

DISTRIBUTED AIR STERILIZER SYSTEM

FIELD OF INVENTION

The invention relates generally to an air sterilizer for performing air and surface sterilization using ozone. More specifically, the invention concerns an air sterilizer system for distributing a controlled level of ozone to large indoor area and/or in multiple locations at one time.

BACKGROUND OF THE INVENTION

Ozone is an efficient sterilant which is commonly used for sterilization because of its strong oxidizing properties. Air sterilizers with the application of ozone are widely used in treatment system for commercial and residential applications for reducing indoor pollutants such as smoke odors, toxic molds, musty odors, bacteria, virus, germs etc..

Presently, most of the indoor air sterilization is performed using different devices such as ozonizers, air filters, air purifiers or sterilized air through an existing ducting system, typically that provided for air-conditioning. Most of the existing sterilization products except through the ducting system are not able to cover large areas. The existing products are also costly to operate on a period of 24 hours continuously. The end users will need to purchase multiple units to address the coverage area which are more than 180 m² (2,000 ft²) or for multiple locations at one time.

On the other hand, there is also a common application of having sterilized air distributed through an existing ducting system which can cover larger area and/or multiple locations at one time. However, the disadvantage with this type of application is the effectiveness in sterilizing the indoor air and surface environment decrease with time as most often the ducting system is not well maintained. Therefore over time, dust, debris, mold, bacteria and fungus grows and develops in the ducting system which affect the effectiveness of the sterilization. These pollutants in the ducting system are potentially distributed throughout the indoor environment thus producing potential health hazard particularly dangerous for people suffering from asthma or other related illnesses. It is also

costly to operate the sterilized air continuously through the ducting system as often the centralized air conditioning must be switched on for the sterilization process to take place.

US patent no. 5,820,828 discloses a modular ozone distributing system for producing and distributing ozone to an air duct network of a building. The ozone distributing system includes an ozone generating unit for producing ozone from oxygen containing air and one or more ozone distributing units mounted to and in fluid communication with the air duct network connected to an HVAC system. Ozone produced by the ozone generating unit is delivered to each ozone distributing unit through a conduit. Each ozone distributing unit includes a high-speed blower which receives conditioned air from the air duct network and mixes it with the ozone delivered from the ozone generating unit for distribution into the air duct system. Control of ozone production by the ozone generating unit and distribution by the ozone distributing unit is provided by operation of the HVAC system.

International patent publication WO 2009/070323 A1 discloses a distributed networked ozonation system for ozonation of storage rooms containing fresh or perishable products, and also may be useful in other applications involving multiple ozonated zones. An exemplary embodiment uses a set of distributed ozone generators connected to a communication network. An exemplary ozone generator comprises an ozone sensor, an ozone-generating cell, and a controller, and also may comprise an air cooling unit with an ozone destruct air filter, so that the generator may be placed within an ozonated environment. The ozone level of the storage area may be under closed-loop feedback control. The controller may communicate with other controllers at the same site and with a site controller, which in turn may communicate with a remote controller.

The air sterilization system as proposed in US patent no. 5,820,828 focuses on a modular ozone distributing system to produce and distribute ozone to an air duct network connected to an HVAC system before treating the indoor environment. The ozone is mixed with the air-conditioned air before distributing. Therefore, such sterilization system is required to be used together with a HVAC system which may limit the application for larger coverage areas in view of the expensive cost of enlarging the distribution of the HVAC system. The ozone distributed via the ducting system or integrated with the HVAC

is costly to operate as most often these are centralized system and to operate continuously will increase the cost of energy.

The distributed networked ozonation system for ozonation of storage rooms as proposed in International patent publication WO 2009/070323 A1 relates to the usage of multiple ozone generators for different rooms. Multiple ozone generators are used instead of having a central generator and a network of piping to different storage rooms as such arrangement is costly due to the special tubing required to be used. The usage of multiple ozone generators may prove to be cumbersome as in the long run, the cost of operating the multiple generators will increase due to replacement of ageing or damaged generators. In addition, the ozone generator is most likely required to be mounted in the room which may not be aesthetically pleasing in a modern office or residential home.

To address the larger coverage areas or multiple locations at one time without using multiple products such as ozonizers, air filters and without going through any existing ducting system with a much more cost-effective solution, there is a need for a sterilization system that is able to directly distribute a controlled level of ozone into large indoor areas or multiple rooms directly and simultaneously. There is a need to develop a sterilization system which does not require the usage of a HVAC system and a ducting system as taught in US patent no. 5,820,828 in view of the potential problems of dirt, mold, bacteria, etc. forming in the ducting network. There is a need as well to develop a sterilization system which is less costly to operate in the long run as most sterilization systems present in the market incur a significant operation cost in view of the continuous operation. Without using the centralized duct system or HVAC, the implementation is also much easier and cost effective. The cost of running multiple generators as taught in International patent publication WO 2009/070323 A1 in the long run will increase and potentially will be more expensive than using a centralized generator with a piping network. The present invention was developed in consideration of these needs.

SUMMARY OF THE INVENTION

In a first aspect, the invention provides a distributed air sterilizer system for distributing ozone to a plurality of rooms comprising:

- an ozone generation system for generating ozone from an air supply;

- a delivery tubing system for distributing the generated ozone from the ozone generation system into each of the plurality of rooms;

- an ozone sensor controller configured by the end-user for setting individual predetermined ozone concentrations in each of the rooms;

- a plurality of ozone sensors connected to the ozone sensor controller for detecting individual ozone concentrations in each of the rooms;

- a plurality of manual control valves that is manually adjustable; and

- a plurality of electronic control valves that is electronically controlled by the ozone sensor controller;

wherein the plurality of manual control valves and electronic control valves are positioned along the delivery tubing system for controlling the amount of ozone distributed from the delivery tubing system into each of the rooms.

The present invention seeks to provide a distributed air sterilizer system for distributing ozone to a plurality of rooms in an efficient and uniform manner. At each stages of the air sterilizer system, from generation of ozone to distribution of ozone, a control and monitoring system is adapted to optimize the efficiency of the air sterilizer system. This system distinguishes from the common sterilizer system which is used together with the HVAC system in which the conditioned air is distributed together with the ozone.

The air sterilizer system provides an ozone generation system for generating ozone from an air supply which comprises oxygen. The ozone generated from the generation system is distributed separately and simultaneously to each of the plurality of rooms through a dedicated delivery tubing system. The distribution of the generated ozone to each of the rooms is controlled by a plurality of control valves positioned along the delivery tubing system. The amount and concentration of ozone to be distributed to each of the rooms is controlled separately. A control valve which is manually adjustable is provided at each of the plurality of rooms to allow the end users to regulate the supply of ozone into the room according to their preference.

In one embodiment, a plurality of electronic valves which is electronically controlled is adapted along the delivery tubing system to regulate the supply of ozone into the plurality of rooms. Each electronic valve is allocated for each room to regulate the supply of ozone separately.

In another embodiment, a plurality of ozone sensors is further provided to each of the plurality of rooms in which individual ozone concentrations in each of the rooms are detected. An ozone sensor controller is configured to receive the data of the individual ozone concentrations from the plurality of ozone sensors. The ozone sensor controller is also configured to transmit data or instructions to the plurality of electronic control valves. In the ozone sensor controller, the individual ozone concentrations in each of the plurality of the rooms are determined and set up according to the end user's preference. In the event, any of the individual ozone concentrations in any of the rooms rises or decreases above or below the predetermined individual ozone concentration respectively, the ozone sensor controller sends a signal to the respective electronic control valves to open or close the supply of ozone.

In another embodiment, a timer is adapted for selectively operating components of the ozone generation system between on and off states. The timer is configured to define the duration of the on and off states in which the components in the ozone generation system are switched off for a predetermined time interval before the components restart again. The components of the ozone generation system remain switched on for a predetermined time interval before the components are switched off.

In another embodiment, a system controller is adapted for controlling and monitoring the production of ozone in the ozone generation system and the distribution of the supply of ozone. The system controller is connected to the ozone generation system, ozone sensor controller and plurality of ozone sensors which allows the system controller to control the generation and distribution of ozone in the distributed air sterilizer system. Upon detecting a change in the ozone concentration in any of the plurality of rooms, the system controller sends signals to multiple components in the air sterilizer system to regulate the supply of ozone to maintain all of the individual ozone concentrations in the rooms separately and simultaneously according to its predetermined ozone

concentrations. Upon detecting change in the ozone concentration, the system controller also sends signals to the ozone generation system to selectively increase or reduce the generation of ozone. The system controller sends signals to the respective electronic valves through the ozone sensor controller to selectively open or close the supply of ozone to any of the plurality of rooms.

In another embodiment, a wireless communication module comprising a centralized remote server is connected to the system controller for allowing the end user to control and monitor the operation of the air sterilizer system.

In another embodiment, the ozone generation system generates ozone from a supply of oxygen filtered from the air supply. The ozone generation system comprises an oxygen concentrator, a mass flow controller and an ozone generator. The air supply is directed to the oxygen concentrator in which the supply of outdoor air is compressed and filtered to obtain a flow of oxygen. The compressed flow of oxygen is directed to the mass flow in which the mass flow controls the flow rate of oxygen for generating a predetermined concentration of ozone. The flow of oxygen is then directed to the ozone generator for the purpose of conversion from oxygen to a predetermined concentration of ozone.

In another embodiment, the ozone generation system generates ozone from a supply of dry air which comprises a mixture of oxygen and other gases. The ozone generation system comprises an air dryer system, a mass flow controller and an ozone generator. The air supply is directed to the air dryer system in which the supply of outdoor air is dried to obtain a flow of dry air. The flow of dry air is directed to the mass flow controller in which the mass flow controller controls the flow rate of supply of dry air for generating a predetermined concentration of ozone. The flow of dry air is then directed to the ozone generator for the purpose of conversion from dry air to a predetermined concentration of ozone.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more clearly understood from the following description of the embodiments thereof, when taken in conjunction with the accompanying drawings. However, the embodiments and the drawings are given only for the purpose of illustration and explanation, and are not to be taken as limiting the scope of the present invention, the scope of which is to be determined by the appended claims.

In the accompanying drawings, like reference numerals are used to denote like parts throughout the several views.

Figure 1 is a block diagram of an air sterilizer system for distributing ozone according to a first embodiment;

Figure 2 is a block diagram of an air sterilizer system for distributing ozone according to a second embodiment with a system controller;

Figure 3 is a block diagram of an air sterilizer system for distributing ozone according to the third embodiment with a wireless communication module;

Figure 4 is a block diagram of an air sterilizer system for distributing ozone according to the fourth embodiment which uses an air dryer system;

Figure 5 is a block diagram of an air sterilizer system for distributing ozone according to the fifth embodiment which uses an air dryer system; and

Figure 6 is a close-up view of a manual control valve positioned in the interior of a room.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Figure 1 is a block diagram which illustrates a first embodiment of a distributed air sterilizer system 100 for distributing ozone to a plurality of rooms which has an ozone generation system 1, a dedicated delivery tubing system 2, a plurality of manual control valves 3, a plurality of electronic control valves 4, a plurality of ozone sensors 5, an ozone sensor controller 6 and a timer 7.

The ozone generation system 1 comprises an oxygen concentrator 1a, a mass flow controller 1b and an ozone generator 1c. The outdoor air is directed to the ozone generation system 1 in which it is first directed to the oxygen concentrator 1a. In the oxygen concentrator 1a, the supply of outdoor air which contains 21% of oxygen combined with nitrogen and a mixture of other gases is first filtered through a high-efficiency particulate air (HEPA) filter. The filtered oxygen is then pressurized and compressed in the air compressor and molecular sieve (Zeolite chamber) in the oxygen concentrator 1a to yield oxygen with a pressure in the range of 0.4 MPa to 0.6 MPa. The molecular sieve is a chemical filter which is made up of silicate granules called Zeolite which sieves nitrogen gas and other gases out of the air supply to yield only concentrated pure oxygen. The concentrated oxygen is then directed to the mass flow controller 1b. The mass flow controller 1b controls the flow rate of the oxygen needed to be delivered to the ozone generator 1c for generating ozone. The mass flow controller 1b controls the flow rate of the oxygen flow as according to the oxygen purity generated from the oxygen concentrator 1a to yield a predetermined ozone concentration. The examples of the different ranges of the oxygen purity/concentration generated from the mass flow controller 1b are as follows: 55%@3LPM, 80%@2LPM and 90%@1LPM.

The generated ozone from the ozone generation system 1 is distributed through a dedicated delivery tubing system 2 into each of the plurality of rooms. The delivery tubing system 2 consisting of a network of tubes made of fluoropolymer is used to direct the supply of generated ozone from the ozone generator into each of the multiple rooms. Similar type of tubing may also be used, for example Fluorinated Ethylene Propylene (FEP) tube, Polytetrafluoroethylene (PTFE) or others. One or more multiple stainless steel T-joints are used to direct the tubing system 2 to distribute the controlled level of ozone to

a plurality of rooms. The union connector is a fitting component used to connect the tubing 2 to the outlet passing through the wall or ceiling depending on the indoor interior design. The union connector is mounted to the wall/ceiling with a mounting plate and spacer to secure the tubing 2.

A series of tubing 2 is directed into each of the plurality of rooms in which at the end of each tubing 2, a manual control valve 3 is adapted at the interior of the room (see Figure 5). Each room has a manual control valve 3. The manual control valve 3 functions as an adjustable valve which regulates and controls the release of controlled level of ozone into the room. The feature of the manual control valve 3 allows end users the ability to adjust the supply of ozone according to their preference as according to the size of the rooms. The manual control valve 3 also serves to cover the end of the tubing 2 in the interior room for aesthetic purposes.

In addition to the manual control valves 3, there is a plurality of electronic valves 4 positioned along the tubing 2 at the exterior of the room for regulating the supply of ozone to each of the plurality of rooms. Each electronic valve is installed along the tubing 2 to be directed into each room. Each electronic valve 4 functions to open and close to regulate the supply of ozone entering into each of the rooms. The electronic valve 4 is electronically controlled by an ozone sensor controller 6 to regulate the supply of ozone. An ozone sensor 5 is installed in each of the plurality of rooms for monitoring and detecting the level of concentration of the ozone. The plurality of ozone sensors 5 transmits data to the ozone sensor controller 6 for the purpose of monitoring and control.

The ozone sensor controller 6 is firstly configured by the end-user to set individual predetermined ozone concentrations in each of the rooms at the starting process of the distributed air sterilizer system 100. The individual level of concentration of ozone in each of the rooms is configured separately in three main settings namely, Low Ozone = 0.01 to 0.04 ppm, Mid Ozone = 0.04 to 0.07 ppm and High Ozone = 0.07 to 0.1 ppm. During the operation of the distributed air sterilizer system, the ozone sensor controller 6 monitors and maintains the individual predetermined concentrations of ozone in each of the rooms. The ozone sensor controller 6 is configured to receive and transmit data to and from the plurality of electronic control valves 4 and ozone sensors 5. The ozone sensor controller 6

monitors the level of ozone concentration in each of the rooms through the individual ozone sensors 5. In the event, the ozone sensor controller 6 detected changes in the ozone concentration in any of the rooms, the ozone sensor controller 6 sends signals to the respective electronic control valves 4 to open or close to control the supply of ozone into the room. For example, a decrease in ozone concentration of 0.03 ppm below its predetermined ozone concentration of 0.07 ppm is detected by the ozone sensor controller 6. This triggers the ozone sensor controller 6 to send signals to the respective electronic control valve 4 to open the supply of ozone to flow into the room till the ozone concentration increases from 0.03 ppm up to 0.07 ppm. If the ozone concentration in the room 0.1 ppm is more than its predetermined ozone concentration of 0.07 ppm, the change of the ozone concentration is detected by the ozone sensor controller 6. This triggers the ozone sensor controller 6 to send signals to the respective electronic control valve 4 to close the supply of ozone flowing to the room. The supply of ozone to the room remains closed until the ozone concentration of 0.1 ppm decreases to 0.07 ppm.

An analogue timer 7 is used to also control the average production of ozone into the plurality of rooms depending on the application needs. The timer 7 selectively operates the components of the ozone generation system 1 between on and off states by defining the duration of the time intervals for the OFF and ON states. Example, in this embodiment, the interval time is 15 minutes. The ozone generation system 1 is switched OFF for an interval time of 15 minutes. After the interval 15 minutes ends, the ozone generation system 1 is switched ON again for the next 15 minutes before it is switched OFF again. The combination of oxygen control by the analogue timer 7 allows flexibility in controlling the production of ozone for different coverage areas very effectively. This method of control allows the user the capability to deliver higher level of controlled ozone when the rooms are not in operations and at a lower level when the room is being occupied. During operation hours when the air-conditioning system is switched ON, the controlled level of ozone in the rooms will be set below 0.05 ppm over 24 hours or 0.1 ppm over 8 hours. However when the rooms are not in operations and when the air-conditioning is switched OFF, the controlled level of ozone could be set between 0.05ppm to 0.1ppm or higher if necessary to boost the sterilization effect to clean the indoor environment. For example, if the room is polluted with heavy smoking activities, higher

ozone level could be set to sterilizer the room as ozone is very effective in deodorizing cigarette smoke or smells.

Figure 2 is a block diagram which illustrates a second embodiment of a distributed air sterilizer system 200 which comprises all the components of the first embodiment except the analogue timer and an addition of a system controller 8. The system controller 8 controls and monitors the production of ozone in the ozone generation system 1 and the distribution of supply of ozone by interfacing with the ozone generation system 1 and the ozone sensor controller 6 respectively. The system controller 8 comprises a system indicator 9 which indicates any fault at ozone generation system 1 and plurality of ozone sensor indicators 5a which indicates the level of ozone concentration in each of the plurality of rooms. Any faulty component in the air sterilizer system 200 is detected by the system controller 8 for the purpose of troubleshooting.

The individual concentration of ozone for each of the plurality of rooms is determined and configured in the system controller 8. For example, the individual concentration of ozone for each room is configured at 0.07 ppm. The data of the predetermined of ozone concentration of 0.07 ppm is transmitted to the ozone generation system 1 to produce a supply of concentrated oxygen to generate the ozone concentration at 0.07 ppm. The ozone concentration at 0.07 ppm is delivered and distributed through the delivery tubing system 2 to each of the plurality of rooms. During the operation of the distributed sterilizer system 200, the level of concentration in each of the rooms is individually monitored by a plurality of ozone sensors 5. The data of the level of concentration in all of the rooms is transmitted to the ozone sensor controller 6 and subsequently to the system controller 8. In the event, a change is detected by the ozone sensor controller 6, a signal is transmitted to the system controller 8. If the ozone sensor controller 6 detected a drop in level of concentration at 0.04 ppm in a room thus indicating insufficient ozone, the system controller 8 sends signals to the ozone generation system 1 to increase the production of ozone by increasing the flow rate of the supply of oxygen into the ozone generator 1c. The production of ozone generation system 1 will increase to reach to its predetermined ozone concentration at 0.07 ppm which is then delivered and distributed to the room. Similarly, if the level of concentration of 0.09 ppm is detected which exceeds its predetermined ozone concentration of 0.07 ppm, the system controller

8 sends signals to the ozone generation system 1 to reduce the production of ozone by decreasing the flow rate of the supply of oxygen into the ozone generator 1c.

In addition to the system controller 8 controlling the production of ozone in the ozone generation system 1, the system controller 8 controls the distribution of the generated ozone to the plurality of rooms. In the event, a decrease in ozone concentration of 0.03 ppm below its predetermined ozone concentration of 0.07 ppm is detected by the ozone sensor controller 6. The ozone sensor controller 6 sends signals to the system controller 8. The change in the level of ozone concentration is indicated in the plurality of ozone sensor indicators 5a. The change of the ozone concentration triggers the system controller 8 to send signals to the ozone sensor controller 6 to open the respective electronic valve 4 to allow more supply of ozone flowing into the room. The electronic valve 4 remains open until the ozone concentration in the room increases from 0.03 ppm up to 0.07 ppm. If the ozone concentration in the room 0.1 ppm is more than its predetermined ozone concentration of 0.07 ppm, the change of the ozone concentration is detected by the ozone sensor controller 6. The ozone sensor controller 6 sends signals to the system controller 8. The change in the level of ozone concentration is indicated in the in the plurality of ozone sensor indicators 5a. The change of the ozone concentration triggers the system controller 8 to send signals to the ozone sensor controller 6 to close the respective electronic valve 4 to close the supply of ozone flowing into the room. The electronic valve 4 remains closed until the ozone concentration in the room decreases from 0.1 ppm up to 0.07 ppm.

Figure 3 is a block diagram which illustrates a third embodiment of a distributed air sterilizer system 200 which comprises all the components of the first and second embodiments with an addition of a wireless communication module 10. A remote alert in the above embodiments is preferably transmitted through a communication module integral to the distributed air sterilizer system 200. The system controller 8 and the manual control valves 3 are wireless enabled for communication to be conducted remotely for the purpose of controlling and monitoring of the level of ozone concentration in the plurality of rooms. Any system or component failures will be detected and alerts are sent to the wireless communication module 10 for action to be taken by the user.

Figure 4 is a block diagram which illustrates a fourth embodiment of a distributed air sterilizer system 300 which has an ozone generation system 20, a dedicated delivery tubing system 21, a plurality of manual control valves 22, a plurality of electronic control valves 23, a plurality of ozone sensors 24, an ozone sensor controller 25 and a timer 26.

The ozone generation system 20 comprises an air dryer system 20a, an mass flow controller 20b and an ozone generator 20c. The outdoor air is directed into the ozone generation system 20 in which the outdoor air is first directed into the air dryer system 20a. In the air dryer system 20a, the outdoor air is filtered by a filter for removing any residues which is subsequently dried by an air dryer to produce a flow of dry air in which moisture from the air is removed. The air dryer may use silica gel, rechargeable dessicant or heat regenerative materials for drying the outdoor air. The flow of dry air consisting of a mixture of gases and 21% of oxygen is then directed to the mass flow controller 20b and ozone generator 20c for producing ozone. In comparison to the first embodiment, the pure oxygen has 90% of oxygen while the dry air as used in the fourth embodiment has 21% of oxygen. The mass flow controller 20b controls the flow rate of the dry air needed to be delivered to the ozone generator 20c for generating ozone. The mass flow controller 20b controls the flow rate of the dry air as according to the concentration of dry air generated from the air dryer system 20a to yield a predetermined ozone concentration.

The pure oxygen supply as described in embodiment 1 has a higher efficiency for generating ozone as high as 4-5 times as compared to the fourth embodiment which uses dry air. The percentage (%) of oxygen in the supply air determines the efficiency of the generation of ozone. The delivery tubing system 21, plurality of manual control valve 22, plurality of electronic control valves 23, plurality of ozone sensors 24, an ozone sensor controller 25 and a timer 26 are essentially identical components with the components as described in the first embodiment which have identical functions.

Figure 4 is a block diagram which illustrates a fourth embodiment of a distributed air sterilizer system 300 which has an ozone generation system 20, a dedicated delivery tubing system 21, a plurality of manual control valves 22, a plurality of electronic control valves 23, a plurality of ozone sensors 24, an ozone sensor controller 25 and a timer 26.

Figure 5 illustrates a fifth embodiment of a distributed air sterilizer system 300 which uses dry air for the generation of ozone, comprises all the components of the fourth embodiment except the analogue timer and an addition of a system controller 27, a system indicator 28 and a plurality of ozone sensor indicators 24a.

Figure 6 illustrates a close up view of the manual control valve 3. A manual control valve is allocated for each room and positioned at the interior of the room. As shown in Figure 6a and 6b, the manual control valve 3 is installed to the end of the tubing 2, 21. As shown in Figure 6c, the opening of the manual control valve 3 is adjusted by the user to regulate the supply of ozone entering into the room.

The invention may also be embodied in many ways other than those specifically described herein, without departing from the scope thereof.

CLAIMS

1. A distributed air sterilizer system (100) for distributing ozone to a plurality of rooms comprising:

an ozone generation system (1; 20) for generating ozone from an air supply;

a delivery tubing system (2) for distributing the generated ozone from the ozone generation system into each of the plurality of rooms;

an ozone sensor controller (6) configured by the end-user for setting individual predetermined ozone concentrations in each of the rooms;

a plurality of ozone sensors (5) connected to the ozone sensor controller for detecting individual ozone concentrations in each of the rooms;

a plurality of manual control valves (3) that is manually adjustable; and

a plurality of electronic control valves (4) that is electronically controlled by the ozone sensor controller;

wherein the plurality of manual control valves and electronic control valves are positioned along the delivery tubing system for controlling the amount of ozone distributed from the delivery tubing system into each of the rooms.

2. A distributed air sterilizer system (100) according to Claim 1, wherein a respective said manual control valve (3) is allocated for each room and positioned at the interior of the room.

3. A distributed air sterilizer system (100) according to Claim 1, wherein a respective said electronic control valve (4) is allocated for each room and positioned at the exterior of the room.

4. A distributed air sterilizer system (100) according to any of Claims 1 to 3, wherein the ozone sensor controller (6) is configured to receive and transmit data to and from the plurality of electronic control valves (4) and ozone sensors (5).

5. A distributed air sterilizer system (100) according to any one of Claims 1 to 4, wherein upon detecting a change in the ozone concentration, the ozone sensor controller (6) sends signals to the respective electronic control valves (4) to open or close to control the supply of ozone.

6. A distributed air sterilizer system (100) according to any one of Claims 1 to 5, further comprising a timer (7) for selectively operating components of the ozone generation system (1; 20) between on and off states by defining a duration for at least one of said on and off states.

7. A distributed air sterilizer system (200) according to Claims 1 to 6, further comprising a system controller (8) which controls and monitors the production of ozone in the ozone generation system (1; 20) and the distribution of the supply of ozone.

8. A distributed air sterilizer system (200) according to Claim 7, wherein the system controller (8) controls the operation of said ozone generation system (1; 20), said ozone sensor controller (6), and said plurality of ozone sensors (5).

9. A distributed air sterilizer system (200) according to Claim 7 or 8, wherein upon detecting a change in the ozone concentration, the system controller (8) sends signals to the ozone generation system (1; 20) to selectively increase or reduce the generation of ozone.

10. A distributed air sterilizer system (200) according to any one of Claims 7 to 9, wherein upon detecting a change in the ozone concentration, the system controller (8) sends signals to the electronic control valves (4) to open or close to control the supply of ozone.

11. A distributed air sterilizer system (200) according to any of Claims 7 to 10, further comprising a wireless communication module (10) for allowing user to control and monitor the operation of the air sterilizer system from a centralized remote server connected to said system controller (8).

12. A distributed air sterilizer system (100) according to any one of Claims 1 to 11, wherein the ozone generation system (1) comprises:

an oxygen concentrator (1a) for compressing the supply of outdoor air into the ozone generation system and subsequently filtering the gases to obtain a flow of oxygen;

a mass flow controller (1b) for controlling the amount of the oxygen flowing from the oxygen concentrator to be used for the generation of ozone; and

an ozone generator (1c) for converting the supply of oxygen from the mass flow controller to a predetermined concentration of ozone.

13. A distributed air sterilizer system (300) according to any one of Claims 1 to 11, wherein the ozone generation system (20) comprises:

an air dryer system (20a) which has an air dryer for removing moisture from the supply of outdoor air to obtain a flow of dry air;

a mass flow controller (20b) for controlling the amount of dry air flowing from the air dryer system to be used for the generation of ozone; and

an ozone generator (20c) for converting the supply of dry air from the mass flow controller to a predetermined concentration of ozone.