Congratulations on the purchase of your new Nitrox Controller. This guide will walk you through proper installation and set up so you can quickly get to blending Enriched Air. Please read these directions prior installing your controller to avoid any problems. If you have any problems during the installation, please email support@rubberduckiedesigns.com or call at (808) 392-8252.

List of tools.
You may need some/all of the following tools/supplies

1. Small slotted screwdriver for electronics, commonly called a tweeker
2. Medium size slotted screwdriver
3. Pen or pencil
4. Drill
5. Screwdriver drill bits
6. 7/8 inch hole saw (if the compressor electrical panel does not have an available small knockout)
7. Assorted drill bits
8. Assorted tie wraps to safely secure wiring
9. Wrenches for hooking up oxygen control valve
10. Teflon seal tape
11. Voltage meter
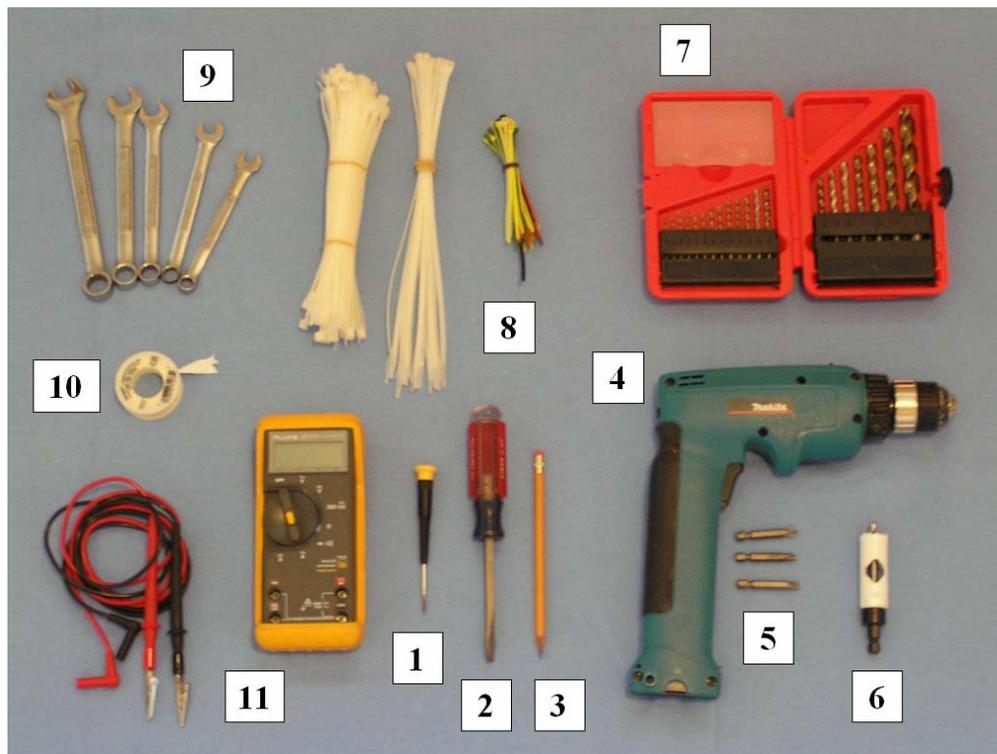
Getting started.

Find a suitable location for mounting your controller. The controller should be mounted such that it can easily be viewed while it is operating and you are filling Nitrox. The wires that come attached to your controller should be long enough for most installations. The wires for the oxygen sensor, oxygen control valve, and 120 Volt AC power are all 15 feet long. The wire for the compressor shut down is 35 feet long. Make sure that wherever you mount your controller, the wires will reach all of the various devices. Molex-type electrical connectors are provided for the oxygen sensor (2 wire) and oxygen control valve (3 wire) to simplify installation. The wires that connect to the compressor to provide the automatic shutdown capability have been terminated with spade connections.

Mounting the controller to the wall.
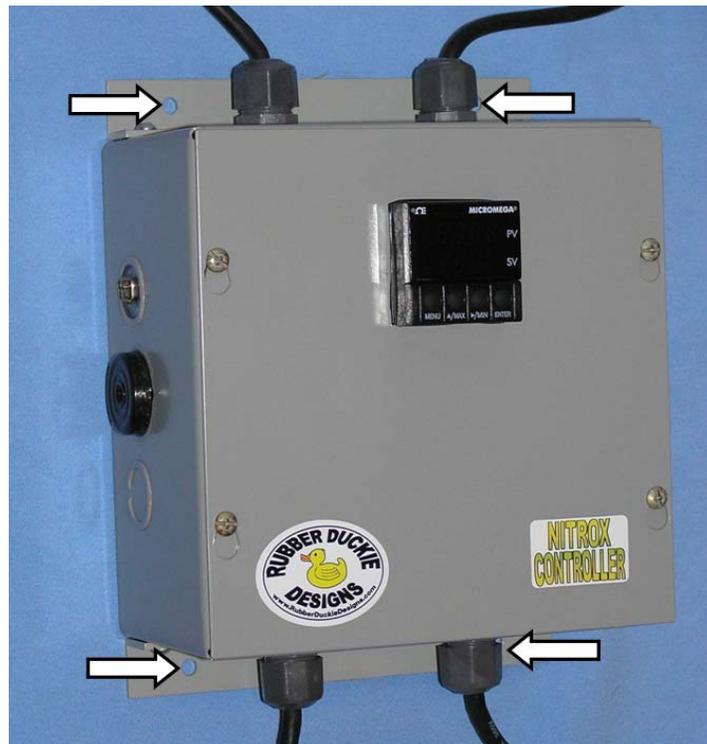
Note the four mounting holes on the Nitrox Controller mounting brackets. Position the controller at the desired mounting location and using a pen or pencil mark the four mounting holes on the wall. Carefully set the controller down out of the way.

For installation onto wallboard (sheetrock), pre-drill the holes for the wallboard anchors using a ¼ inch drill bit. Insert the wallboard anchors into the holes then tighten them to lock them into place. Remove the screws. This process is much easier if done with a drill and screwdriver drill bits. Attach the Controller to the wall using the wallboard anchor screws and provided washers.

For installation onto a wood surface, or when attaching to wood studs, use the provided general purpose 1-5/8 inch screws. Attach the controller to the wall with the provided screws and washers.

Installing the oxygen sensor.
A medical grade oxygen sensor, flow diverter, and 1-1/2 inch PVC "T" have been included with the Nitrox Controller. Install the PVC "T" immediately downstream of the Nitrox Mixing Stick. Screw the oxygen sensor into the diverter. Then push the oxygen sensor and diverter into the PVC "T". The oxygen sensor should be installed such that the face of the sensor (the part that measure the oxygen content) points down. This is to prevent moisture buildup on the oxygen sensor and a resulting faulty indication. If there is already an oxygen sensor/meter in your system, you may choose to leave it installed for an additional indication.

Note: If your mixing stick is built from something other than 1-1/2 inch PVC, you can purchase the correct size "T" at your local hardware store. Make sure that the part where the oxygen sensor goes has a ½" pipe thread. Remove the black sleeve from the provided 1-1/2" PVC "T" with your fingers. Do not use tools as you will mar the inside surface and the oxygen sensor/diverter will not fit or seal properly.

Run the appropriate wire (two wire Molex-type connector) from the Nitrox Controller to the sensor and plug it into the sensor. Neatly tie-wrap the wire out of the way so that it does not get caught on anything.

Installing the oxygen control valve.
The solenoid operated control valve has DuPont Viton seals, is designed for corrosive environments and is oxygen certified. The "P" on the valve indicates the port (inlet) that should

be hooked to the pressure regulator. The "A" on the valve indicates the port (outlet) that connects to your mixing stick. Both ports on the valve have 1/8" pipe thread. You may need to purchase parts/adapters from your local hardware/welding supply store to hook this valve into your system, depending on your system's configuration. Remove the black cleanliness plugs from the valve, and connect the valve into your system. Install the oxygen control valve downstream of oxygen pressure regulator and metering valve. Initially shut the metering valve; you will set the metering valve in a later step to establish the maximum flow of oxygen.

The oxygen control valve should be installed using Teflon seal tape.

If you install the valve backwards, when you apply pressure, the valve will flutter and gas will freely flow through the valve.

System pressure seals the valve. The valve is designed to open against a maximum pressure of of either 100psi or 200 psi (check valve label for rating).

Run the appropriate wire (three wire Molex-type connector) from the Nitrox Controller to the control valve and plug it into the control valve. Neatly tie-wrap the wire out of the way so that it does not get caught on anything.

Hooking up the wire for the compressor automatic shutdown.
This system has been designed so that the oxygen control valve will only open when the compressor is running. Should the compressor shut down while you are blending Nitrox, the oxygen control valve will immediately shut, and the controller's buzzer will alarm.

Open the electrical supply breaker to your compressor. Remove the access cover from your compressor's electrical panel.

Identify how the shutdown wire from the Nitrox Controller will be routed into the electrical panel. If a small knockout is available remove it. If no knockout is available, you will need to drill a hole though the wall of the electrical panel with a 7/8" hole saw. Install the provided electrical box connector in the hole and run the shutdown wire into the electrical panel.
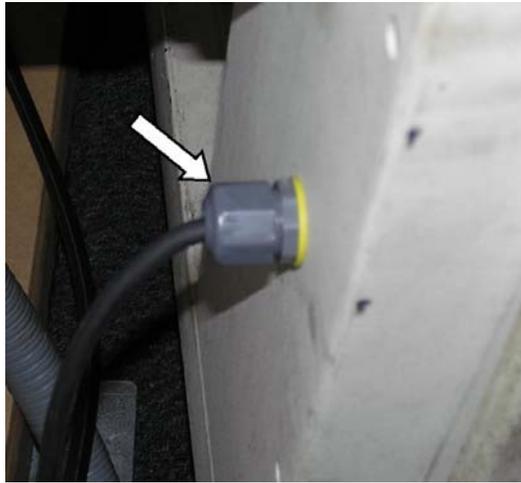
Connect the white wire to the compressor's 110 Volt AC negative buss. The black wire connects to a 110 Volt AC positive terminal that is energized **only** when the compressor is running. Shut the supply breaker to your compressor. Use the voltage meter to identify a terminal in your compressor that provides 110 Volt AC when the compressor is running and no voltage when the compressor is not running. Connect the black wire to the appropriate terminal. Replace the access cover for your compressor's electrical panel.
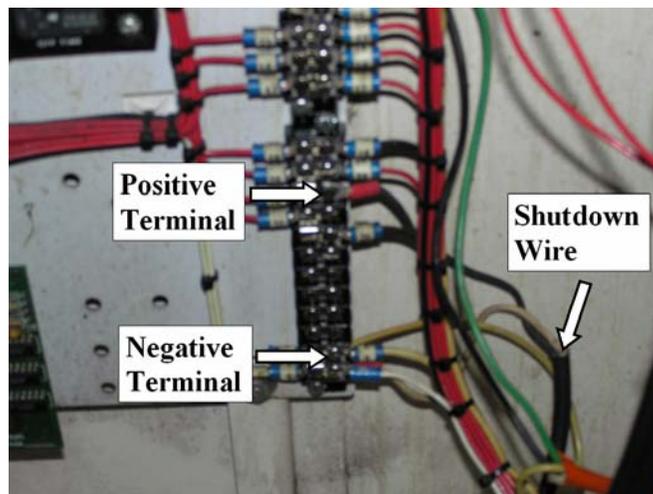
Nitrox Controller Setup.
Plug the controller into a 110 Volt AC outlet. The front panel of the controller should light up and indicate the Present Value (PV) oxygen concentration (upper row, displayed in red) and Setpoint Value (SV, lower row displayed in green). The controller has no on/off switch; instead it has two operating modes: **Run** and **Standby** (STBY).

When the Nitrox Controller is in the **Standby** mode, to place it into the **Run** mode, press the **Enter** button once.

When the Nitrox Controller is in the **Run** mode, it will throttle the flow of oxygen to maintain the oxygen concentration at the oxygen sensor at the indicated Setpoint. If the oxygen concentration goes above or below this Setpoint by 2% (alarm band) the buzzer will "buzz".

When properly connected, the Nitrox Controller will only open the oxygen control valve if the compressor is running.

When the Nitrox Controller is in the **Run** mode, to place it into the **Standby** mode, press the **Enter** button twice. "Stby" will show in the lower display in green.

When the Nitrox Controller is the **Standby** mode, it will stop blending Nitrox, close the oxygen control valve, and silence any alarms.

Changing the Nitrox Blend
To change the oxygen blend (e.g. from 32% to 36% O_2), press the **Menu** button once until the green SP1 (Set Point 1) on the left side of the display is blinking. The first digit of the set point display will then blink. Pressing the **⇒/Min** will change the display so that the next digit to the right will then blink. Press the **⇑/Max** button to initially change the digit to "0", continue pressing the **⇑/Max** button until the desired value is entered. Then press the **Enter** button to enter this value as the new set point.

Setting the Micro Metering Valve and Oxygen Pressure Regulator
By correctly setting the metering valve and pressure regulator, you ensure that in the event of a controller overshoot or system malfunction; you do not admit a dangerous quantity of oxygen to your air compressor.

Start with the micro-metering valve completely closed. Change the Nitrox Controller Setpoint 1 to 90% (this value is sufficiently above 40% such that the oxygen control valve will be fully open as you adjust the metering valve). Fully open the Oxygen supply valve and oxygen regulator (maximum supply pressure).

Start your air compressor and place the Nitrox Controller into **Run** by pressing the **Enter** button. The Nitrox Controller will fully open the oxygen control valve and attempt to achieve the Setpoint of 90% (which it will never reach).

Slowly open the metering valve and allow the Present Value display to stabilize. Continue to **slowly and incrementally open the metering valve** until the Present Value display just reaches 40%. This is the highest oxygen concentration at which your system can safely operate. Place the controller into **Standby**. Remove the metering valve green knob and install the cover on the metering valve. Change the Nitrox Controller Setpoint 1 to your desired setting (e.g. 32%).

You can reduce the oxygen supply to a lower pressure, but need to provide sufficient pressure for the Nitrox Controller to achieve and maintain the desired oxygen blend.

 Nitrox Controller Operating Characteristics.
When the Nitrox Controller starts up for the first time, after experiencing a loss of power, or after changing any of the parameters other than the Set Points (SP1 or SP2), the Controller has been in effect "reset" and it will behave differently than if it were placed from **Standby** into **Run**.

When placing the Nitrox Controller into **Run** after having been "reset" it will very slowly ramp up the addition of oxygen until the Present Value equals the Setpoint Value with no overshoot. In addition, the alarm will not be active until the Present Value has entered the alarm band (2%) around the Setpoint Value.

When placing the Nitrox Controller into **Run** from **Standby,** it will rapidly open the oxygen control valve; overshoot the Setpoint and then return to the Setpoint value. Properly setting the metering valve and pressure regulator will limit this overshoot and ensure that you do not admit a dangerous quantity of oxygen to your air compressor. The alarm will "buzz" as long as the Present Value remains outside the alarm band (+/- 2% around the Setpoint).