

**GEN1000  
GEN1000-GE  
GEN1000-ECO  
GEN2000**

**OPERATOR MANUAL**

314796-ENG R00

GEN1000  
GEN1000-GE  
GEN1000-ECO  
GEN2000  
OPERATOR MANUAL

**Please read these instructions carefully and completely before operating the chamber.**

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CONVIRON®

# Genesis™

Space efficient, reach-in growth chambers ideal for a wide range of plants and research applications.



GEN 1000



GEN 1000 GE



GEN 1000 ECO



GEN 2000

## PREFACE

Welcome to the Conviron Genesis Operator Manual.

This manual describes the features and use of Conviron's GEN1000, GEN1000-GE, GEN1000-ECO, and GEN2000 chambers and is designed to provide sufficient detail for the different kit configurations, including a structured format providing step-by-step instructions. Clients will find sufficient detail for a typical installation including figures, diagrams, and graphics to operate the chamber without issue. However, given that many installations are specific to each facility and that facilities may have unique requirements, additional information or assistance from Conviron may be required.

This equipment is only to be used by authorized personnel - that is, personnel who have been trained in the proper use of the equipment and who have read this manual.

### Latest Manual Versions and Languages

For the latest version of this and other manuals, please visit [www.conviron.com](http://www.conviron.com).

For manuals in other languages, or for additional printed manuals, please contact Conviron head office.

### Functional Description/Intended Use

This chamber is designed to provide a controlled environment for plant production and scientific experiments including, but not limited to, plant science, biotechnology, and entomology.

## WEEE and RoHS Compliance Statements

CONVIRON is committed to meeting all requirements of the WEEE directive (2012/19/EU). Please contact Conviron, or your Conviron distributor, for proper handling and disposal instructions.

## RoHS Compliance

Conviron meets the requirements of the RoHS directive (2011/65/EU) and its amendments. The RoHS directive sets limits for the inclusion of hazardous chemicals.

## Document Conventions

Conviron maintains a policy of continual improvement and reserves the right to change the product without prior notice. Therefore, the images used throughout this manual may differ slightly from the actual configuration due to updates and product changes.

- Wherever possible, textual descriptions are accompanied by photographs or line drawings of the chambers to assist the reader in understanding the material.
- Frequent reference is made to left and right sides throughout this manual. Left is considered to be the left-hand side while facing the equipment.
- Indented bold and italicized text is used to introduce instructions.
- Italicized text is used to identify additional reference manuals.
- Red circles or colored highlights are used to highlight important assembly or disassembly details, or to show important small parts in an otherwise large assembly.



The “**NOTE**” symbol is used to draw attention to additional information which may assist in the operation of the equipment.

## SERVICE & TECHNICAL SUPPORT

Before contacting Conviron, please check the following:

- Read this document and the accompanying controller manual in their entirety before attempting to operate the chamber.
- If you are having a problem using your cabinet(s), pay particular attention to the relevant section and the pertinent information in this manual, and use the information to diagnose and correct the problem.
- If the problem persists and/or you require additional assistance, please collect the following information prior to contacting Conviron:
  - The serial number of the cabinet, located on the rating plate on the left side of the chamber.
  - The software version of the control system. Instructions for obtaining the software version of your control system are provided in the control system operator manual.
  - A description of the problem.
  - A description of what you were doing before the problem occurred.

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# 1. PRECAUTIONS



The equipment is intended to be installed, operated, maintained, and only serviced by trained personnel, according to the instructions and precautions described in the manuals provided by Conviron.

Table 1-1 lists precautions intended to help guide users in the safe operation of Conviron chambers.

## 1.1 Hazard Identification Symbols


Table 1-1 Hazard Identification Symbols

Symbol	Description
	The "HAZARD WARNING" symbol is used whenever a general hazard exists which could cause personal injury or potential equipment damage and requires correct procedures/practices for prevention.
	The "IMPORTANT INFORMATION" symbol is used to identify operating procedures which must be followed to ensure smooth and efficient equipment operation.
	The "ELECTRICAL SHOCK/ELECTROCUTION" symbol is used to identify a source of potentially dangerous electrical current.
	The "BURN HAZARD/HOT SURFACE" symbol is used to identify surfaces which are hot enough to cause personal injury.
	The "SLIP HAZARD" symbol is used to identify a potential hazard of falling from elevated surfaces.
	The "PROTECTIVE EARTH-GROUND" symbol is used to identify the protective earth connection.
	The "OPTICAL RADIATION" symbol is used to identify areas where exposure to ultraviolet (UV) and infrared radiation may be possible.
	The "DISCONNECT MAINS POWER" symbol is used remind service personnel to disconnect the power at the mains panel before servicing this equipment.

Symbol	Description
	The "DO NOT DISCONNECT UNDER LOAD" symbol is used to remind the user to shut off the power to the receptacle before removing the plug.
	The "READ THE OPERATOR MANUAL" label is intended to remind the user to have a thorough understanding of the equipment BEFORE use.


## 1.2 General Precautions

These precautions should be read and understood before proceeding with installation, operation, and maintenance.



**Warning:** Read and understand the product manuals before moving, installing, operating, or servicing this equipment. Failure to follow these instructions could result in equipment damage, serious personal injury, or death.

The manual contains safety information that must be understood and followed before working with the product.




**Conduct a visual inspection of the equipment and surrounding area by walking around the unit to ensure no debris or obstacles are present that could pose a safety hazard before operating the chamber.**

**Operate your Conviron equipment for a minimum of five days before introducing any research material to ensure proper and stable operation.**

**Avoid direct contact with any broken fluorescent lamps. Fluorescent lamps are extremely fragile and may emit harmful vapors when broken.**

**Follow all applicable local environmental regulations and guidelines for disposal of hazardous material. If in doubt, contact local authorities for proper disposal procedures.**



**Warning: Electricity hazard**

**Serious personal injury or death could result from contact with live electrical circuits.**

**Tool accessible areas are for qualified service people only. Disconnect power before accessing.**



**Warning: Hot surface hazards**

Personal injury could result from contacting hot surfaces within the chamber.

The user accessible fluorescent lamps, the inaccessible refrigeration system components, and the inaccessible heater element become hot during normal operation. Do not touch.



**Warning: Slip and fall hazard Personal injury could result.**

Clean up any spilled or accumulated water immediately. Contact maintenance personnel if the problem recurs.



**Warning: Optical radiation hazard**

Personal injury could result from unprotected exposure. The lighting system in this product produces potentially dangerous ultraviolet and infrared radiation in close proximity.

Always wear protective clothing such as gloves and long sleeve shirts when working within the chamber.

Always wear protective glasses when working within the chamber that are CSA Z94.3-07 or ANSI Z87.1-2010 compliant and block 99.9% of UVA/UVB/UVC rays. Do not look directly at the lights even while wearing protective glasses.



**Warning: Electrical Shock Hazard**

Serious personal injury or equipment damage could result from contacting live electrical circuits.

An arc flash risk assessment should be performed to determine the voltage, shock boundaries and PPE requirements to protect workers from electrical hazards.



**Water splash hazard**

Splashed water in contact with live electrical components could result in serious personal injury or serious equipment damage.

Do not allow water or liquids to contact any electrical components.

If water comes into contact with electrical components, disconnect power immediately at the mains and have the chamber inspected by service personnel before putting the chamber back into use.

---

## 2. CHAMBER FEATURES

### 2.1 GEN1000 Configurations

The 27.6ft<sup>3</sup> (781L) base GEN1000 chamber can be fitted with any of the following specially configured kits and each kit is also available with an LED lighting:

- The Short Plant (SH) kit is a two-tier, or an SH-XTIER three-tier configuration, that uses horizontal airflow over multiple shelves optimizing the growth area for shorter plants, like Arabidopsis. Ideal for research in propagation, genetics, physiology, and other moderate light experiments.
- The Incubator (IN) kit is a four-tier configuration that uses horizontal airflow and low light levels optimizing the incubation of plantlets and insects.
- The Tall Plant (TA) kit is a single-tier configuration that provides upward airflow, maximum growth height, and light intensity for taller plants such as cereal crops, horticultural plants, and silviculture.
- The Tissue Culture (TC) kit is a four-tier configuration that uses low light to maximize space. It also provides upward airflow minimizing condensation in petri dishes and jars used in propagation and genetics experiments.

#### 2.1.1 GEN1000 Germinator (GE)

The GEN1000-GE chamber is a five to fifteen-tier seed germinator that provides horizontal airflow, equivalent low light intensity throughout growth area, high humidity control and adjustable removable shelves to accommodate different germination stages.

#### 2.1.2 GEN1000-ECO

The GEN1000-ECO fits through a standard doorway and can be fitted in SH, IN and TA configurations, distributes horizontal airflow with broad spectrum energy-efficient LED lighting.

- Short Plant (SH)
- Incubator (IN)
- Tall Plant (TA)

### 2.2 GEN2000 Configurations

The 55.2ft<sup>3</sup> (1526L) GEN2000 adaptable chamber provides 33.8 ft<sup>2</sup> (3.14m<sup>2</sup>) of shelf space. The GEN2000 chamber ships in one piece, requiring minimal assembly and easy installation in most research labs.

- Short Plant (SH)
- Incubator (IN)
- Tall Plant (TA)
- Tissue Culture (TC)

### 2.3 Plant Placement

Depending on the chamber configuration, a wide variety of plant growth options are available, from seed to full maturity, and for short to medium and tall plant species.

Plant pots or trays are placed on the wire shelves, or directly on the Unifloor in a TA configuration.

The shelves can be installed in any position within the chamber, depending on the experiment requirements. Refer to Section 3.9 Installing the Light Canopies and Shelving Configuration Kits, for installation instructions.

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## 2.4 Control System

The control system provides advanced programming capabilities, allowing ramping or stepping of environmental conditions to match research requirements. User programmable "set and forget" alarms track the chamber operation relative to user-defined setpoints. Visual and audible notifications provide a further level of protection. For remote monitoring and control, the chamber comes ready to communicate with Convicon's Central Management™ or CMP-Link.

Refer to the included *Convicon CMP6060 Operator's Manual* for complete instructions.

### 2.4.1 Central Management System (Optional)

For use in conjunction with the 6000 series controllers, the Convicon Central Management™ (CM) system provides a comprehensive suite of timesaving, value-added features for remote control and monitoring of chambers, such as:

- A supervisory dashboard that provides a quick overview of all operational chambers. Thumbnail properties that show essential chamber management details.
- Triggers that protect the experiment by alerting designated personnel.
- Risk management that includes auto backup and restore, system protection, disaster recovery, and file restoration.
- Data management capabilities that include collection and storage.

Refer to the *Convicon Central Management Operator's Manual* for complete instructions.

### 2.4.2 CMP-Link (Optional)

The CMP-LINK feature enables Argus Titan 900 full interaction of any Convicon chamber or room that is equipped with CMP6060 control system. With CMP-LINK enabled, features of Titan 900 such as scheduling and programming, table views for data, comprehensive graphing, real-time status (including alarms, sensors and IOs), retrieval and exporting of chamber data, time synchronization, and a remote interface are available for the chamber.

### 2.4.3 ConviconDirect (Optional)

ConviconDirect is fully compatible with Convicon chambers or rooms equipped with the CMP6060 control system and can be activated remotely by contacting Convicon. Access and manage chamber setpoints and actual conditions remotely through any building LAN connected desktop, notebook or handheld mobile device.

## 2.5 UPS Uninterrupted Power Supply (Optional)

Surge protection and uninterrupted power supply. Provides surge protection and battery back-up for the controller hardware during power outages, surges and spikes for up to 30 minutes. Visually and audibly alarms when the battery is in use, when battery is low, when not available to provide back up, or overloaded.

## 2.6 Webcard (Optional)

The Webcard is a network card used for remote access to chamber and connected to an existing CM (standard with 2.4.1 Central Management System (Optional) and 2.4.2 CMP-Link (Optional), not required with ConviconDirect)

## 2.7 Network Connectivity

An RJ45 port is included for connection to the facility network.



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## 2.8 Levelers

The unit is supplied with leveling feet to stabilize the chamber and take the weight of the chamber off of the 2" heavy-duty casters.

## 2.9 Instrument Port

One 2" (50mm) access port with a light-tight cap is provided on the right side of the chamber. The port allows small instruments and monitor leads to be inserted into the chamber without opening the front door, and without significantly changing the environment within the chamber.

## 2.10 Condensate Pump (Optional)

Pumps the condensate water from drip pan to remote drain.

### 2.10.1 Condensate Pan (Optional for GEN2000)

Drip pan collects chamber condensate when direct plumbing to the floor drain is not available or desirable.

## 2.11 Air Intake and Exhaust

Air inside the chamber is exchanged through manually adjustable fresh-air and exhaust ports. Exhaust air flows to ambient with no additional connection required.

### 2.11.1 Hepa Filter (Optional)

Located on fresh air intake and located on exhaust port.

### 2.11.2 Ducted Collar (Optional)

Ducted collar on fresh air intake and on exhaust port.

## 2.12 Temperature and Humidity Sensor

Shielded sensor within return air stream available above 4 °C.

## 2.13 Lighting

### 2.13.1 SH-XTIER (Optional)

Additional canopy and shelf for the SH configuration. When combined with low temperature control, no humidity control is available below 4°C.

### 2.13.2 Dimmable Lamp Control - LMMCL (Optional)

Closed loop dimmable lamp control through controller interface. Automatic adjustment of light intensity within the programmed range, includes quantum light sensor. Apogee quantum light meter provided for display and recording of light output, displayed through user interface. Not available with low temperature operation below +10°C ON using fluorescent lamp design. Not available for GEN1000 GE

### 2.13.3 Fluorescent lighting (Optional)

Optional balanced spectrum for TC configurations. Light intensity will diminish when chamber is operating at low temperature.

#### 2.13.4 High Light Intensity (Optional)

Available in the Short Plant kit – two tier only (SH-HL). When combined with low temperature control, no humidity control is available below 4°C.

#### 2.13.5 Light Sensor (Optional)

Allows for closed-loop dimmable control of lighting intensity through controller. Automatic adjustment within programmed range. Not available with low temperature operation below +10°C ON using fluorescent lamp design.

#### 2.13.6 PFR-LED (Optional)

Supplemental open-loop control far red T5 LED fixtures. Available in SH, SH-XTIER (Lighting intensity remains 550 micromoles/m<sup>2</sup>/s (18% FR)) and TA (700 micromoles/m<sup>2</sup>/s (11% FR)) lighting configurations.

### 2.14 Low Temperature (Optional)

Low temperature operation of 2°C with the lights ON (No fresh air below 8°C.) A defrost cycle will occur resulting in a temperature increase for temperatures set below 10°C with the lights ON, 4°C with the lights OFF. Temperature spikes and defrost time are dependent on the chamber operating temperature. During this cycle, the lights will be turned off. When using fluorescent lighting, specified light intensity will diminish when the chamber is operating at low temperatures.



No humidity control below 4°C. SH-XTIER units with LED will achieve 5°C with the lights ON.

### 2.15 Water Cooled Condensing Unit (Optional)

For facility with a water chiller system, or if an air-cooled condenser system will add unwanted heat into the room.

### 2.16 Humidity Control

Additive humidity is controlled through the use of an ultrasonic humidifier. Based on +21°C (70°F) and 50% RH ambient conditions, a range of up to 90% RH with the lights off and 75% with the lights on, limited by a +25°C (77°F) dew point.



The stated humidity range is for an empty chamber. The chamber may achieve higher humidity levels with plant loading.

#### 2.16.1 Bypass Dehumidification – BDH (Optional)

Bypass Dehumidification (BDH) is a dehumidification system used to control relative humidity setpoints below the combination of the ambient conditions and moisture load in the cabinet. A precisely controlled volume of chamber air bypasses the heat exchanger by means of a proportionally controlled air damper. Using the cooling system, moisture is removed from the remaining air by cooling and reheating.

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### **2.16.2 Dehumidification by Desiccant Dryer - DEH (Optional)**

Moisture is removed from the air by compressed air. System requires air compressor to supply 12CFM at 100psig (by others). Using a desiccant media, moisture is removed from ambient air supplied by a compressor. The dry air is introduced as required into the chamber air to achieve the designed humidity levels. Not available with BDH option. Consult factory for 50Hz configuration. Option is externally mounted, adding 7½”(190.5mm) to overall width of unit.

### **2.16.3 Ultrasonic Humidification – USH (Optional for GEN2000)**

Ultrasonic Humidification: Range: Resultant to 90% RH lights OFF, 85% RH lights ON, limited by a +29°C dew point. Additive humidity through use of ultrasonic humidifier. Range given in an empty chamber. Chamber may achieve higher levels with plant loading. Control: ±3% RH. System uses a dry humidity sensor to directly measure humidity in %RH (no wet sock). System must be supplied with Type IV purified water to ASTM D1193 - 06(2018). Maximum water usage to maintain specified levels is 1 liters/hr.

### **2.16.4 Compact Pump Spray Nozzle Humidifier – CPSNH (Optional for GEN2000)**

Pressure pump for spray nozzle humidifier. Stand-alone assembly, including mounting hardware, cord and plug powered to 120V-60Hz, 15amp or 230V-50Hz, 10amp electrical.

## **2.17 Carbon Dioxide Additive Control**

### **2.17.1 CO<sub>2</sub> Additive (Optional)**

Increases the chamber CO<sub>2</sub> level above ambient. Package includes CO<sub>2</sub> sensor, control valve and injection system for additive CO<sub>2</sub> control. CO<sub>2</sub> supply tank not included.

### **2.17.2 CO<sub>2</sub> Monitoring (Optional)**

Monitoring only of CO<sub>2</sub> concentration.

### **2.17.3 CO<sub>2</sub> Scrubber (Optional for GEN1000)**

CO<sub>2</sub> Scrubbing allows user to program CO<sub>2</sub> concentration levels below resultant indoor ambient conditions. Design provides monitoring CO<sub>2</sub> concentration. Includes sensor.

## **2.18 Central Alarm Contact**

The Central Alarm Contact (CAC) consists of a closed dry contact energized by a control system alarm output connected to a Building Management System (BMS). When an alarm condition occurs, that contact opens, interrupting the circuit from the BMS (or other system) to indicate an alarm. The CAC is only triggered by shut-down alarms.

### **2.18.1 To install the CAC**

The connection point to the BMS is a receptacle on the back panel of the chamber (Figure 3-27). This receptacle is connected to a relay that operates when a chamber alarms. The receptacle connections must be wired according to the electrical drawings. The electrical load must be within the rating of the technical specifications. The receptacle is mated with the plug and then screwed tightly together.

## 3. INSTALLATION

GEN1000 and GEN2000 units must be placed in ventilated areas with circulating air flow.

### 3.1 Chamber Temperature Range

Install the chamber in a dry, well-ventilated area with the ambient temperature maintained is between temperature 68°F (20°C) and 95°F (35°C).



Ideally, the temperature around the chamber will be 70°F (21°C).

#### 3.1.1 GEN1000

The GEN1000 chambers dissipate up to 2350W (8000 BTU/hr) to ambient with the dehumidification option, and up to 1850W (6300 BTU/hr) without dehumidification.

#### 3.1.2 GEN2000

The GEN2000 chambers will dissipate to ambient up to 4570W (15610 BTU/hr) to ambient with the dehumidification option, and up to 5570W (19000 BTU/hr) without dehumidification.

Locate the chamber on a relatively level floor so that adjustments can be made with the levelers to ensure the chamber is level.

#### 3.1.3 Chamber Clearance

- At least 1 ft. (300mm) must be left clear above the chamber.
- At least 4" (102mm) must be left clear behind the back wall of the chamber.
- At least 4" (102mm) must be left clear on each side of the chamber in order to provide access to the instrumentation, fresh air, and exhaust ports.

### 3.2 Power Supply

Refer to *Section 8 Technical Specifications* for details of the power configuration.

This unit will tolerate  $\pm 10\%$  voltage fluctuation from the rated voltage on the serial plate. Use a voltage stabilizer if the fluctuation is greater than  $\pm 10\%$ .



Failure to install overcurrent protection if fluctuation greater than 10% is detected can result in serious damage to the compressor and electronic components and will void the warranty.

### 3.3 Water Supply



Failure to use a water source with the quality stated in Table 3-1 will void the product warranty.

**Table 3-1 Water Supply Parameters**

Parameter	Measurement
Connectivity	1/4" Quick Connect
Flow	0.26 gallons / hour (1 Liter / hour) reverse osmosis
Pressure	Min. 25 psi (1.7 bar), Max. 60 psi (4.1 bar)
pH	5.0 to 8.0
Filtration	0.2-micron membrane
Resistance	Min 0.2 Megaohm-cm (MΩ-cm)
Conductivity	Max 5.0 μS/cm

### 3.3.1 Condensate Drain

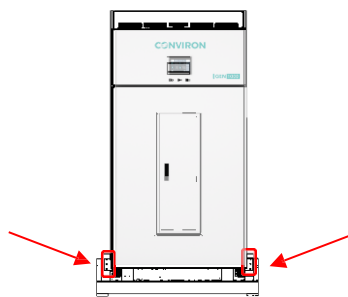
A (GEN1000) 3/4" (19 mm), and (GEN2000) 1" (25 mm) drain is provided underneath the chamber, located near the back. The drain may be extended to a nearby floor drain, as required. If there is no floor drain nearby, a condensate pan (optional for GEN2000), and pump may be used to remove collected fluid.

## 3.4 Removing the Chamber from the Shipping Pallet

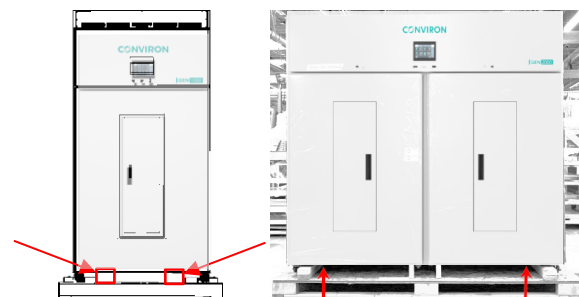
The GEN1000 chamber weighs 700lbs (~318kg), and the crated GEN2000 chamber weighs approximately 1100 pounds (499 kg) and should be removed from the shipping pallet with a forklift. In smaller facilities without access to a forklift, the shipping pallet may be ordered with an optional built-in ramp to unload the chamber.

### 3.4.1 To remove the chamber from the pallet with a forklift:

1. Remove the wooden brace and metal shipping bracket (Figure 3-1) from both sides of the pallet.



**Figure 3-1 Remove the L-Brackets**



**Figure 3-2 Position the Forks**



**Warning:** Severe equipment damage and potential personal injury hazard  
Only a trained forklift operator should attempt to remove the chamber from the pallet.



Ensure the forks do not contact the drain hose or drain fitting located under the floor in the center of the chamber.



Warning: Personal injury hazard

Do not leave any nails, staples, or screws protruding from the crating material to eliminate potential puncture injuries.

2. Position the forks of the forklift truck as shown in Figure 3-2.



Ensure the chamber is secured to the forklift cage with straps, chains, or ropes before attempting to lift the chamber off the before attempting to lift it off of the shipping pallet.

3. Lift the chamber straight up and remove the pallet from underneath the chamber.
4. Lower the chamber to the floor and remove the straps or ropes securing the chamber to the forklift cage.

### 3.4.2 To remove the chamber from the pallet using the optional ramp:

1. Remove the packing material and lower the ramp (Figure 3-3, Panels 1 & 2).
2. Remove the wooden brace and metal shipping bracket (Figure 3-3, Panel 3 & 4) from both sides of the pallet.
3. Ensure the locks on the front casters are in the unlocked position (Figure 3-3, Panel 5).
4. Slowly roll the chamber down the ramp (Figure 3-3, Panel 6).



Warning: Personal injury hazard

Do not lose control of the chamber speed while removing it from the pallet.

At least two people are required to control the speed of the chamber while rolling it off the shipping pallet and down the ramp.



Panel 1



Panel 2



Panel 3



Panel 4



Panel 5



Panel 6

Figure 3-3 Remove the Chamber from the Pallet Using the Optional Ramp

### 3.5 Moving the Chamber into Final Position

The chamber casters make moving the chamber into final position easy and straightforward.



Warning: Personal injury hazard

The chamber could cause serious personal injury if it falls while moving into final position. Ensure the chamber does not exceed a 10-degree angle while in transit.

#### 3.5.1 To move the chamber into position:

1. Ensure the locks on the front casters are in the unlocked position (Figure 3-4, Panel A).
2. Slowly push the chamber into its final location.

### 3.6 Leveling the Chamber

The GEN1000 is equipped with four levelers (Figure 3-4, Panel B) to prevent the unit from rolling on its casters once installed, and to compensate for any variations in the floor level.



Panel A



Panel B

Figure 3-4 Chamber Levelers

The levelers at the four corners at the bottom of the base must be adjusted to take the weight of the unit off of the casters. Once the chamber is moved into position, adjust the levelers until they are in firm contact with the floor and the chamber is level.

#### 3.6.1 To adjust the Levelers:

1. Use a 3/4" (18mm) open-end wrench, or a medium sized adjustable wrench, to turn the levelers under the back wall of the chamber clockwise to lower the foot into firm contact with the floor.
2. Adjust the levelers under the front corners until the gap between the caster and the floor is at least 1/8" (3mm) and no more than 1/4" (6mm).



It is important that the two front levelers are perfectly level (side to side), so the door closes easily. An out-of-level condition on the front levelers can cause the door to bind or water not to flow to drain.

3. Ensure the chamber is level in both the side-to-side and front-to-back directions for proper drainage.



### 3.7 Configuration Kit Overview

The GEN1000, GEN2000 chambers can be purchased with, or converted to, any of four configurations, each designed to suit specific plants and applications. Replacing the back-wall plenum, canopies, and shelves allows researchers to convert the chamber and adapt to a variety of research programs requiring different light intensity, airflow direction, growth height and growth space.

### 3.8 Airflow

Continuous airflow is critical to the efficient operation of the chamber. Fresh air may be introduced using the fresh air port located on the side of the chamber.

Conditioned air is drawn down from the refrigeration coil and optional heaters and enters the interior of the chamber through a rigid metal plenum in the rear wall of the chamber. Airflow is then directed through precisely designed and manufactured back-wall plenums.

The SH and IN kits use a perforated plenum that distributes airflow horizontally across multiple shelves.

The TA kit uses a solid plenum and distributes uniform upward airflow through the chamber floor.

The TC kit incorporates individual air-shelves that distribute air vertically to minimize condensation within petri dishes and containers.

Figure 3-5 shows airflow, light intensity, and growth height comparisons between the four configurations.

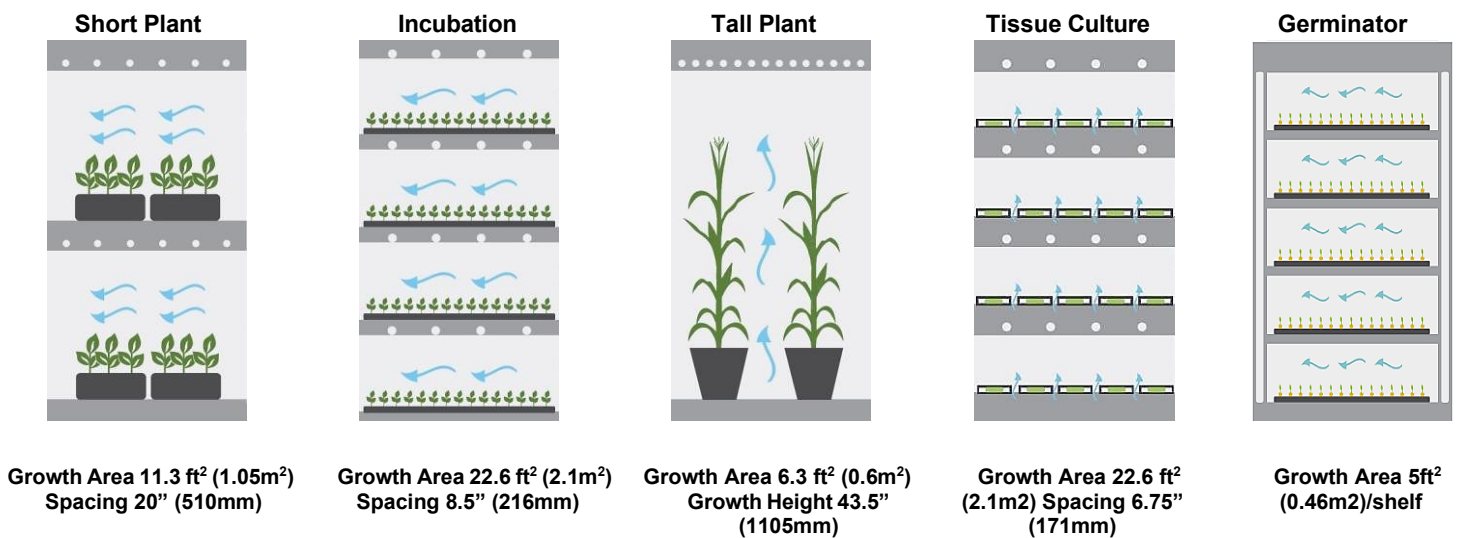


Figure 3-5 GEN1000 Chamber Airflow



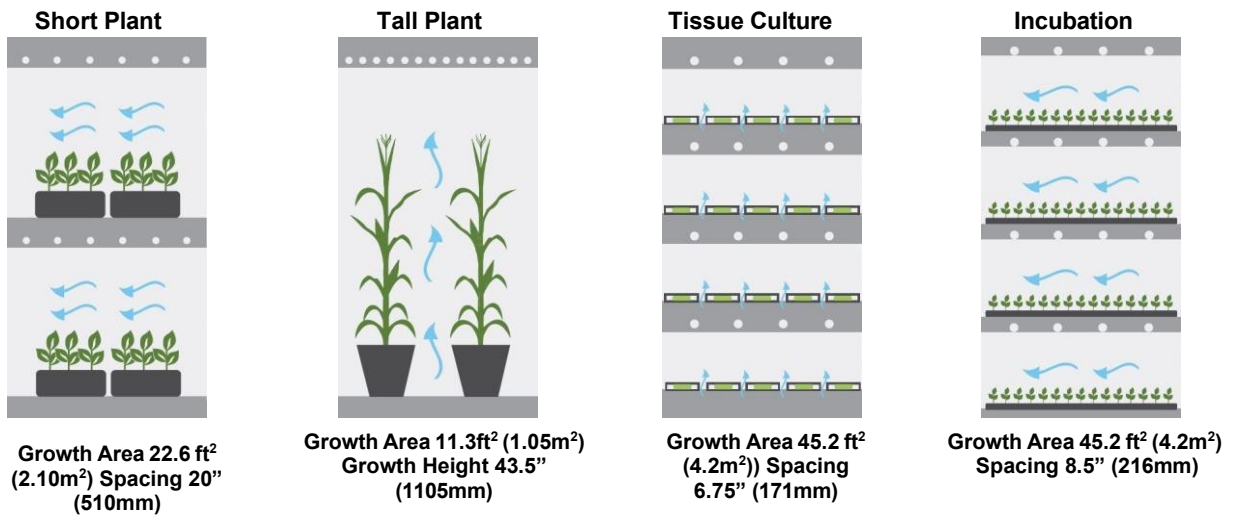


Figure 3-6 GEN2000 Chamber Airflow

### 3.8.1 SH Configuration

Horizontal airflow across shelves optimizes growth area for shorter plants (Figure 3-7 by forcing the air into the chamber through the perforated back-wall plenum.

One additional tier with an additional lamp canopy and wire shelf may be ordered as an option for the SH configuration (Figure 3-8). Growth area with the X-TIER option becomes 16.9ft<sup>2</sup> (1.5m<sup>2</sup>).

SH configuration, top and bottom shelves both provide 20" (51cm) of growth height.



Figure 3-7 SH Configuration

The optional LED lighting canopies are installed the same way as fluorescent light canopies.

**X-TIER configuration, top and middle shelves both provide 13" (33cm) of growth height, the bottom shelf provides 12" (30cm) growth height**



**Figure 3-8 SH X-TIER Configuration**

### **3.8.2 IN Configuration**

The IN configuration distributes airflow horizontally across multiple shelves from back to front by forcing air into the chamber through the perforated back-wall plenum.

**IN configuration provides 10.5" (26.5cm) of growth height**



**Figure 3-9 IN Configuration**

### 3.8.3 TA Configuration

The TA configuration uses solid back-wall plenum and a perforated floor to direct the airflow horizontally through the plant material.

TA configuration provides 43.5" (110.5cm) of growth height



Figure 3-10 TA Configuration

- **Unifloor®**

The Unifloor®, available only in the TA Kit, has openings that allow conditioned air to be distributed evenly up through the floor into the chamber. Excess irrigation water and condensate will drain out of the chamber to the floor drain.

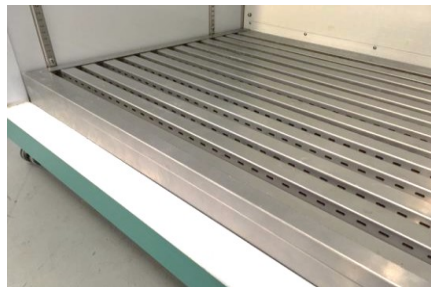


Figure 3-11 Unifloor



To ensure proper airflow and water drainage, keep the vents and drain channels in the Unifloor clear of debris.

- **Removing the Unifloor**

The Unifloor is held in place by screws that hook into matching holes along the back of the chamber.

1. Lift up the front of the Unifloor.
2. Slide the back of the Unifloor up to disengage the screws that are holding it in place.
3. Remove the floor from the chamber.

- **Replacing the TA Back-Wall Plenum**

All GEN1000 and GEN2000 chambers are constructed with one piece back-wall plenums.

1. Remove all lamp canopies, canopy support brackets, shelves, and shelf clips from the chamber (Figure 3-12). Refer to Section 3.10.5 To remove the Lamp Canopies and Shelves, and the Unifloor® (Figure 3-1Figure 3-11).
2. Using a Phillips screwdriver, or a drill with a Phillips bit, remove all the screws from the perimeter of the plenum (Figure 3-13).



Figure 3-12 Remove All Canopies & Shelves

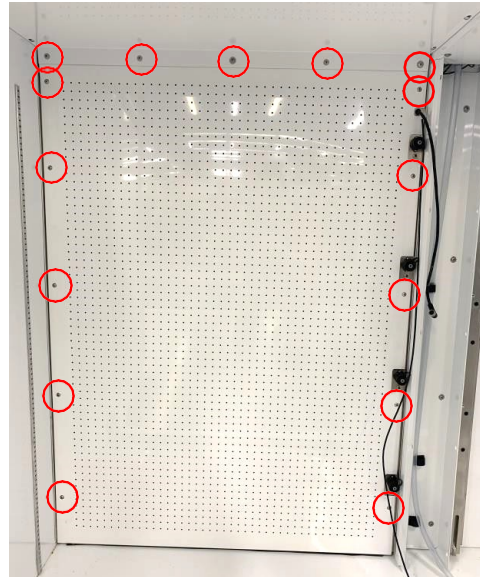


Figure 3-13 Remove All Plenum Screws

3. Carefully remove the plenum from the chamber by pulling the bottom of the plenum wall towards you and slide the plenum out of the chamber (Figure 3-14).



Figure 3-14 Remove the Plenum

4. Reinstall the canopy supports, canopies, shelf clips, shelves, and Unifloor, if required. Refer to Section 3.10 Lamp Canopies.



### 3.8.4 TC Configuration

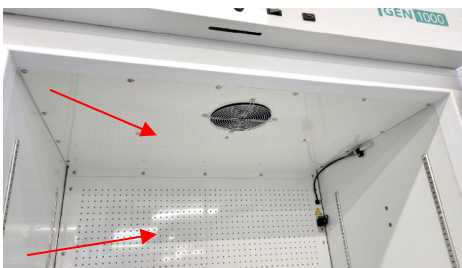
The TC kit distributes air vertically through the individual air-shelves to minimize condensation within petri dishes and containers. Arrange the air-shelves and light canopies to provide a growth height of 9.5" (24cm).

TC configuration provides 9.5" (24cm) of growth height



Figure 3-15 TC Configuration

### 3.8.5 To install the TC kit:



1. Remove Unifloor and Ceiling Cover, which covers fan.
2. Remove back wall perforated Plenum.



3. Install TC plenum, fastening LH and RH screws into back wall supports along LH, RH sides.



NOTE: Leave top row of holes to install Ceiling Cover in next step.

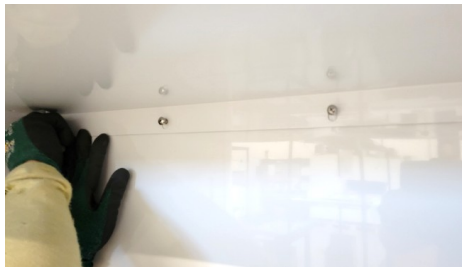


*Do not* overtighten the screws to avoid distortion panel damage.

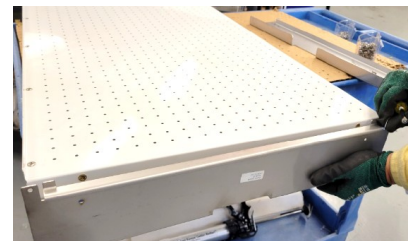
Tighten the screws until metal-to-metal contact is made, then tighten the screws an additional  $\frac{1}{4}$  turn.



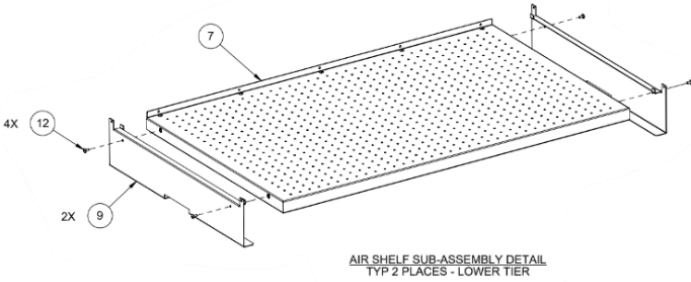
4. Re-install Ceiling Cover over TC Plenum.



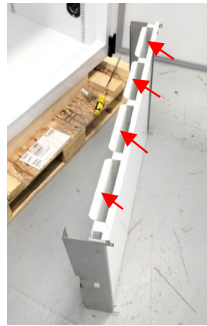
Fastening screws into top row of holes to complete Ceiling Cover re-installation.



5. Attach Qty 2 Lower Support Bracket (3.8" height) to Air Shelf.



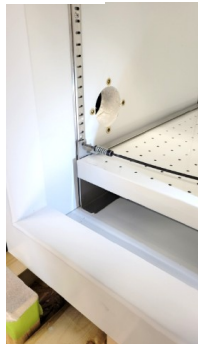
NOTE: Lower Support Brackets have middle notch and are 3.8" in height. Support Brackets for upper shelves are 4.21" in height.



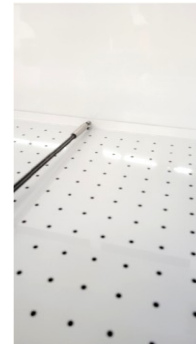
6. Line up metal from Air Shelf with slots in TC Plenum.



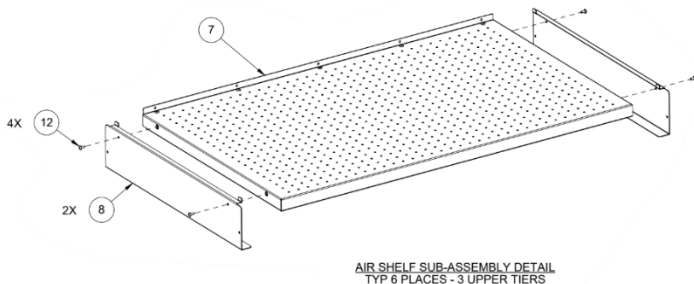
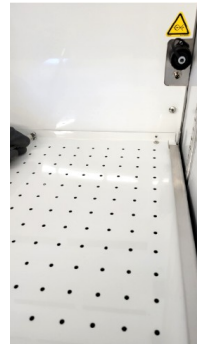
7. Insert Air Shelf metal into TC Plenum slots.



8. Fasten Lower Support Bracket to side walls through LH and RH 48" Pilasters.



9. Fasten Air Shelf to back wall Plenum.

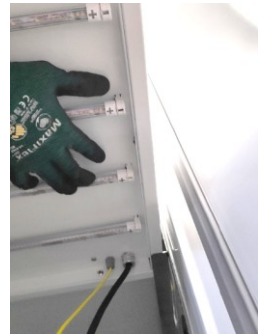


10. Attach Qty 2 Support Bracket (4.21" height) to Air Shelf.



11. Measure and support spacing for the next shelf.





12. Fasten Support Bracket to side walls at LH and RH 48" Pilaster.
13. Repeat steps for remaining Air Shelves, fastening Air Shelves to back wall Plenum.

14. Attach Qty 2 Canopy Support Brackets to the tops of the 48" Pilasters.

15. Slide Light Canopies into Support Brackets, under Air Shelves.



16. Connect Light Canopy power and control wires at RH side back wall.

17. Slide top Light Canopy power onto Canopy Support Brackets.
18. Connect control wires at RH side back wall.

**Figure 3-16 TC Kit Installation**

- **Removing an Air Shelf**

1. Using a Phillips bit, remove the screw securing the bracket to the shelf.
2. Remove the brackets from the pilaster.
3. Support the front end of the shelf with one hand, and with the other hand, remove the screws that secure the shelf to the plenum.
4. Continue supporting the front of the shelf and lift the back of the shelf to separate it from the cover plate.
5. Remove the shelf from the chamber.

- **Removing an Air Shelf Bracket**

1. Using a Phillips bit, remove the screws from the clips.
2. Tilt the clip upwards to unhook the top of the bracket.

### 3.8.6 GEN1000-GE

Uniform horizontal airflow germination area from a perforated rear wall plenum with adjustable fan speed control is available through the controller. The unit accommodates a wide range of experiment formats while providing excellent uniformity throughout the entire chamber volume. Growth area is 5ft<sup>2</sup> per shelf (1.5m<sup>2</sup>).

**GE configuration, shelves provide 4" (10cm) to 12" (30.5cm) of growth height depending on shelf configuration.**



Figure 3-17 GE Configuration

### 3.8.7 GEN1000-ECO

Horizontal distributed across one or multiple shelves for uniform airflow ideal for plantlets to tall plants.

**ECO chamber configurations include SH, IN, TA**



Figure 3-18 ECO SH Configuration

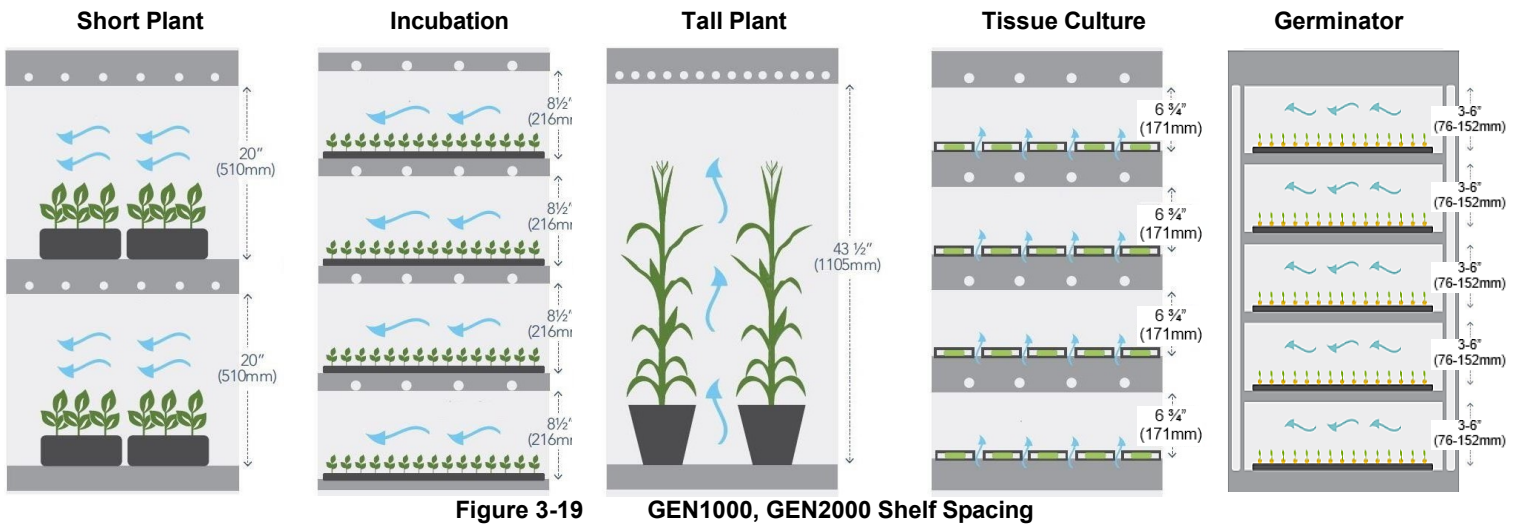


### 3.9 Installing the Light Canopies and Shelving Configuration Kits

GEN1000, GEN2000 chambers are configured onsite using one of four pre-packaged lighting and shelving kits; SH, IN, TA, or TC; GEN1000 ECO chambers shelving kits: SH, IN, TA; GEN1000 GE: 5 to 15 wire shelves.



To create equidistant growth height on each tier in the SH kit, ensure distance from shelf to underside of canopy is 20" (51cm) for two tiers and 13" (33cm) for three tiers.



### 3.10 Lamp Canopies

(Figure 3-20) Lamp Canopy Supports are two long metal brackets that are secured to pilaster strips on the sides of the chamber. The Lamp Canopy slides onto the brackets and is connected to control and power receptacles on the right side of the chamber interior. Control and power cables are color coded and equipped with unique connector plugs.

#### 3.10.1 Light Canopy Control

Up to four lighting fixtures are plugged into the four small receptacles to control those fixtures. The small plugs are mated with these receptacles and then pushed snugly together.

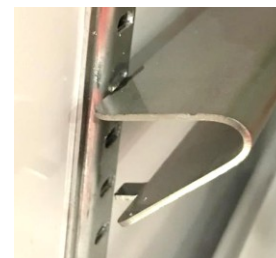
#### 3.10.2 Light Canopy Power

Four large, dedicated receptacles located above the Light Canopy Control receptables provide power to the lighting fixtures. The large plugs are mated with these receptacles and then screwed tightly together.

#### 3.10.3 To install Lamp Canopy Supports Brackets



Correct



Incorrect

**Figure 3-20 Install the Canopy Support Brackets or Adjustable Wire Shelves**



Ensure the canopy support brackets are firmly seated into the slots in the pilaster and that the canopy support is level and secure before installing the canopy.

Incorrectly installed canopy support brackets could cause the canopy to collapse.

#### 3.10.4 To install the Lamp Canopies:

1. Referring to Figure 3-19 as a general guide to shelf spacing, install the canopy support brackets (Figure 3-20) for the appropriate number of canopies and to achieve the required growth height.
  - a. Insert the angled top tab of the canopy support bracket into the pilaster at the required level.
  - b. Squeeze the bracket to align the bottom straight tab with the slot in the pilaster
2. Line up the canopy cables with the closest ports on the center wall (Figure 3-21). Repeat for the other canopy(ies).



Figure 3-21 Install the Canopies



Figure 3-22 Control Connection



Figure 3-23 Power Connection

3. Plug the yellow canopy Control Cable into the small port on the center wall (Figure 3-22).
4. Unscrew the black protective cover and plug the black canopy Power Cable Plug into the large port (Figure 3-23).

#### 3.10.5 To remove the Lamp Canopies and Shelves

Prior to installing a new configuration kit, the existing configuration kit must be removed. Retain all associated fasteners, clips, bracket, shelves, and canopies for future use.

#### 3.11 Wire Shelves

Supported by four metal clips attached to the four pilaster strips inside the chamber (Figure 3-24). Each wire shelf supports up to 40 lbs (18Kg) of distributed load. The Unifloor in the TA configuration supports up to 60 lbs (27Kg).

### 3.11.1 To install the Wire Shelves:

1. Starting at the bottom of the chamber, install the shelf clips (Figure 3-24) for the appropriate number of shelves and to achieve the required growth height.
  - a. Insert the angled top tab of the shelf-clip into the pilaster at the required level.
  - b. Squeeze the clip to align the bottom straight tab with the slot in the pilaster.



Correct



Incorrect

Figure 3-24 Install the Shelf Clips

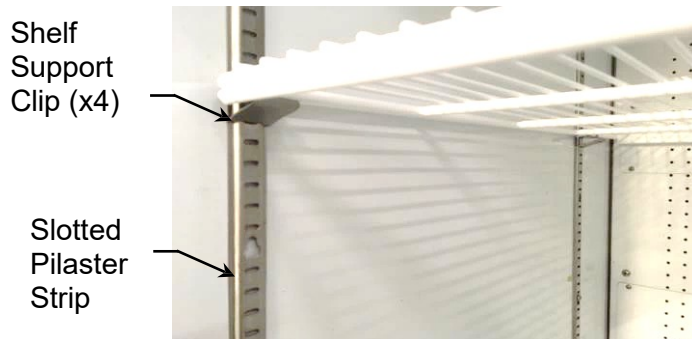


Figure 3-25 Wire Shelf Supports



Ensure the shelf clips are firmly seated into the slots in the pilaster before installing the wire shelf. Incorrectly installed shelf clips could cause the shelf to collapse.

2. Install a wire shelf on top of the wire shelf clips. Be careful not to scratch the wall painted white finish (Figure 3-25).
3. Repeat steps 1 and 2 for the remaining clips and shelves.

### 3.12 Adjustable Wire Shelves (GEN1000-GE)

The GE chamber comes with five wire shelves to be spaced evenly. An additional ten shelves may be ordered to expand the shelving area to fifteen shelves with a minimum gap between shelves of 3" (76.2mm). Optional seedling trays (Figure 3-26) may also be ordered.



Figure 3-26 Wire Shelves, Support Brackets, and Seedling Tray

### 3.13 Installing Adjustable Wire Shelves

#### 3.13.1 To install Adjustable Wire Shelves:

Starting at the bottom of the chamber, install the shelf-support brackets (Figure 3-24) for the appropriate number of shelves and to achieve the required shelf height.

1. Insert the angled top tab of the bracket into the pilaster at the required level.
2. Squeeze the bracket to align the bottom straight tab with the slot in the pilaster.
3. Install a wire shelf on top of the shelf brackets. Be careful not to scratch the painted white finish (Figure 3-27).



Figure 3-27 Shelf Installed onto Support Bracket

4. Repeat steps 1 through 3 for the remaining shelf support brackets and shelves.

### 3.13.2 To install the optional seedling tray:

Slide the seedling tray over the top of the wire shelf (Figure 3-28).



Figure 3-28 Seedling Tray

### 3.13.3 GEN1000-GE Adjustable Shelf Spacing

Shelf configurations with up to 10 shelves:

- Install the first shelf at 10" (25.4cm) below the chamber ceiling.
- Install all remaining shelves with a 4" (10.16cm) space between shelves.

Shelf configurations with between 10 and 14 shelves:

- Install the first shelf at 10" (25.4cm) below the chamber ceiling.
- Install all remaining shelves with a 3" (7.62cm) space between shelves.

Shelf configurations with 15 shelves:

- Install the first shelf at 7" (17.78cm) below the chamber ceiling.
- Install all remaining shelves with a 3" (7.62cm) space between shelves.



Optimized lighting is based on the use of the Conviron seedling tray in the GEN1000-GE chamber.

Light intensity in the chamber will vary according to the number of shelves installed in the chamber; the use of Conviron's optional trays, or trays from another manufacturer, on the installed shelves; and the type and placement of the germinating dishes used. Your results may vary from the stated light intensity values.

### 3.14 External Connections

Connect the UPS, communication, customer alarm, and condensate pump connectors to the ports on the rear of the chamber as shown in Figure 3-29 and described in Table 3-2.

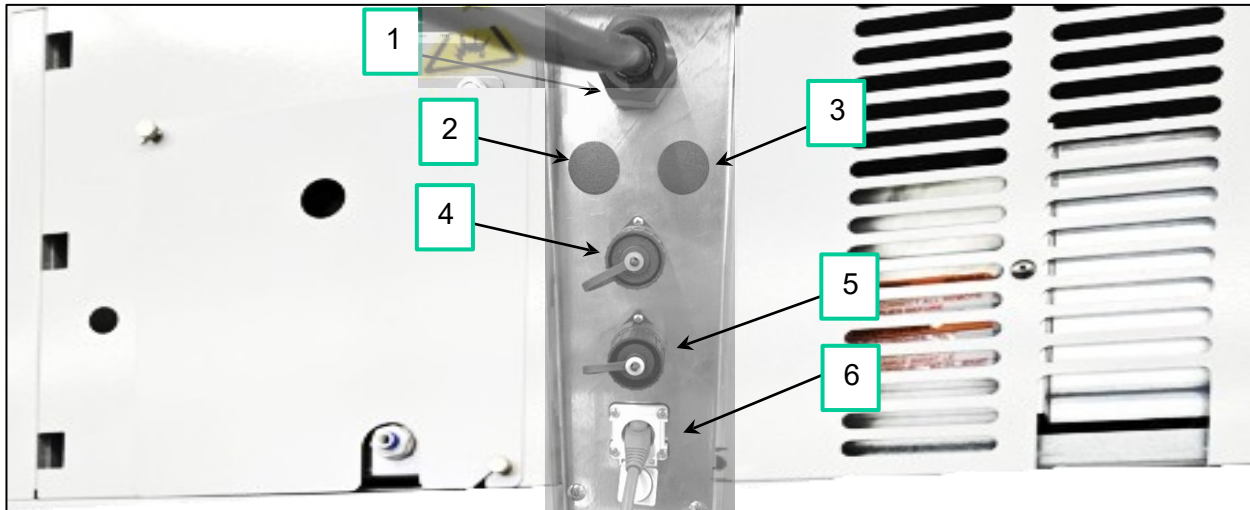


Figure 3-29 Back Panel Connections

Table 3-2 Back Panel Connection Descriptions

Item	Description	Usage
1	GEN1000 Power Cord	Plug the power cord into a receptacle on a dedicated circuit after all other connections have been made.
1	GEN2000 Electrical Mains Entrance	Connect Electrical Mains described in Section 3.15.
2	A/C Power to UPS (optional)	The UPS has two connection cables. One is power to the UPS and the other is power from the UPS to the control system. The plug and receptacle are keyed and dedicated to the UPS is not used for any other purpose.
3	Backup A/C Power from UPS (optional)	
4	Central Alarm Contact (CAC)	The receptacle is dedicated for the CAC connection. The receptacle is mated with the plug and then screwed tightly together. CAC rated for 230VAC is at 0.5 amperes.
5	Condensate Pump Connection (optional)	This receptacle is dedicated for the drain pan pump which is a purchasable option. The plug is mated with the receptacle and then screwed tightly together.
6	RJ-45 Communications Port	Connect an RJ-45 terminated cable to the facility network.



### 3.15 GEN1000 Connecting the Electrical Cord

All power and grounding connections must be made in accordance with this manual and local regulations.



A power cord plug end is not supplied with the product on 50 Hz models. The country specific cord end supplied by the client must be wired in accordance with applicable electrical codes. Hot, neutral, and ground connections must be verified by a locally qualified person.



Observe the following precautions when handling the power cord:

- Handle the power cord carefully and protect it from damage.
- Pull on the plug when unplugging the power cord. Do not pull on the cord.
- Do not handle the power cord with wet hands.
- Do not bend or modify the ground pin.

Plug the power cord into a receptacle on a dedicated circuit after all other connections have been made.

### 3.16 GEN2000 Connecting the Chamber to the Electrical Mains



The chamber must be connected to mains power by a qualified person.

All power and grounding connections must be made in accordance with this manual and local regulations.

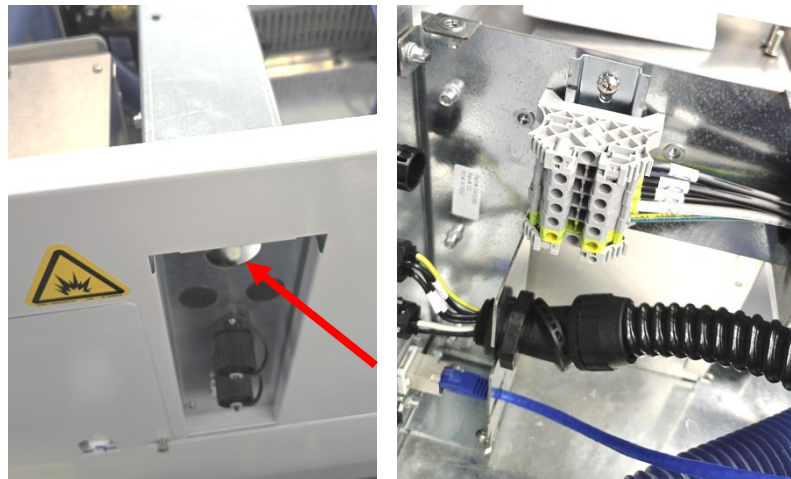


Figure 3-30 Mains Connection Blocks

#### 3.16.1 To connect chamber to the electrical mains:

1. Refer to Section 0
2. Performing Maintenance Inside the Machine Compartment to access the electrical connections.
3. Connect 3 phase, 4 wire power plus a ground to the mains connection block using the rating plate information to correctly size the wires and overcurrent protection.





## 4. START UP

Once the chamber is assembled, leveled, and all connections have been made, turn on the power to the chamber and allow to run before starting any programs. Ensure that the chamber is operating properly before introducing any research material.

### 4.1 Start Up Preparation

Chambers shipped by air freight will have a warning sign attached to the outside of the machine (Figure 4-1). The breakers on the inside of the machine compartment are also turned off. The chamber cannot be powered up without opening the machine compartment to turn the breakers on. Inside the machine compartment is a tag also indicating that the machine has been charged with nitrogen.

### **WARNING**

FOR SHIPPING PURPOSES THIS CHAMBER  
HAS BEEN CHARGED WITH NITROGEN.  
PRIOR TO START-UP CHARGE WITH R513A  
REFRIGERANT (4.5LB/2KG) AND TURN ON  
THE MAIN BREAKER.



Figure 4-1 Nitrogen Warning Label



Before powering ON, ensure the nitrogen, if so equipped, has been completely removed and replaced with the correct refrigerant. Severe equipment damage and possible injury will result from starting a chamber charged with nitrogen.



Before powering ON, ensure all mechanical, fluid, communication, and electrical connections are secure. Ensure all local, municipal, and facility inspections are complete



Before powering ON, ensure that no service or other personnel are performing work on the cabinet.



Ensure the chamber is level and stable before operating.

## 4.2 Start-Up Procedure

1. Ensure the mains breaker is ON.
2. Ensure the power cord is plugged into a receptacle on a dedicated circuit.
3. Once power is connected, do not run programs or turn on the compressor, allowing the crank case heater to sit for a minimum of 12 hours.
4. Ensure that all drain, water, and CO<sub>2</sub> lines are connected.
5. For a water-cooled condensing unit, open the manual bypass valve for constant flow supply, close the bypass valve for variable flow supply, or adjust the bypass valve as required during water system balancing.
6. Turn the power switch on the front of chamber to ON.



Do not turn the control system off during boot up.

7. With the control system powered up, set and run a program. Refer to the supplied control system manual for further details.



In case of low-pressure refrigeration alarm on initial start-up, stop the program and acknowledge the alarm. Restart the program after 60 seconds until no alarm is generated.

## 4.3 Visual Checks

1. Confirm that all lights function when turned on and that the doors are light tight.
2. Inspect the doors with interior lights on, in a darkened room.



Operate your Conviron equipment for a few days before introducing any plant material. This acquaints you with the equipment's operation and ensures the equipment meets the requirements for your experiments.

## 5. OPERATION

The following description and instructions provide an overview of basic operation of the chamber. Refer to the *CMP6060 Control System Manual* for a complete description and operating instructions of the controller.

### 5.1 Control and Monitoring

The GEN1000 comes equipped with Convicon's CMP6060 controller, which includes powerful programming and reporting capabilities through a full-color, high resolution touchscreen with an intuitive graphic interface. Users can create custom programs for key parameters such as temperature, lighting and humidity and receive audible, visual and e-mail notifications of alarms. Options include connection to your local area network (LAN) and connectivity to a central PC or mobile device with Convicon Central Management™. CMPLink allows integration with an Argus Control System. ConviconDirect can be activated remotely and access and manage chamber setpoints and actual conditions remotely.

Refer to the *CMP6060 Control System Manual* for a complete description and operating instructions.

### 5.2 LED and Fluorescent Lighting

The standard lighting systems for the GEN1000 use high efficiency 12W T5 LED lamps configured to suit the intensity required for each application and kit. Lamp and ballast combinations have been designed to ensure uniform light distribution. Standard lighting in the TA and SH kits can be adjusted in levels; for all kits, options for dimming through the controller are available.

All lighting control outputs are logged to determine how long the lights have been on. Operators can set a "warning" message to pop up at the controller as a reminder.

Refer to the lamp manufacturer's specifications for more detailed information.



Warning: Optical radiation hazard

The lighting system in this product produces potentially dangerous ultraviolet and infrared radiation in close proximity.

Exposed body parts should be covered within 8" or 200mm of the lighting. Always wear protective clothing such as gloves and long sleeve shirts when working within the chamber.

Always wear protective glasses when working within the chamber. Glasses should be CSA Z94.3-07 or ANSI Z87.1-2010 compliant, such as with Steele THT416AFG or equivalent and block 99.9% of UVA/UVB/UVC rays.

Do not look directly at the lights even while wearing protective glasses.



Warning: Burn hazard

Potential injury could result from contact with the hot light canopies or lamps.

The lamp ends near the sockets produce enough heat to cause skin burns.

Do not touch the lamps while in operation. Allow the lamps to cool before changing burnt out tubes.

### 5.3 Lighting and Options

The chamber can be equipped with several different lighting configurations. Programmable ranges depend on the light type selection and choice of dimming or levels control.

#### 5.3.1 LED Lighting

LED lighting offers significant advantages over the fluorescent lighting packages, including:

- Decreased wattage consumption, which yields significant energy savings.
- Reduced overall maintenance costs due to the longer life of LEDs.
- Reduced heat production during operation, which reduces demand on the cooling system and allows the light to be closer to the plants.
- Reduced sensitivity to temperature variations.



LED tubes are not compatible with fluorescent canopies. Conversely, fluorescent lamps are not compatible with LED canopies.



Contact Conviron for LED tube replacement.

#### 5.3.2 Fluorescent Lighting TC Option

The fluorescent lamps option provides a balanced spectrum for plant growth. The lighting is programmable in steps, dimmable from 10% to 100% of maximum output. If required, the fluorescent tubes are individually replaceable.

#### 5.3.3 Closed Loop Dimmable Lighting System

Lamp canopies incorporate dimmable ballasts. Automatic adjustment of the light intensity can be set within the programmed range for as low as 10% for LED and 10% for fluorescent.

Prior to operating dimmable fluorescent lamps, run the lamps at full intensity for a period of 100 hours to burn off impurities on the filament ends of the lamps left during the manufacturing process.



Failure to burn in the fluorescent lamps before dimming will significantly reduce the life of the tubes.

### 5.4 Germination Material Placement

Depending on the shelving configuration, a wide variety of germination options are available. Optional white polymeric trays are also available.

The shelves can be installed in any position within the chamber, depending on the experiment requirements. Refer to Section 3.11 To install the Wire Shelves: for shelf installation instructions.

Continuous airflow is critical to the efficient operation of the chamber. Fresh air may be introduced using the fresh air port located on the side of the chamber. Refer to Section 5.7 Fresh Air Inlet and Exhaust Ports, for port adjustment details.

Conditioned air is drawn down from the refrigeration coil and enters the interior of the chamber through a rigid metal plenum in the rear wall of the chamber.

### 5.5 Aspirator

Located in the growth area, the aspirator houses the sensors used to monitor temperature and humidity levels within the chamber. The aspirator receives an air sample from the room to measure and control conditions and provides shielding from the chamber lighting to prevent false readings caused by radiant energy.



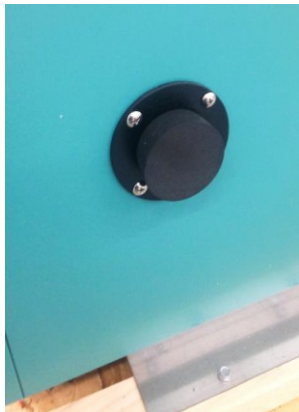
Figure 5-1 Aspirator

### 5.6 Instrumentation Port

The instrumentation port with a threaded closure is located on the lower-right side of the chamber (Figure 5-2). The port enables instrument probes, and small hoses, etc. to be passed through the wall of the cabinet for connection to equipment within the cabinet growth environment.



The instrumentation port is intended for low-voltage wires only. Do not use extension cords inside the chamber.



Exterior View



Interior View

Figure 5-2 Instrumentation Port Location

## 5.7 Fresh Air Inlet and Exhaust Ports

The fresh air inlet allows the operator to manually adjust the rate at which fresh air is introduced into the chamber. The adjustment knob is located on the lower-left side of the chamber and can be adjusted from fully closed (no fresh air) to fully open to allow up to 20 ft<sup>3</sup>/min (0.57m<sup>3</sup>/min) of air exchange.

The fresh air inlet assembly contains a foam filter to help prevent light, dust, and larger particulate matter from entering the growth area. This filter should be cleaned monthly to prevent a build-up of foreign material that could restrict airflow.

Fresh air is drawn into the bottom of the chamber through the inlet port by the chamber's variable speed fan located in the ceiling compartment, and then the chamber air is exhausted through the top exhaust port (Figure 5-3).



Figure 5-3 Fresh Air Inlet and Exhaust Port Location

## 5.8 Fan Speed Control

Fan speed is user-adjustable between the preset minimum and the maximum allowable fan rpm.

### 5.8.1 To adjust the fan speed:

Refer to the supplied control system manual for a complete description and operating instructions.

## 5.9 Additive Carbon Dioxide Control – CO<sub>2</sub> (Optional)

The Carbon Dioxide control option provides additive control of CO<sub>2</sub>. It includes a sensor connected to the control system and a solenoid-controlled injection system to elevate CO<sub>2</sub> levels in the chamber.

The level of CO<sub>2</sub> in the chamber is displayed in parts per million (ppm) on the control screen and is programmed the same way as temperature and humidity. CO<sub>2</sub> is monitored continuously as long as the control system is active.

### 5.9.1 Set up the Additive CO<sub>2</sub> Control

CO<sub>2</sub> control requires a high-pressure and a low-pressure regulator. In most chambers, the low-pressure regulator and the solenoid assembly are located in the machine compartment and are factory set at 2 pounds per square inch (psi).



Do not adjust this setting.

The high-pressure regulator is located on the customer-supplied CO<sub>2</sub> line. This regulator comes in two styles of flow meters, a dial gauge or a glass tube and ball style. In North America, Conviron can provide the high-pressure regulator as an option. Outside North America, the customer supplies the high-pressure regulator due to different thread sizes on the CO<sub>2</sub> line.



Do not adjust the regulator on the CO<sub>2</sub> tank once it has been set up.

Close the main valve on the CO<sub>2</sub> tank when it's not in use.

The optional CO<sub>2</sub> connection is located on the left side of the rear of the chamber, above the USH water connection (Figure 5-4).

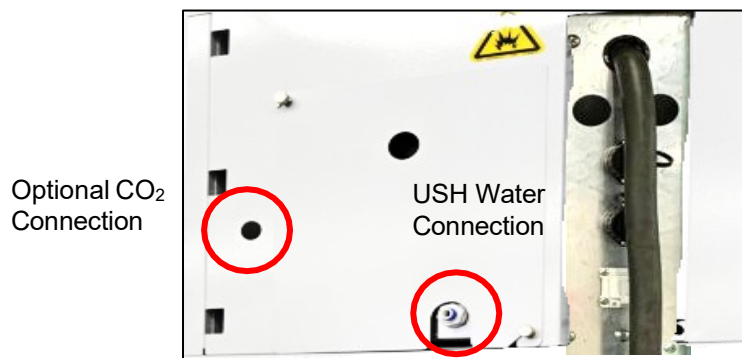


Figure 5-4 Optional CO<sub>2</sub> Connection Location

## 5.10 Adjusting the CO<sub>2</sub> Control

There are two variables to consider: programming desired CO<sub>2</sub> concentration, and control of air flow through the chamber.

Programming the CO<sub>2</sub> setpoint is as easy as programming temperature or relative humidity. Values are entered in parts per million in the CO<sub>2</sub> zone on the Main Status Program Screen of the control system. The Vaisala™ CO<sub>2</sub> monitor operates in two ranges: up to 2000 ppm, and up to 3000 ppm. Refer to the *CMP6060 Control System Manual* for more information.



Customized ranges are available upon written request. Contact Conviron for more information.

Ambient CO<sub>2</sub> levels are usually at least 350 ppm and can be higher, depending on proximity to other CO<sub>2</sub> sources such as human beings or automobiles. The CO<sub>2</sub> concentration in the chamber can never be less than the ambient concentration because CO<sub>2</sub> control is additive only.

Closing fresh air into and exhausting air out of the chamber is important to achieving desired CO<sub>2</sub> concentrations. Failure to consider this will lead to undesired results.

### 5.10.1 To adjust the CO<sub>2</sub> control:

Refer to the supplied control system manual for a complete description and operating instructions.

## 5.11 Central Management System – CMS Option

Refer to the supplied central management manual for a complete description and operating instructions.

## 5.12 Shutdown

If less than 14 days will pass before the next experiment starts, it is best to keep it running, with the temperature at or near ambient and with only the fans running.

If experiments will not be run for a period of longer than 14 days, to minimize unnecessary electricity consumption, ensure all plants and soil are removed from the growth area, and clean the unit as described in 6.2Cleaning the Chamber. Open the fresh air inlet and exhaust ports and leave the chamber and observation doors slightly open to reduce moisture buildup.



## 6. CLEANING AND MAINTENANCE

The GEN1000 chamber requires regular maintenance in order to continue performing to specifications.



Warning: Read and understand the product manuals before moving, installing, operating, or servicing this equipment.

Failure to follow these instructions could result in equipment damage, serious personal injury, or death.

The manual contains safety information that must be understood and followed before working with the product.



Warning: Electrical shock hazard during maintenance or service.

Serious personal injury or death could result from contacting live electrical circuits.

Turn the power to the chamber OFF at the mains panel before performing maintenance or service on this chamber.



Warning: Rotating blade hazard

Opening the access panel results in exposure to rotating fan blades. Serious personal injury could result from contact with the rotating fan blades.

Remove power from the chamber before servicing. Do not perform maintenance within the machine compartment with the power connected. The condenser fans on air-cooled units have exposed fan blades which are a hazard when the top cover of the machine compartment is open, and power is connected.



Only qualified trades or facility personnel, who have read and completely understand these instructions, should perform the required installation work following acceptable safety standards.

Contact the responsible party, or Conviron, immediately if in doubt about safe operation and/or maintenance of the equipment.



Warning: Potential hand injury

The machine compartment, which is not user accessible, may include a fan without a guard. Contact with the sharp edges of the fan could result in lacerations.

Do not contact the sharp edges of the fan compartment.



Warning: Burn hazard

Personal injury could result from contacting hot surfaces within the chamber. The refrigeration system components and heater element become hot during normal operation.

Allow the hot refrigeration components and heater elements to cool to the touch before service.



Warning: Potential user injury after service

Personal injury to the users could result from not replacing the access panels after service.

Ensure the access panels are replaced and secure before operating the chamber after service.

## 6.1 Disconnecting the Mains Power

Before cleaning, maintaining, or servicing the chamber, disconnect it from power.

### 6.1.1 GEN1000

1. Turn the chamber power off by moving the toggle switch on the front panel to the OFF position, as indicated by the **O** symbol.
2. Press and hold the UPS button until the power shuts off. Verify that all three LED indicators are off.
3. Turn off and lock the building disconnect switch provided during the installation.
4. Remove the load plug from the UPS.
5. Verify the power is off between contacts **L1A** and **NA** after opening a service access panel as an additional precaution.

### 6.1.2 GEN2000

1. Turn off AC power to the chamber at the mains.
2. Lockout/tag out the building disconnect switch provided during the installation.



24 VDC from the UPS optional battery backup will still be present with the mains disconnected.

### 6.1.3 Disconnecting the Optional UPS Backup Power

1. Turn off AC power to the chamber at the mains – refer to Section 6.1.
2. Remove the machine compartment access panel – refer to Section 6.4.1.
3. Remove the jumper between the two backup batteries (Figure 6-1).

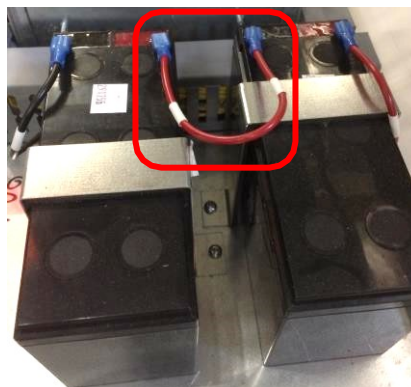


Figure 6-1 Disconnecting UPS Battery Backup Power



Warning: - Chemical burns – potential explosion hazard during battery jumper removal/connecting. Ensure the batteries are not short circuited while working on or near them during removal and re-installation of the jumper cable. Severe personal injury and equipment damage could result from a short circuited, exploding battery.

## 6.2 Cleaning the Chamber

Disconnect power at the mains and at the UPS battery backup. Refer to Section 6.1 Disconnecting the Mains Power.

For regular cleaning, dampen a clean towel or rag outside the unit, and carefully wipe the unit down. Do not use abrasive cleaners. Mild detergent solutions are suitable for most cleaning requirements.

Use glass cleaner on both the interior and the exterior of the glass viewport window, if present.

## 6.3 Replacing LED or Fluorescent Lamps

Inspect lamps daily to ensure all lamps are functioning properly and replace poorly lit or flickering lamps to ensure unit performance. The frequency of changes is determined by application.



Warning: Burn hazard

Do not touch the ends of the lamp tubes. Fluorescent lamps operate at high temperatures and present a burn hazard.



The LED bulbs and the fluorescent bulbs are physically similar with the same sockets. Read the lamp identification label on the canopy and ensure the correct replacement lamp type is being installed. Mixing of LED and fluorescent lamps in a fixture which is designed for LED only or fluorescent only will result in reduced light output and may result in damage to the lamps and/or lamp canopy.

### 6.3.1 To replace an LED tube:

1. Identify the tube(s) to be replaced.
2. Turn the power to the chamber OFF. Refer to Section 6.1 Disconnecting the Mains Power for instructions to turn off the power.
3. Unlock the tube by rotating it one quarter turn, and then carefully remove it from its receptacle.
4. Install the new tube. Orient the positive end of the tube as described on the label on the canopy (Figure 6-1).

### 6.3.2 To replace a fluorescent tube:

1. Identify the tube(s) to be replaced.
5. Turn the power to chamber OFF. Refer to Section 6.1 Disconnecting the Mains Power for instructions to turn off the power.
2. Unlock the tube by rotating it one quarter turn and then carefully remove it from its receptacle.
3. Install the new tube by inserting it fully into the correctly oriented lamp holders.
4. Secure the tube in place by rotating it one quarter turn.
5. Dispose of used tube(s) following local requirements or contact the local authorities for proper disposal procedures.



Figure 6-1 LED Tube Orientation



Polarized LED tubes will not light up if installed incorrectly.

## 6.4 Performing Maintenance Inside the Machine Compartment

The machine compartment is located on top of the chamber and should only be accessed by qualified service technicians.

### 6.4.1 To remove the machine compartment access panel:

6. Turn the power to the chamber OFF. Refer to Section 6.1 Disconnecting the Mains Power for instructions to turn off the power.
1. Use a ladder to access to the top of the chamber. Do not stand on the chamber.
2. Remove the screws from the perimeter of the top compartment cover (**Error! Reference source not found.**).



Take care when removing and re-installing the top cover screws to avoid stripping the screw threads. Do not use a high torque setting on an electric driver.

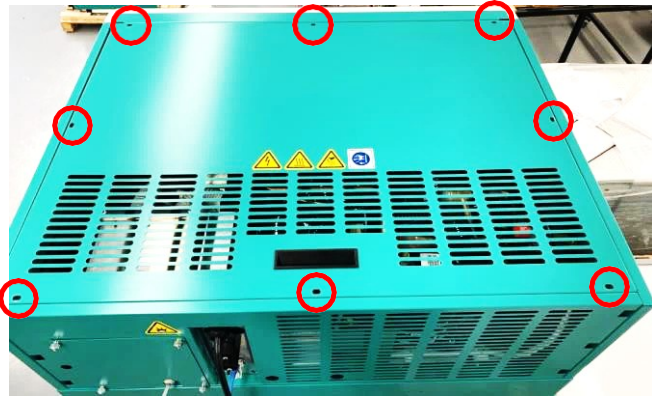


Figure 6-2 Remove the Screws from the Top Cover

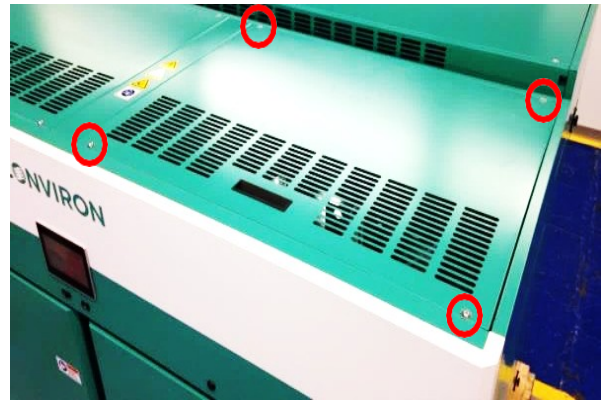


Figure 6-3 Machine Compartment Access Panel Screws

3. Lift the front edge of the cover, using the handle provided.
4. Slide the cover off and carefully lower the cover down to the floor.
5. Perform the required maintenance.
6. Reposition the machine compartment cover.



Re-install the top cover with the handle facing the front of the chamber to position the ventilation grill over the controller assemble in the machine compartment.

7. Re-install the cover screws to secure the cover to the chamber.

## 6.5 Maintaining the Ultrasonic Humidity System (USH)

Clean the USH box every month and replace the ceramic discs every six months to maintain optimal performance. When not in use, the USH box (located inside the machine compartment), must be drained and cleaned. Close the water supply valve while not in use.

Set a moderate RH value in all programs to keep the USH feature operable without significantly affecting the experiment.

### 6.5.1 GEN2000

The GEN2000 chamber has two USH tanks, mounted on the upper-right and upper-left of the machine compartment (Figure 6-3).



Figure 6-3 GEN2000 USH Tank Access Panels

### 6.5.2 To remove and clean the USH box:

1. Shut off the water supply valve to the chamber and disconnect the water line from the USH box (Figure 6-4, Detail A).
2. Remove the USH access panel at the back of the chamber by removing the thumb screws (Figure 6-4, Detail B).
3. Gently pull the USH tank out of the back of the chamber, being careful not to tip the box (Figure 6-4, Detail C and D).

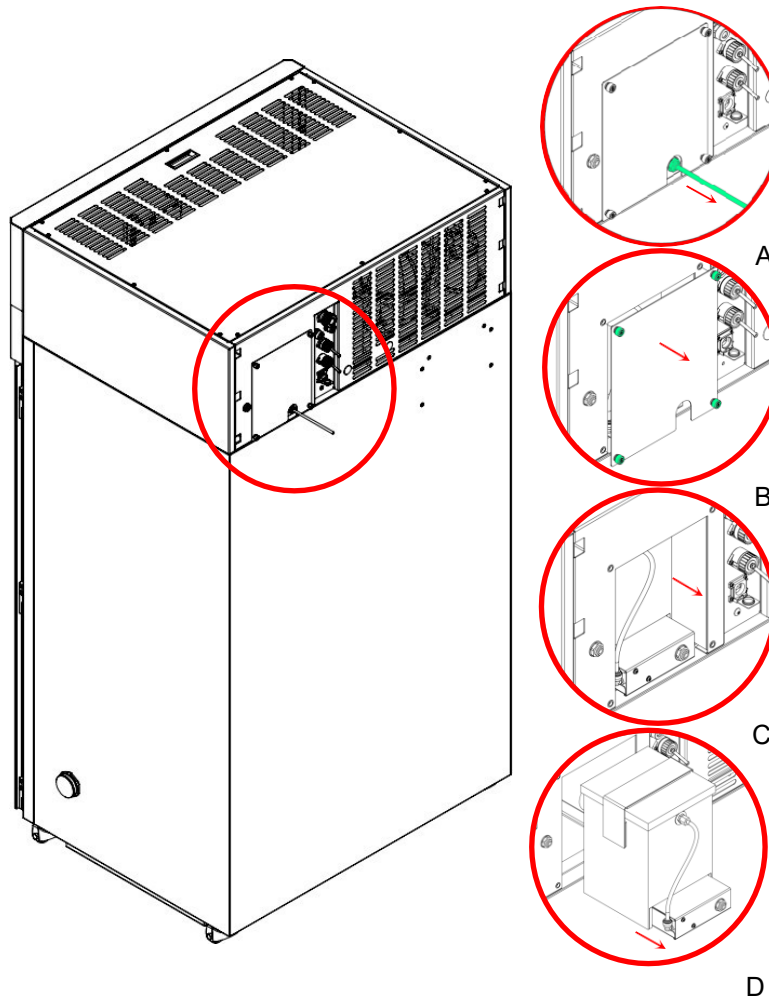


Figure 6-4 Remove the USH Box from the Chamber

4. Detach the hook and loop side straps and remove the USH box lid (Figure 6-5).

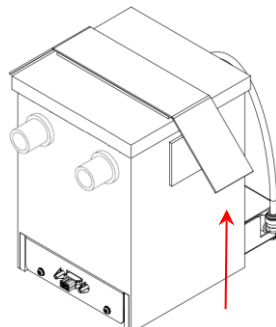


Figure 6-5 Remove the USH Box Lid



5. Pour the water out of the box and wipe the interior surfaces of the USH box with a damp cloth to remove biological residue and particulate matter.
6. Ensure there is no water residue on the ceramic discs.



Pay particular attention to the surface of the ceramic discs, which must be free of deposits in order to function properly. Stubborn buildup may be removed with a cleaner capable of removing mineral deposits, such as a dilute vinegar solution.

7. Dry the interior surfaces.

### 6.5.3 To replace the ceramic discs:

1. Contact Conviron to order the USH disc replacement kit (PN 236411).
2. Place USH puck key into the corresponding slots of the disc ring (Figure 6-6) and turn the puck key counterclockwise to unscrew the disc ring.
3. Remove the disc ring, ceramic disc, and silicone seal.
4. Install the silicone seal ring followed by the new ceramic disc and screw the disc ring back into place.

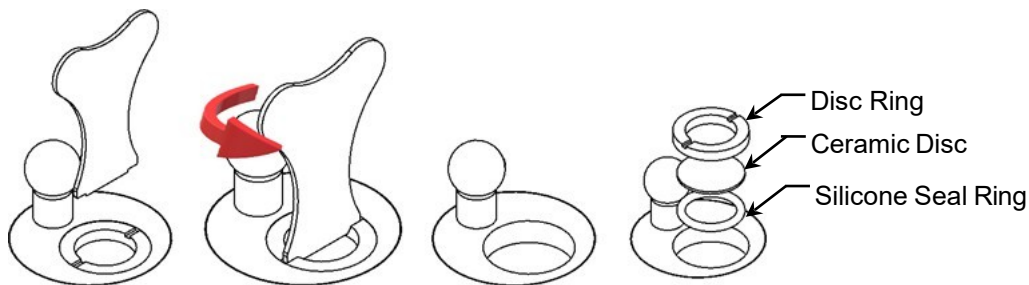


Figure 6-6 Ceramic Disc Replacement



The ceramic disc is very fragile; handle it with care during installation.

5. Replace the USH box lid and secure it in place with the hook and loop side straps. This is very important to prevent water from splashing over electrical components.
6. Replace the USH box in the chamber by reversing the removal steps above.

## 6.6 Calibrating the Temperature and Humidity Sensor

Calibrate the temperature and humidity sensors yearly. Contact Conviron Service for more information.

## 6.7 Adjusting the Door



Operation of the door, at the hinge point, presents a crush hazard.

The door may be removed from the chamber if absolutely necessary. Contact Conviron for door removal instructions.

## 6.8 Cleaning the Condensate Pump and Condensate Pan



Warning: Electrical shock hazard during maintenance or service. Serious personal injury or death could result from contacting live electrical circuits. Disconnect power to the pump at the rear of the chamber before performing maintenance or service.

Clean the optional condensate pump and condensate pan regularly.

### 6.8.1 To clean the condensate pump and pan:

1. Remove the condensate pump power plug from the receptacle at the rear of the chamber.

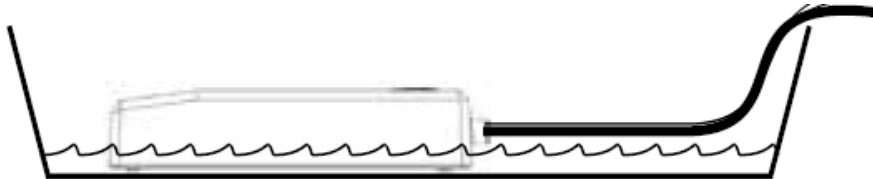


Figure 6-7 Condensate Pump Connection

2. Slide the condensate pump and pan out from under the front of the chamber.
3. Clean the pan and pump with a diluted vinegar solution.
4. Reinsert the pump into the pan and slide them back under the chamber.
5. Plug the pump back into the receptacle on the rear of the chamber.



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### 6.8.2 GEN2000 Cleaning the Condensate Pump and Condensate Pan in TA Configuration

The chamber drain is accessed through the removable floor plate located between the center walls in a TA configuration.



Figure 6-7 Removeable Floor Plate

### 6.9 Cleaning the Fresh Air Inlet Filter

During regular operation the fresh air inlet filter should be inspected once per month and cleaned as required.

## 7. TROUBLESHOOTING



Conviron Technical Support is available to all users at no charge, to either assist with troubleshooting or to order parts, for the life of the equipment.

Have the serial number, located on the rating plate on the left-hand side of the chamber, available when requesting service.

Although service may be close by, troubleshooting steps can significantly reduce the time to diagnose and correct a fault. Make careful notes of the fault symptoms and the chamber and ambient conditions. This could help determine the cause of the problem.

### 7.1 Troubleshooting the Chamber

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#### 7.1.1 Chamber won't start

---

1. Confirm that the mains breaker for the chamber is ON.
2. Ensure the program is set and running in the controller and the start/stop switch is ON.
3. Check the temperature limit settings and ensure they are outside the program range.
4. Still won't start: Contact Conviron.

#### 7.1.2 Chamber won't cool

---

1. Confirm that the ambient temperature is below 35°C.
2. Ensure that the door is firmly closed.
3. Ensure that the fresh air and exhaust ports are closed.
4. Ensure that the temperature sensor is in the correct position.
5. Still won't cool: Contact Conviron.

#### 7.1.3 Chamber won't heat

---

1. Confirm that the ambient temperature is above 20°C.
2. Ensure that the door is firmly closed.
3. Ensure that the fresh air and exhaust ports are closed.
4. Ensure that the temperature sensor is in the correct position.
5. Still won't cool: Contact Conviron.

#### 7.1.4 Chamber won't make humidity

---

1. Confirm that water is supplied to the rear of the chamber.
2. Ensure that the door is firmly closed.
3. Ensure that the fresh air and exhaust ports are closed.
4. Still won't start: Contact Conviron.

#### 7.1.5 Chamber lamp won't light up after replacement

---

Possible defective ballast: Contact Conviron

## 7.1.6 Optional UPS doesn't work

1. Refer to Section 6.1 Disconnecting the Mains Power to turn off the power to the chamber.
2. Refer to Section 6.4 Performing Maintenance Inside the Machine Compartment to remove the machine compartment top.
3. Locate the UPS controller on the far left-hand side of the machine compartment (Figure 7-1) and check the BATT.FAIL indicator (Figure 7-2).

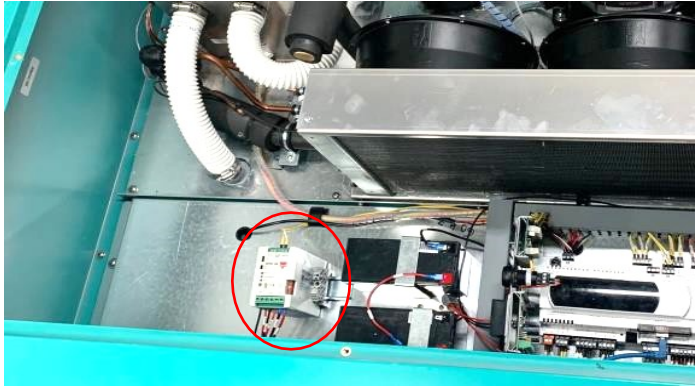


Figure 7-1 UPS Controller Location



Figure 7-2 BATT.FAIL Indicator

4. If the LED is red, contact service or Convicon.

## 7.2 GEN1000 Fuse Schedule

Fuse	Description	Convicon P/N	Location	System/Component Protected
F1	FUSE - 2.5A, 250V, MDL, TIME DELAY	233327	Main Control Panel	PLC Controller
F2	FUSE - 0.75A, 250V, ABC, FAST ACTING	79815	Main Control Panel	Central Alarm
F3	FUSE - 2.5A, 250V, MDL, TIME DELAY	233327	Main Control Panel	USH Unit
F4	FUSE - 1A, 250V, ABC, FAST ACTING	742296	Main Control Panel	Condensate Pump
F5	FUSE - 2.5A, 250V, MDL, TIME DELAY	233327	Transformer Mtg Plate (50Hz UPS option only)	UPS Transformer
F6	FUSE - 4A, 250V, MDL, TIME DELAY	291767	Transformer Mtg Plate (50Hz chamber only)	Lighting Transformer

## 7.3 GEN2000 Fuse Schedule

Fuse	Description	Convicon P/N	Location	System/Component Protected
F1	FUSE - 2.5A, 250V, MDL, TIME DELAY	233327	Main Control Panel	PLC Controller
F2	FUSE - 0.75A, 250V, ABC, FAST ACTING	79815	Main Control Panel	Central Alarm
F3	FUSE - 6A, 250V, MDL, TIME DELAY	264496	Main Control Panel	USH Units
F4	FUSE - 1A, 250V, AGC, FAST ACTING	742296	Main Control Panel	Condensate Pumps
F5	FUSE - 3A, 250V, AGC-3, FAST ACTING	2742297	Main Control Panel	Damper Actuator

## 8. TECHNICAL SPECIFICATIONS

Conviron maintains a policy of continual improvement and reserves the right to change the technical characteristics of the model without prior notice.

### 8.1 GEN1000

Specifications	Short Plant (SH)	Tissue Culture (TC)	Tall Plant (TA)	Incubator (IN)
Chamber Crated Weight (lbs / kg)	700 / 318			
<b>Exterior Dimensions</b>				
Height (in. / mm)	77 / 1956			
Width (in. / mm)	41 / 1040			
Depth (in. / mm)	32.5 / 825			
<b>Interior Dimensions</b>				
Height (in. / mm)	52.5 / 1330			
Width (in. / mm)	37.5 / 953			
Depth (in. / mm)	24.3 / 617			
Volume (ft <sup>3</sup> / L)	27.6 / 78			
<b>Power Requirements</b>				
The chamber will tolerate $\pm 10\%$ voltage fluctuation from the rated voltage on the serial plate. Use a voltage stabilizer if the fluctuation is greater than $\pm 10\%$ .				
60 Hz	120Vac, 1Ph, N, PE, 60Hz, 20A, NEMA 5-20 plug			
60 Hz dehumidification	120Vac, 1Ph, N, PE, 60Hz, 30A			
50 Hz	230Vac, 1Ph, N, PE, 50Hz, 16A			
Customer Alarm Contact	230Vac, 0.5A maximum			

<b>Environmental Requirements</b>	
Temperature	95°F (35°C) maximum
Humidity	Up to 55% RH, non-condensing

## 8.2 GEN2000

Specifications	Short Plant (SH)	Tissue Culture (TC)	Tall Plant (TA)	Incubator (IN)
Chamber Crated Weight (lbs / kg)	~1100 / 499			
<b>Exterior Dimensions</b>				
Height (in. / mm)	77 / 1956			
Width (in. / mm)	84 / 2135			
Depth (in. / mm)	32.5 / 825			
<b>Interior Dimensions</b>				
Height (in. / mm)	52.5 / 1330			
Width (in. / mm)	80.5 / 2045			
Depth (in. / mm)	24.25 / 620			
Volume (ft <sup>3</sup> / L)	55.2 / 1562			
<b>Power Requirements</b>				
The chamber will tolerate $\pm 10\%$ voltage fluctuation from the rated voltage on the serial plate. Use a voltage stabilizer if the fluctuation is greater than $\pm 10\%$ .				
60 Hz	120/208Vac, 3Ph, N, PE, 60Hz, 20A			
50 Hz	230/400Vac, 3Ph, N, PE, 50Hz, 16A			
Customer Alarm Contact	230Vac, 0.5A			

<b>Environmental Requirements</b>	
Temperature	68°F (20°C), 95°F (35°C) maximum
Humidity	Up to 55% RH, non-condensing

Figure 8-1 shows an example of the GEN1000 chamber rating plates, located on the rear of the chamber. Please have the Serial Number available when requesting service.

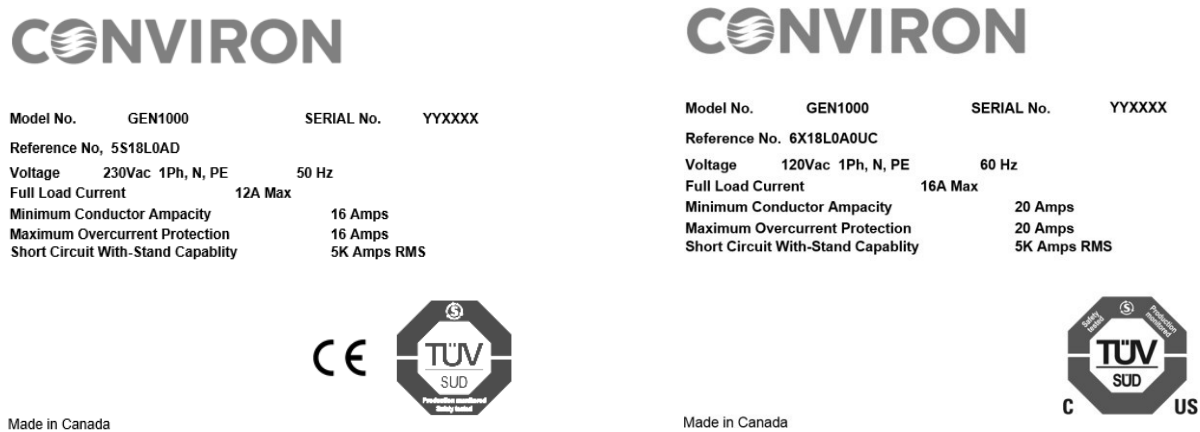


Figure 8-1 Sample GEN1000 Rating Plates

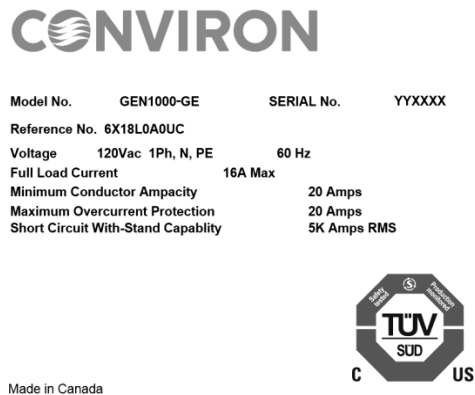


Figure 8-2 Sample GEN1000-GE Rating Plate



230/400Vac 50Hz Version

120/208Vac 60Hz Version

Figure 8-3 Sample GEN2000 Rating Plates

## 9. ADDITIONAL INFORMATION

### 9.1 Terms & Definitions

Table 9-1 lists the terms and their definitions used throughout this manual.

**Table 9-1 Terms and Definitions**

<b>Term</b>	<b>Definition</b>
%RH	Humidity level expressed as a percentage of the maximum relative humidity level
Φ	Greek letter Phi – SI prefix for electrical phase
μ	Greek letter Mu – SI prefix for micro
°C	Celsius degrees
A	Amperes
AC	Air-cooled Condenser unit
AR	Arabidopsis
BTU/hr	British Thermal Unit per hour
CFC	Chlorofluorocarbon
CM	Central Management System
COMM	Connection to LAN
EMI	Electro Magnetic Interference filter
ESD	Electrostatic Discharge
EU	European Union
Gph	Gallons per hour
GR	Ground
Hz	Hertz
ID	Inside Diameter
L/hr	Liter per hour
Lpm	Liter per minute
micromole/m <sup>2</sup> /s	Light intensity
mm	Millimeter
OD	Outside Diameter
PE	Protective Earth – mandatory ground connection
PG	Plant growth, for use with tall plants



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<b>Term</b>	<b>Definition</b>
ppm	Parts per million - used a unit of measurement for CO <sub>2</sub> concentration
psi	Pounds per square inch
PVC	Poly Vinyl Chloride
RoHS	Restriction of Hazardous Substances Directive
TC	Tissue Culture
UPS	Uninterruptable Power Supply
USH	Ultra Sonic Humidifier
V	Volts
WC	Water Cooled condenser unit
WEEE	Waste Electrical and Electronic Equipment

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## **9.2 Product Updates**

Product lifecycle is a key development consideration at Conviron, whereby products are developed using high quality materials and component parts. Consequently, Conviron has developed a reputation for product longevity where products in excess of 30 years old remain fully active. Efforts taken to extend the life of the product include developing retrofit systems to replace old, inefficient, and aging components, and working with clients to upgrade components rather than decommissioning the equipment. Conviron also provides customized Preventative Maintenance services to extend the useful life of your chambers and rooms. Contact Conviron for more information.



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