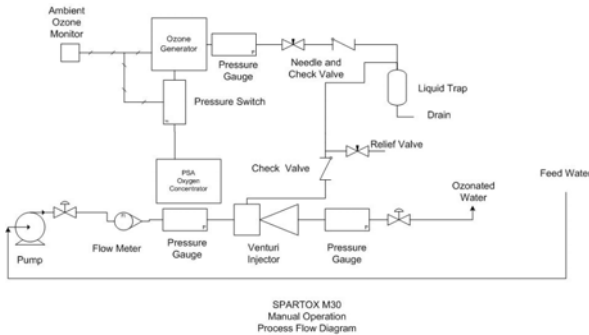


SPARTOX™ Ozone Water Treatment System

Optional Equipment

Manual Controls



The standard SPARTOX system comes with automatic controls managed by an on board PLC, but a manual version is also available for applications where such control is not required. The operator is responsible for start-up and shut down of the system. A loss of pressure in the oxygen system or a high ambient ozone level will shut down the ozone generator. The schematic on the left shows P&ID for this system.

Dissolved Ozone Monitor/ORP Monitor with Ozone Generator PID Controller

Spartan can provide instruments and control packages that will permit automatic control of the ozone generator output to maintain a targeted level of ozone or oxidation/reduction potential (ORP). Dissolved ozone or ORP monitors are employed that have built in PID controllers (Analytical Technologies, Inc.). These are matched with ozone generators that are fitted with power output control circuits that respond to 4-20 mA signals from the PID controllers. The PID controllers are then able to increase or decrease ozone output to achieve a targeted residual ozone or ORP level. The monitors are integrated into the SPARTOX control panel and the sensors can be placed in the most appropriate location in the liquid system.

On Skid Degassing



The concentration of ozone in the output of the SPARTOX ozone generator is between 5 to 10%. This means that most of the gas injected into the water is oxygen with a small amount of nitrogen. In many applications this gas must be released from the water after the ozone has dissolved. In some situations, an existing atmospheric tank can be used for the separation of the gas and liquid. In other cases, removing the gas on the SPARTOX skid is required. SPARTAN can supply an integrated degassing system on the SPARTOX skid for this purpose. The photo on the left shows this arrangement with an integrated ozone destroyer.

Ozone Destruction for Vent Gas

Whether the undissolved gases are removed on the skid or downstream of the SPARTOX system, they will contain a small amount of unreacted ozone. In some situations, the destruction of the ozone in the vent gas is required. If so, Spartan can provide a thermal or thermal catalytic gas phase ozone destruct system that is compatible with the production and gas flow of the SPARTOX system.

UV Ozone Destruct of Dissolved Ozone in the Treated Water

Where removal of the ozone from the treated water is required before use, Spartan can supply a UV based system for destroying the ozone in the liquid phase. An example of such an application is where the ozone is applied prior to a membrane filtration system where the membranes may be damaged by ozone. Spartan can add a UV ozone removal system to the SPARTOX skid or downstream of the skid to remove the ozone residual from the water.

Advanced Oxidation Processes (AOP)

The SPARTOX can be configured as an Advanced Oxidation Process with hydrogen peroxide addition for an Ozone/Peroxide, with a UV reactor for Ozone/UV or a combination of ozone peroxide and UV. AOP systems create hydroxyl radicals that are more powerful oxidants than ozone or peroxide and react with virtually all organic compounds. The table below shows the relative oxidizing strength based on oxidation potential in mV for typical oxidants.

<u>Oxidant</u>	<u>Oxidation Potential (V)</u>
Hydroxyl Radical	2.8
Ozone	2.1
Hydrogen Peroxide	1.8
Hypochlorite	1.5
Chlorine	1.4
Chlorine Dioxide	1.3
Oxygen	1.2

AOP systems can be used to remove difficult to treat organic compounds that are not readily removed by membrane, carbon or conventional oxidants. These systems can also provide for final TOC reduction (conversion of low levels of organic carbon to CO₂ and salts). Membrane and carbon system concentrate the waste so that it must be treated or disposed of in a second step.

