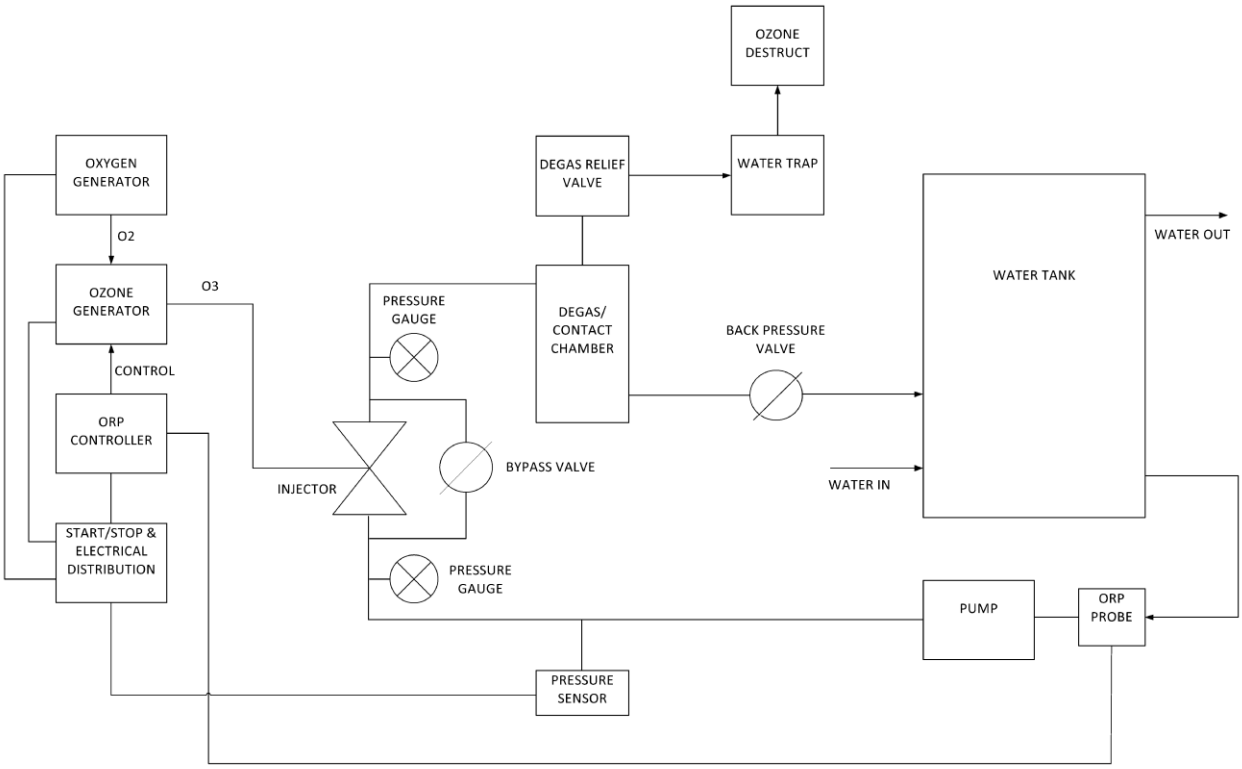
Ozone injection into a water tank

Following is an overview of the basic design principles of a straightforward ozone injection system. Please treat it as such and contact us for further information on your specific requirement.

The block diagram below shows the components of a complete ozone system that would be used to treat water in a storage tank.

OZONE INJECTION SYSTEM



Following is a brief description of each of the components:

- **Water tank** - This can be any type of storage tank with the proviso that the material is ozone friendly. Polyethylene would be a good example of a commonly available rain water tank material that is not readily affected by ozone. Water can flow into and out of the tank during the treatment process but the minimum contact time for the water to ensure treatment will depend on the size of the tank and the volume of water

moving through it. The ozone concentration within the tank will depend on the volume of water moving through the tank, the organic or chemical load in the water and the capacity of the ozone system.

- **ORP probe** - This sensor is affected by the Oxidation Reduction Potential (ORP) of the ozonated water leaving the tank. It provides a signal to the ORP controller that will be translated into a display of the ORP level in mV. ORP is a simple and effective method to measure the amount of disinfection capability of ozone (and other disinfectants) dissolved in the water. It can be distorted by other aspects of water chemistry but still remains the most cost effective and simple system available. Dissolved ozone as a level can also be measured by a more specialised and costly dissolved ozone monitor that indicates the actual amount of ozone concentration in the water.
- **Pump** - The pump is used to circulate water through the injection system and back to the tank. To operate correctly the injector must have enough water flowing through it at sufficient inlet and outlet pressure. All injectors come with sets of tables to enable correct selection. Ozone is a corrosive product and the pump must be constructed of materials that can withstand that corrosive effect.
- **Pressure sensor** - The simplest way to determine that the pump is operating is to test the pressure of water leaving it. With ozone systems using oxygen or forced air feed it is important that the ozone generator is stopped if the pump stops. This is not so important with air feed systems using only the suction from the injector. In that instance if the pump stops then suction also stops and no ozone gas flows even if the ozone generator remains on. Switching the ozone generator off in the case of a pump fail is still desirable to ensure other by-products are not formed that can block the fine airways of the ozone cells.
- **Injector and bypass** - All injectors have tables which detail their air suction performance under different pressures and flows. The selection of the injector and pump will depend on a number of factors:
    - To improve efficiency aim for a flow rate and ozone output combination that equates to a dissolved ozone level from the injector of no more than 8 gm/kL of water, i.e. don't use too small an injector.
    - Ozone will dissolve more readily when under pressure so allow for an injector outlet pressure of over 100Kpa if the degas/contact chamber can handle it.
    - Use the bypass to increase the flow to prevent the pump running outside of its efficient part of the operating curve. In other words don't stall it. Use the bypass also to make fine adjustments to the suction when setting it up.

Overall you will find from the injector tables that the pump will need to be able to provide an injector inlet pressure of over 300Kpa to be effective.

- **Degas/Contact chamber** - Is used to provide a contact medium that will allow as much as possible of the undissolved ozone gas to dissolve into the water and then finally to separate any undisolved gas from the water stream. This degas and contact function could be carried out in the water tank if desired which would make the whole system simpler. The disadvantage to that is the tank cant withstand pressure which will make the dissolving of the gas less efficient and the destruction of the off gas more difficult. There are for's and against for all options it just depends on what is more suitable for you.

There are many different options available in putting together the requirements for an efficient ozone injection system, please contact us with your ideas so that we can assist in making sure that your design will work and produce a cost effective solution.