight. The next day get a fresh sample of wine and compare the two samples for acetaldehyde in the aroma. This fresh pumpkin or chocolate character detected in the overnight sample and not the fresh sample indicate that the rate of oxygenation is about right for this wine. If acetaldehyde is detected in both samples then the rate of oxygenation is too high and should be reduced. If acetaldehyde is not detected in either sample the rate of oxygenation can be increased, though this is not necessary depending on timing and end use for this wine.

Care and Maintenance

While the Ox Box is produced using a NEMA 4 Waterproof Electrical Box it is best if a protective shield can be made to protect the box from direct sunlight, rain and wind if mounted outside.

When not setting flows ensure that the flow meter is isolated (not inline) from possible backflow of wine. Also, make sure that the flow meter is unplugged when not in use this will help extend it's life.

If by chance wine does flow back through the box it is possible to clean the lines

No flow

1. Tube pinched, trace tubing and insure it's integrity.
2. Tubing not pushed completely into the fitting on the side of the box.
3. Leak inside box, check fittings inside box with snoop leak detector.
4. Oxygen cylinder is empty.
5. Sparge stone plugged.
6. Flow controller turned off.
7. Valve is in the off position.
8. Jumper tube fittings are loose, tighten 1/8 turn past finger tight.

No Reading on Flow Meter or inconsistent readings

1. Check that the box is plugged in.
2. Check inside the box that the power supply is plugged in.
3. Check inside the box that the cord from the display to the flow meter is plugged into the side of the box.
4. Check that fittings are tight on panel.
5. Check that fitting on the flow meter (behind the front panel) are tight.