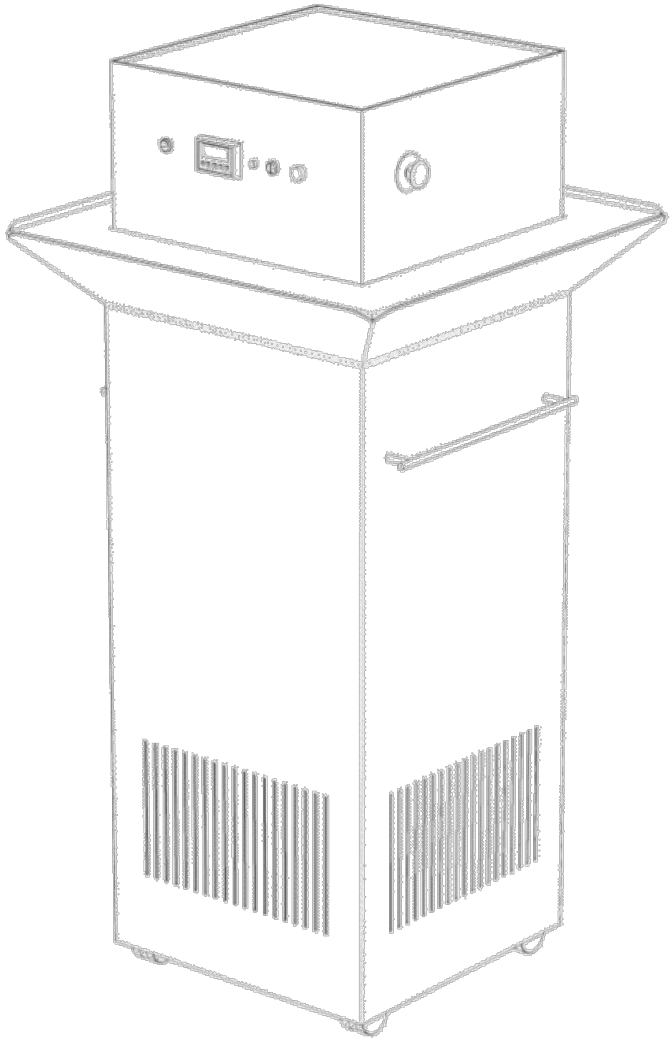
React-Air Expanse MK1

Operation and Maintenance Manual



The following Virus Neutralizer Air Disinfection System are covered in this document:

Part No. REACT AIR EXPANSE MK1

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Operator's Health and Safety

1.1 Safety Recommendations and Warnings

Safety instructions contained in this section and throughout this document apply to tasks that may be performed with or on the React Air Expanse Unit. **Safety Symbols** related to specific safety concerns are included within the text as appropriate in the next section.

With this in mind, some basic safety recommendations are as follows:

- Store this document within easy reach of personnel operating or maintaining the unit.
- Read and become familiar with the ***Operation and Maintenance Manual*** section prior to installing, operating, maintaining or repairing the unit.
- Read and follow the warnings which appear within the text and are related to specific tasks.
- Familiarize yourself with and follow all safety instructions prescribed by your company, general accident prevention regulations and government safety regulations.

DANGER!!!

STUDY AND FOLLOW OPERATION AND MAINTENANCE MANUAL:

It is very important that safety recommendations are always followed before using the React Air Expanse Unit. Failure to do so could result in personal injury, death and/or damage to the system or other equipment.

DANGER!!!

PROPER USE OF PERSONAL PROTECTIVE EQUIPMENT:

It is very important that the Service Engineer (Qualified Personnel) must wear Personal Protective Equipment and Clothing such as safety goggles, gloves, and safety jacket provided by their company before undertaking servicing or repair work on the React Air Expanse Unit. Failure to do so could result in personal injury, death of the operator.

DANGER!!!

QUALIFIED PERSONNEL:

"Qualified Personnel" is defined as individuals who thoroughly understand the equipment and its safe operation, maintenance and repair. Qualified Personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations, and have been trained to safely install, operate, maintain, and/or repair the equipment. It is responsibility of Reaction Group to ensure that its personnel meet these requirements.

1.2 Safety Symbols

The following symbols are used to warn against dangers or possible sources of danger. Become familiar with them! Failure to pay attention to a warning could lead to personal injury and/or damage to the unit or other equipment.

DANGER!!! 	Failure to observe may result in personal injury or death
CAUTION!!! 	Failure to observe may result in equipment damage
WARNING! 	Electrical Hazard Warning: Failure to observe may result in serious electric shock, death, or equipment damage
PPE 	Use of Personnel Protective Equipment and Clothing to protect personnel from UVC light exposure

1.3 Mandatory Safety Precautions

The mandatory safety precautions, as recommended below by Reaction Group, must be taken seriously, by The Client, once the unit is installed and working:

- All 'keyholders' must have received training from Reaction Group. Under no circumstances must anyone else be given ozone operation keys or be allowed to change the ozone controls on the device.

- All building occupants must have received notification that ozone is being used within the allotted time frame and that the area must not be occupied or accessed between these times. Building occupants must also have been made aware of the safety warnings (visual and audible) on the Expanse Unit, as well as emergency stop procedures.
- No animals or livestock must be present in areas where ozone is being used. Failure to do this may result in injury or death to mammals, birds, fish, reptiles and other animals
- Ozone Gas has the potential to cause damage to wood, textiles, metals and other items. The client should be aware that whilst unlikely, damage can occur and therefore Ozone Gas should never be used in areas containing delicate or expensive items such as antiques.
- Air handling systems, with the potential to transfer ozone gas from the area, into other parts of the building must be deactivated whilst ozone is being used. It is extremely important that the client consults with their HVAC company / operatives to ensure that cross-contamination of ozone in to other occupied or undesirable areas of the building does not occur
- Doors and windows must be closed to the area, when ozone is being released.
- Safety signage, provided by Reaction Group, must be displayed in prominent places within the building to reinforce the use of the Expanse Unit and the Ozone Release Times must be detailed on this signage by the Building Manager.
- It is the client's responsibility, not only to follow the above safety steps, but to also to conduct their own risk assessment to assess and mitigate the risks involved with using ozone gas within their building

1.4 Potential Hazards at Installation and Service Stage (Installation and Service Engineers Only)

The following risks were identified for Reaction Group Service and Installation Engineers, completing work on the React Air Expanse unit:

- **RISK** of personal injury from sharp or pointed edges developed either from sheet metal enclosure or broken UVC lamp/quartz tubes. Wear suitable protective hand gloves.
- **RISK** of injury / damage due to contact between UVC lamp and operator's skin.

- **RISK** of serious injury to operator's eyes from UVC Light under direct exposure.
- **RISK** of serious injury to persons unqualified in electrical systems.
- **RISK** of serious injury due to inhalation of Ozone Gas.

1.5 Material Safety Data Sheets

React Air Expanse unit does not use any kind of chemicals. Therefore, material safety data sheets are not required.

1.6 Airborne Noise Emissions

The maximum allowable noise emission level for this unit, at the operator's position, is 50 dBA.

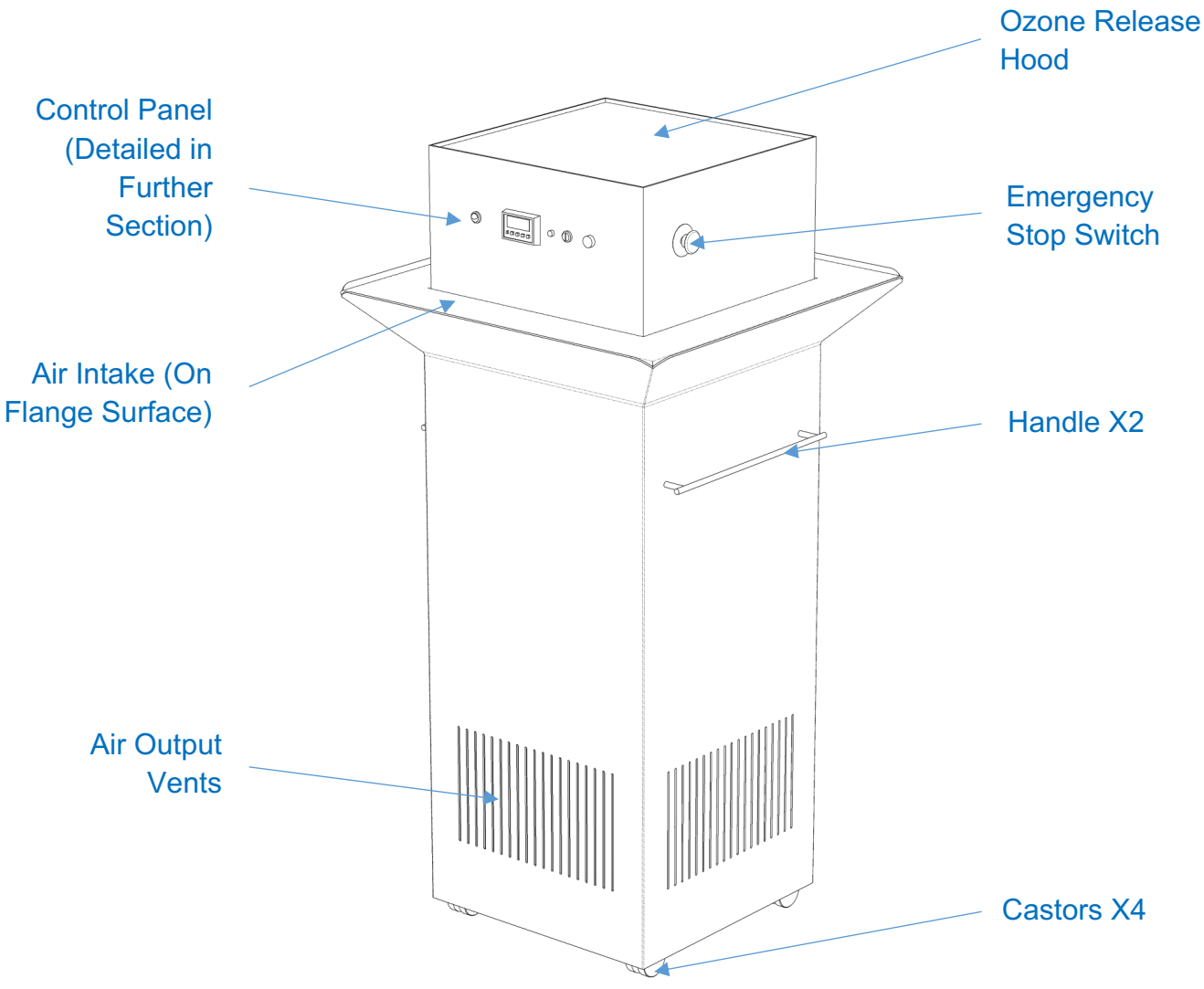
2 Description and Specifications

2.1 Introduction

This manual contains Operation and Maintenance Instructions for the React Air Expanse Unit. Specifications, performance details, supplier's product information and parts lists are also included in following sections.

2.2 General Layout – REACT AIR EXPANSE Virus Neutralizer Unit

Below shown is the Typical Layout of the React Air Expanse Unit.



2.3 General Description

The React Air Expanse Unit, developed by Reaction Group, is primarily designed for air disinfection and surface sterilization. This unit is equipped with various sub-systems like powerful Air Blower (Fan), HEPA Filter, UV-C Germicidal and Ozone Generation systems for neutralizing various kinds of microbes present in air. The unit also includes sophisticated programmable Digital Time Switch to preset the duration of ozone cycle and UV-C disinfection process and emergency shutdown.

After careful study, the sub-systems are placed in their relevant chambers within a robust enclosure having air vents on top surfaces, equipped with four castors for ease in mobility. Enclosure and its panels are made from sheet metal and are corrosion protected by application of suitable coatings.

The unit is compact in design and must be used only in commercial environments such as offices as per the available space and comfort to the Staff & Users.

2.4 UV-C Germicidal Disinfection System

The UV-C germicidal disinfection system has been in use, majorly in medical facilities, since the invention of UV Quartz Lamp (known as Germicidal Lamp) in year 1904 after the disinfection properties of short wavelengths (UV-C, wavelength ranging 200nm – 280nm) by sunlight had been discovered around 140 years ago. Drastic measures, taken by WHO and Countries worldwide, has forced various industries to invest in developing UV-C Technologies to mitigate risks associated with the spread of viruses.

The UV-C germicidal disinfection system is effectively capable of decontamination by neutralizing or capturing micro-organisms. Neutralization of micro-organisms is possible by damaging nucleic acids and altering the structural characteristics of their DNA. UV-C rays are not just harmful for viruses and bacteria but also for humans. Exposure of UV-C Rays to human skin and eyes may lead to skin burns and damage/loss of vision.

DANGER!!! 	**NOTE:** The UV-C rays could have harmful effects when exposed to human skin and eyes. However, UV-C lamps are placed inside a closed chamber in this unit, which is not accessible to any user until it is opened. For safety purposes, opening of unit **MUST** be restricted to authorized personnel only. Failure to follow may result in personal injury, death, or equipment damage.

This unit is equipped with 16 Nos of 25W UV-C Germicidal Lamps (dominant wavelength 253.7nm) with a maximum UV-C Dose of 250 J/m2. The UV-C lamps are mounted in a closed chamber just above the Air Blower.

2.5 Ozone Generation System

Chemicals like hydrogen peroxide and alcohol have been used in various standard cleaning and disinfection applications for disinfection of surfaces, from viruses and bacteria, which are easily accessible. However, the inability to reach or penetrate narrow places, uneven surfaces and fabrics may justify the need for advanced surface sterilization processes.

The capability to penetrate through such Hard to Reach areas makes Ozone Gas a valuable addition to standard cleaning processes for disinfection applications in Advanced Surface Sterilization Procedures.

The Ozone Generator System, in React Air Expanse Unit, is incorporated as a separate system and contains 1 No of high-powered ozone discharge plate, timer setting, audible and visual warning system before dispersing ozone gas. The ozone generator system is also connected to Emergency Shutdown if anyone may still be present in the room.

DANGER!!! 	**NOTE:** The ozone gas could have harmful effects when inhaled by human. Therefore, its use has been restricted in vacant rooms and can only be set using a password and manual ‘arm’ key, by authorized personnel only. Failure to observe may result in personal injury, death, or equipment damage.

2.6 Emergency Shut Down

Emergency Shut Down feature is also provided in this unit with an emergency STOP button for deactivating power to the unit, in case of an emergency.

2.7 Air Blower (Fan) Pre-Filter and HEPA Filter

The powerful Air Blower (Fan) is capable of circulating air within the building/area. The maximum average air flow rate of 2075 m3/h can be achieved when mounted with HEPA Filter.

A Pre-Filter and dedicated HEPA Filter are used for removal of particles from the air.

2.8 System Specifications

Product Description	
Unit Model	MK1
Unit Type	React Air Expanse Unit
Mass	
Maximum Gross	70 kg
Overall Dimensions	
Length	540 mm
Height	1500 mm
Width	840 mm
Functional Capabilities	
Electrical Power Specification:	
Supply Voltage	230V AC
Minimum Power Consumption	440 W
Maximum Power Consumption	462 W
Average Power Consumption	451 W

UV-C Disinfection System Specification:	
UV-C Lamp Model	18” Long 15/25W UV-C Lamp
UV-C Lamp	16 x 15/25 W Germicidal Lamps
Dominant Wavelength	253.7 nm
Avg. Lamp Lifetime	6000 – 9000 hours
Avg. Volumetric UV-C Dose	273.44 J/m3
Total BC Flux	94.94 W
Ozone Generator Specification:	
No. Of Ozone Discharge Plates	1
Ozone Generation Rate	15g / 20g
Supply Voltage	220 V
Air Blower (Fan) Specification:	
Overall Dimension	400 mm
Supply Voltage	4 pole, Single Phase
Speed Controller	Variable Speed
Avg. Air Flow w/HEPA Filter	2075 m3/h
HEPA Filter Specification:	
HEPA Filter Model	H13
Avg. Lifetime	12 Months

Certifications:

- CE marked.

3 Handling, Installation and Shipping

3.1 Handling Instructions

Before handling of equipment, ensure the following:

- Suitable protective clothing should be worn such as steel-toe-cap foot ware
- Power cable of the unit must be disconnected from the electrical socket.
- All controls are in OFF position.
- All associated electrical cables are suitably stored away.
- Movement path of unit must be clear

WARNING!!!

NOTE: Reference should also be made to Section 1.1 & 1.3 in regards to Safety Recommendations / Warnings & Potential Hazards during Design Phase respectively.

3.2 Installation Instructions (Reaction Group Installation Engineers Only)

Installation of the unit MUST always be undertaken by Reaction Group personnel. The following should be taken in to consideration:

- Unit to be placed on a level and firm surface which can hold the gross weight of the unit (70Kg).
- The positioning of the unit with regards to access for essential and non-essential maintenance.
- The Expanse unit is for internal use only and must never be placed in damp or wet environments
- Routing of electric power cables from the unit to recommended electrical socket in a safe was so as to avoid potential damage and trip hazards.

- The position of the control panel with regards to operator access, especially the emergency stop switch.
- The unit should be placed so that the air inlet and outlet vents provided for air flow, are not blocked.

3.3 Services

1) Air supply:
   - Air Supply is not required.
2) Electrical Power Supply:
   - Supply Voltage 230V AC.
   - Minimum Power Consumption – 440 W.
   - Maximum Power Consumption – 462 W.
   - Average Power Consumption – 451 W.
3) Electrical Earthing:
   - A protective earth point and suitable earth cable may be required for safe use if needed.

WARNING!!!

NOTE: Electrical power cables should be properly routed and free from damage. Portable Appliance Testing on cables and the unit itself is highly recommended. However, as a client-owned device, it is the responsibility of the building manager to ensure ongoing electrical safety regulations and recommendations are adhered to.

Before connection of the electrical supply to the unit, check all controls, on the control panel, are set to OFF position.

4 Operating Instructions

4.1 Max. Recommended UV-C Dose and Air Flow Rate

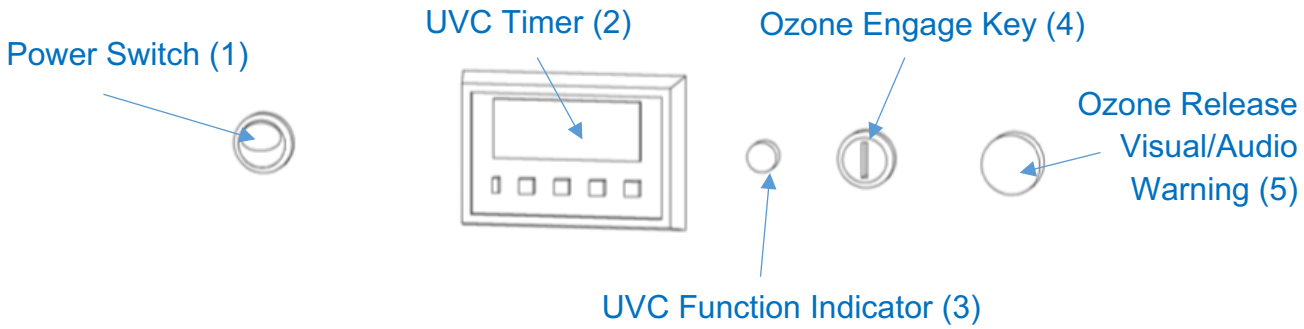
This unit is designed to operate at varying air flow rates ranging up to 2057 m3/hr. Maximum depending on user specific requirements. The UV-C Disinfection System is designed to adjust UV-C Dose up to 250J/m2 max., depending upon varying user requirements, after a careful research on coronavirus susceptibility.

Variable Parameter	Maximum Recommended
UV-C Dose	250 J/m2
Air Flow Rate	2075 m3/hr.

WARNING!!!

NOTE: Before operating this unit, ensure that there is enough room around the unit and that it is free from any obstruction that may lead to in-efficient operation of the unit.

4.2 React Air Expanse UV-C Air Sterilisation Operating Procedure



(Above) Control Panel Assembly

1) Ensure that the Emergency Stop Switch is unlocked and not engaged

2) Connect Power Cable to the electrical supply socket after ensuring the location of the unit, and condition of power cables are in line with the instructions above

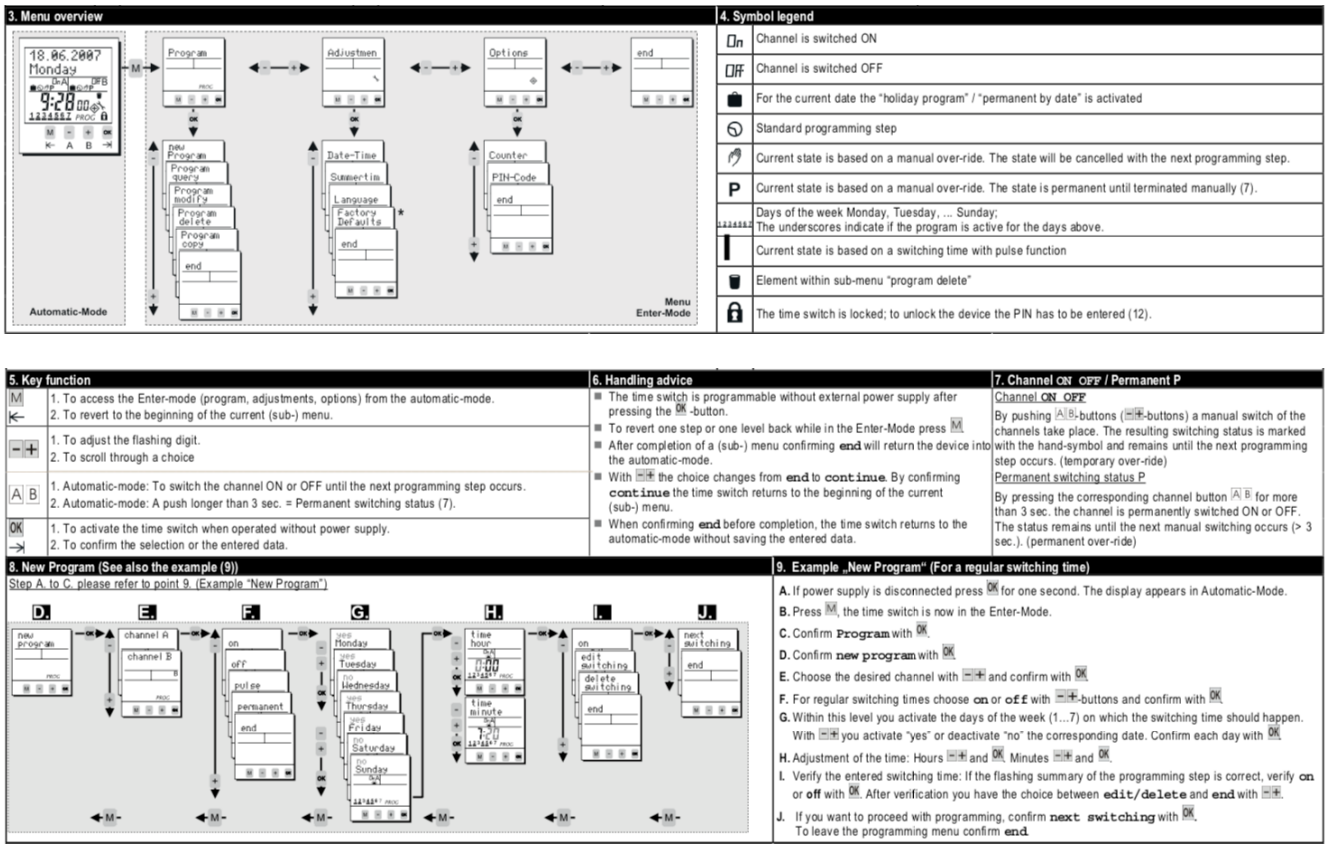
3) Push the Power Switch (1) fully downward to the **ON** position

4) After switching **ON**, the UVC Function Indicator (3), next to Digital Time Switch, will turn **ON**, showing a **Green** light indicating that the UV-C Lamps and Fan are **ON and Functioning.** ***If the UVC does not initiate, please check the timer (2) settings. If the timer is programmed to be turned off, this will override the function.***

5) The Power Switch (1) can be used to turn the unit **OFF**. Note however that if the unit is switched off, the Ozone feature will not initiate

6) If required, the UVC Timer (2) can be used to automatically switch the UVC and Fan on and off at the desired times

7) UVC Timer (2) Operation



4.3 React Air Expanse Ozone Sterilisation Operating Procedure

The React-Air Expanse must be opearted manually by a trained and authorised Key Holder. All Key Holders mush have undertaken training, provided by Reaction Group. Under NO CIRCUMSTANCES must anyone other than Key Holders be allowed to operate the ozone element of the unit. To do so may consititure a seriousl safety risk. The Mandatory Safety Precautions (section 1.3) must be considered and implemented before use of ozone.

1) Switch **OFF** the UV-C and Fan Assembly by turning the Ozone Engage Key (4) to fully right. As soon as the key **flips** back, the operator must take out the key from the retractor switch. The UV-C and Fan assembly will **STOP** running.

2) After turning **OFF** the UV-C and Fan Assembly in step 1 above, the unit will initiate a 3 minute visual warning, indicated by red flashing lights in both the top and bottom of the Expanse unit. You now have 3 minutes to evacuate before ozone

release starts **STARTS**. **At any point, this process can be stopped by using the Emergency Stop switch on the site of the Expanse unit.**

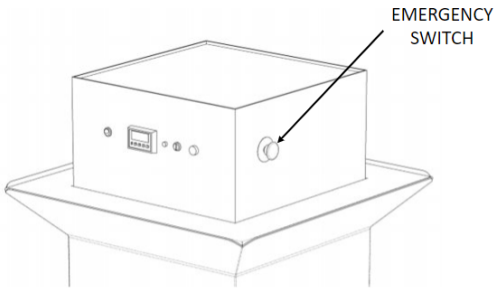
3) The area should now be evacuated, and any doors closed and locked. The ozone cycle has a duration of 2 hours, during which time the room should NOT BE ENTERED.

4) As soon as the ozone generator **STARTS** after the 3-minute warning, an audible warning mode with Buzzer **ON**, represented by **RED** light indicator (5) next to the Ozone Engage Key (4), will **START** and the visual warning of flashing **RED** lights will continue for **2 HOURS**.

5) During the first hour of the ozone cycle, ozone will be released into the room. After one hour, ozone release will stop and the audio/visual warning will continue for a further hour whilst the remaining ozone in the area is converted back in to oxygen. **AFTER 2 HOURS** from initiation of the cycle, the audio/visual warning will stop, indicating that it is now safe to re-enter the area.

4.4 Emergency Shut Down

In the event of emergency or need for immediate shutdown of the Expanse unit, use the emergency stop switch indicated below. The stop switch will lock when used. To unlock, pull the button OUT



WARNING!!!

NOTE: Manufacturer recommends to use Ozone Sterilization Process in vacated room during Night Hours (around 8 o'clock) when Office Staff/Users are not present. Building users MUST be alerted and the Mandatory Safety Precautions (section 1.3) must be adhered to.

5 Maintenance Schedule, Spares and Accessories

DANGER!!! **REGULAR MAINTENANCE OF REACT AIR EXPANSE UNIT:**

For continual and safe operation, the regular maintenance of the air expanse unit is very necessary. An adequate maintenance schedule must be followed as well as recorded for safe operation.

DANGER!!!

PERIODIC INSPECTION, TESTING AND EXAMINATION:

For continual and safe operation, the periodic inspection, testing and examination of the air expanse unit is essential. An adequate inspection, testing and examination schedule must be followed as well as recorded for safe operation.

CAUTION!!!

PRECAUTION BEFORE MAINTENANCE:

Before carrying out any maintenance on the air expanse unit, isolate all power sources.

1. Isolate power supply by pushing emergency stop button mounted on control panel.
2. Alternate option of isolating power is to disconnect the power supply from plug-in adaptor mounted on bottom side of the air expanse unit.