



# GEN2000

## OPERATOR MANUAL

293430-ENG R01

# GEN2000

## OPERATOR MANUAL

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

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## PREFACE

Welcome to the GEN2000 Operator Manual. This manual describes the features and use of Conviron's GEN2000 chamber and is written in a straightforward and minimally technical style.

This manual is designed to provide sufficient detail for the different kit configurations, including a structured format that provides 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.

### 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.

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## WEEE Compliance

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.

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## 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.

**Head Office**  
Technical Services  
Conviron  
590 Berry St.  
Winnipeg, Manitoba,  
Canada R3H 0R9

Conviron Technical Services

Please visit [www.conviron.com](http://www.conviron.com) for global service contact information.

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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.

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

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

### 1.1.1 General Precautions

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

	<p>Warning: Read and understand the product manuals before moving, installing, operating, or servicing this equipment.</p> <p>Failure to follow these instructions could result in equipment damage, serious personal injury, or death.</p> <p>The manual contains safety information that must be understood and followed before working with the product.</p>
	<p>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.</p> <p>Operate your Conviron equipment for a minimum of five days before introducing any research material to ensure proper and stable operation.</p> <p>Avoid direct contact with any broken fluorescent lamps. Fluorescent lamps are extremely fragile and may emit harmful vapors when broken.</p> <p>Follow all applicable local environmental regulations and guidelines for disposal of hazardous material. If in doubt, contact local authorities for proper disposal procedures.</p>
	<p>Warning: Electricity hazard</p> <p>Serious personal injury or death could result from contact with live electrical circuits.</p> <p>Tool accessible areas are for qualified service people only.</p> <p>Disconnect power before accessing.</p>

	<p><b>Warning: Hot surface hazards</b></p> <p>Personal injury could result from contacting hot surfaces within the chamber.</p> <p>The user accessible fluorescent lamps, the inaccessible refrigeration system components, and the inaccessible heater element become hot during normal operation. Do not touch.</p>
	<p><b>Warning: Slip and fall hazard</b></p> <p>Personal injury could result.</p> <p>Clean up any spilled or accumulated water immediate. Contact maintenance personnel if the problem recurs.</p>
	<p><b>Warning: Optical radiation hazard</b></p> <p>Personal injury could result from unprotected exposure. The lighting system in this product produces potentially dangerous ultraviolet and infrared radiation in close proximity.</p> <p>Always wear protective clothing such as gloves and long sleeve shirts when working within the chamber.</p> <p>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.</p>
	<p><b>Warning: Electrical shock hazard</b></p> <p>Serious personal injury or equipment damage could result from contacting live electrical circuits.</p> <p>An arc flash risk assessment should be performed to determine the voltage, shock boundaries and PPE requirements to protect workers from electrical hazards.</p>
	<p><b>Water splash hazard</b></p> <p>Splashed water in contact with live electrical components could result in serious personal injury or serious equipment damage.</p> <p>Do not allow water or liquids to contact any electrical components.</p> <p>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.</p>



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## 2 CHAMBER FEATURES

The 55.2 ft<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.

### 2.1 Chamber Configurations

The base GEN2000 chamber can be fitted with any of the following specially configured LED kits. Each kit is also available with an fluorescent lighting option;

- The Short Plant (SH) kit is a two-tier configuration using 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 Tall Plant (TA) kit is a single-tier configuration providing 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 using low light to maximize space. It also provides upward airflow minimizing condensation in petri dishes and jars used in propagation and genetics experiments.
- The Incubator (IN) kit is a four-tier configuration using low light levels optimizing the incubation of plantlets and insects.

### 2.2 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's 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 Conviron's Central Management™.

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

### 2.3 Ventilation

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

### 2.4 Instrumentation Ports

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.

## 2.5 Levelers

The unit is supplied with leveling feet to stabilize the chamber and take the weight of the chamber off of the casters.

## 2.6 Central Alarm Contact

The Central Alarm Contact (CAC) (Figure 3-24) consists of a normally closed dry contact energized by a control system alarm output that is connected to a Building Management System (BMS) or an optional auto dialer. When an alarm condition occurs, the normally closed contact opens, interrupting the circuit from the BMS (or other system) to indicate an alarm. The CAC is only triggered by shut-down alarms.

The connection point to the BMS is the plug and receptacle on the back panel of the chamber (Figure 3-24). This plug (and receptacle supplied) is connected to a relay that operates upon chamber alarms. The wire connections of the receptacle must be done in accordance 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.

## 2.7 Central Management System (Optional)

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

- A "dashboard" view displaying the status of all chambers with remote access/control of all chambers from anywhere with Internet access.
- Enhanced protection by alerting designated personnel when an alarm is triggered.
- Risk management through auto backup and restore, including system protection, disaster recovery, and file restoration.
- Data collection, storage and management capabilities, and multi-chamber account management.

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

## 2.8 CMP-Link (Optional)

The CMP-LINK feature enables Argus Titan 900 full interaction with 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.



## 2.9 Hardware Options

Factory installed options available with the GEN2000 include:

- RJ45 connection port and network card - provides connectivity to the facility network.
- Additive Humidity – adds moisture to the chamber above the ambient level.
- CO<sub>2</sub> Additive – increases the chamber CO<sub>2</sub> level above ambient.
- CO<sub>2</sub> Monitoring – indicates the CO<sub>2</sub> level without controls or limits.
- Dehumidification – removes excess humidity from the chamber.
- Fluorescent Lighting – optional for all configurations.
- Light Sensor – allows for closed -loop control of lighting intensity, measured in micromoles.
- Low Temperature – available only with the LED lighting option.
- X-TIER – additional canopy and shelf for the SH configuration only. ~~Not available with the Fluorescent Lighting option.~~
- Observation Window – allows a clear view inside the chamber without opening the door through a 34" high by 9.5" wide (650mm by 240mm) window in the door. One window per door.
- Phenolic Coated Refrigeration Coil
- Uninterruptable Power Supply (UPS) – provides surge protection for the controller hardware, aspirator and data during power outages, surges and spikes. Battery back-up time is between 5 to 30 minutes.
- Water Cooled Condensing Unit – used when a facility has a water chiller system, or when an air-cooled condenser system will add unwanted heat into the room.

Customer installed options available with the GEN2000 include:

- Condensate Drip Pan – collects chamber condensate when direct plumbing to the floor drain is not available or desirable.
- Condensate Drip Pan and Pump - collects chamber condensate and pumps the condensate from the condensate drip pan to the floor drain when direct plumbing is not available or desirable.
- Powder Coated Steel Wire Shelf – non-rusting and easy to clean shelving option.



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## 3 INSTALLATION

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 where the ambient temperature is maintained between 68-95°F (20 - 35°C).



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

The GEN2000 chambers will dissipate to ambient up to 5050W (17200 BTU/h).

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

#### 3.1.1 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.

#### 3.1.2 Power Supply

Refer to Section 8 Technical Specifications on page 51 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  $\pm 10\%$ .



This unit will tolerate  $\pm 10\%$  voltage fluctuation from the rated voltage on the serial plate. A voltage stabilizer must be used if the fluctuation is greater than  $\pm 10\%$ . Failure to do so can result in serious damage to the compressor and electronic components and will void warranty.  
The disconnect switch must be sized by a local qualified electrician.

### 3.1.3 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
<b>Connectivity</b>	1/4" Quick Connect
<b>Flow</b>	0.52 gallons / hour (2 Liter / hour) purified water
<b>Pressure</b>	Max. – 115 psi (7.9 bar), Min. – 5 psi (0.3 bar)
<b>pH</b>	7.0 ± 0.5
<b>Filtration</b>	< 0.00008 inch (2 microns)
<b>Resistance</b>	0.01 to 0.02 Megaohm-cm (MΩ-cm)
<b>Conductivity</b>	2.0 to 0.2 µS

### 3.1.4 Condensate Drain

A 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 connection to a floor drain is not required, an optional condensate pan and pump may be used to remove collected fluid.

## 3.2 Removing the Chamber from the Shipping Pallet

The crated GEN2000 chamber weighs approximately 1100 pounds (499 kg) and should be removed from the shipping pallet with a forklift.

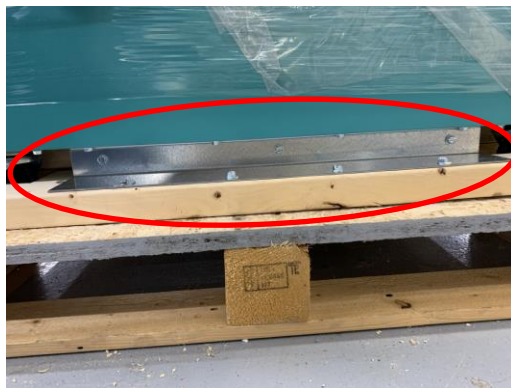
### *To remove the chamber from the pallet with a fork lift:*

1. The crating lumber is attached to the shipping pallet with staples and screws. Dismantle and remove the crating material from the shipping pallet.



Do not leave any nails, staples, or screws protruding from the crating material to eliminate potential puncture injuries.  
Recycle or properly dispose of the crating material and shipping pallet.

2. Remove the screws securing the metal shipping bracket to the pallet and to the bottom of the chamber (Figure 3-1).



**Figure 3-1**      **Metal Shipping Bracket**

3. Position the forklift truck to place the forks under the chamber floor in the location shown in Figure 3-2.



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



**Figure 3-2**      **Fork Placement**



Secure the chamber to the forklift cage with straps, chains, or ropes before attempting to lift the chamber off the pallet.

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

### 3.3 Moving the Chamber Into Final Position



**Warning: Personal injury hazard**

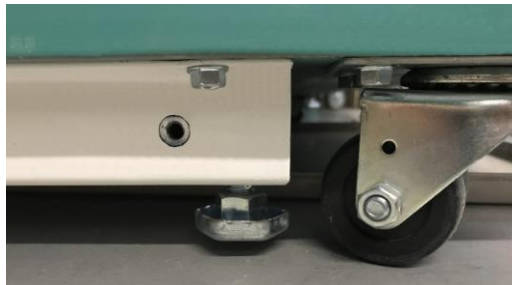
The chamber could cause serious personal injury if it falls while moving into final position.

Ensure the chamber does not exceed a 10 degree angle while in transit.

The casters under the chamber make moving the chamber into final position easy and straightforward. Slowly push the chamber into its final location.

### 3.4 Levelling the Chamber

The GEN2000 is equipped with four levelers (Figure 3-3) to prevent the unit from rolling on its casters once installed, and to compensate for any variations in the floor level. The chamber may have to be lifted slightly in order to adjust the levelers.



**Figure 3-3 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.

#### ***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) to ensure proper drainage. If the chamber is not level, water might not flow to the drain and may pool in the bottom of the chamber which could cause the growth of mold.

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

### 3.5 Configuration Kit Overview

The GEN2000 chamber 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.

#### 3.5.1 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.

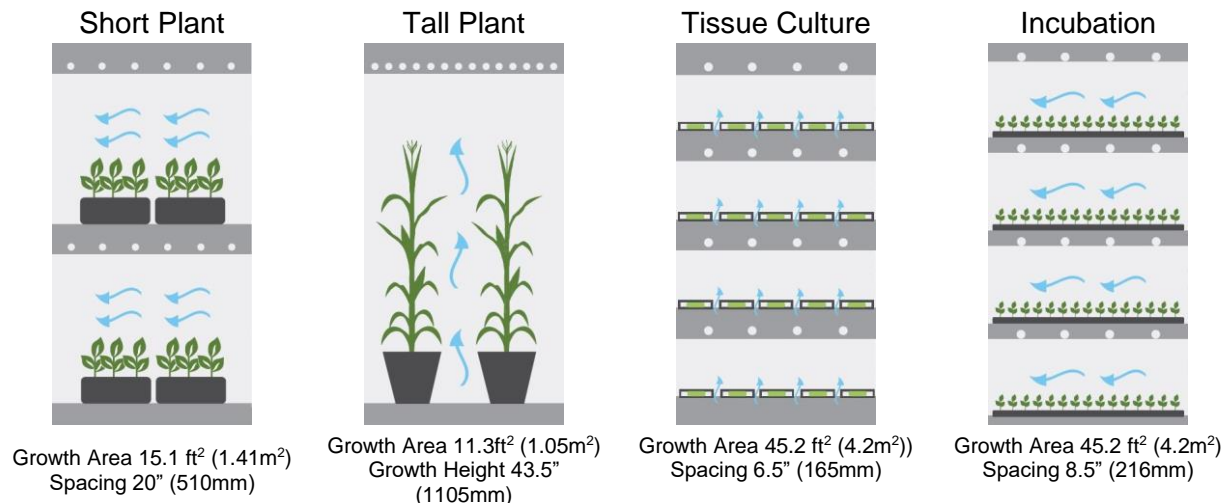
Conditioned air is drawn down from the refrigeration coil and optional heaters and enters the interior of the chamber through a rigid metal plenum in the rear wall of the chamber. Airflow is then directed through precisely designed and manufactured back-wall plenums.

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 3-4 shows airflow, light intensity, and growth height comparisons between the four configurations.



**Figure 3-4 Chamber Airflow**

### 3.6 SH Configuration

Horizontal airflow across shelves optimizes growth area for shorter plants (Figure 3-4) by forcing the air into the chamber through the perforated back-wall plenum.

One additional tier with two additional lamp canopies and two additional wire shelves may be ordered as an option for the SH configuration (Figure 3-6). Growth area with the X-TIER option becomes 33.9 ft<sup>2</sup> (3.15m<sup>2</sup>).

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



Figure 3-5 SH Configuration

The optional fluorescent lighting canopies are installed the same way as LED 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 3-6 X-TIER Option for the SH Configuration



### 3.7 TA Configuration

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

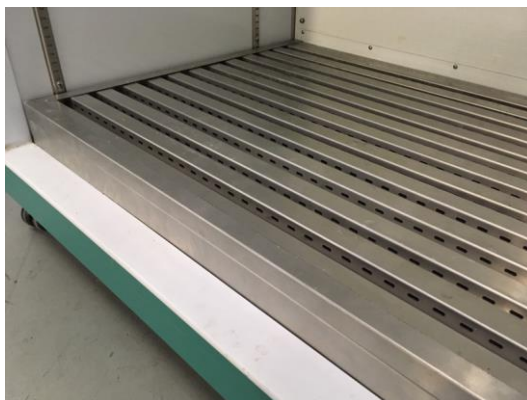
TA configuration provides 43.5" (110.5cm) of growth height.



Figure 3-7 TA Configuration

#### 3.7.1 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.



New Image

Figure 3-8 Unifloor



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

### 3.8 TC Configuration

The TC configuration 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 6.5" (16.5cm).

TC configuration provides 6.5" (16.5cm) of growth height.



Figure 3-9 TC Configuration

### 3.9 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 8.5" (21.6cm) of growth height.



Figure 3-10 IN Configuration

### 3.10 Lamp Canopies and Wire Shelves

Lamp canopies and wire shelves are mounted on metal support clips attached between the slotted pilaster strips on the interior center and the left and right chamber walls.

Lamp canopy supports (Figure 3-11) are two long metal brackets that are secured to two pilaster strips on the same side of the chamber. The lamp canopy then simply slides onto the brackets and is connected to control and power receptacles on the interior rear wall. Control and power cables are color coded and equipped with unique connector plugs (Figure 3-11).

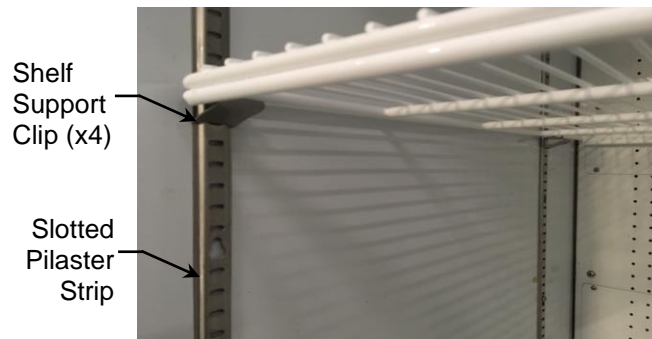
Light Canopy Control – Eight small receptacles are used to control the lighting fixtures. The small plugs are mated with these receptacles and then pushed snugly together.

Light Canopy Power – Eight large dedicated receptacles provide power to the lighting fixtures. The large plugs are mated with these receptacles and then screwed tightly together.

Wire shelves are supported by four metal clips attached to the four pilaster strips inside the chamber (Figure 3-12). Each wire shelf supports up to 40 lbs (18Kg) of distributed load. The wire shelf in the TA configuration supports up to 60 lbs (27Kg).



**Figure 3-11 Canopy Supports and Connections**



**Figure 3-12 Wire Shelf Supports**

### 3.11 Installing the Lamp Canopies and Wire Shelves

Convion chambers may be configured onsite using one of four pre-packaged lighting and shelving kits; SH, TA, TC, or IN.



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

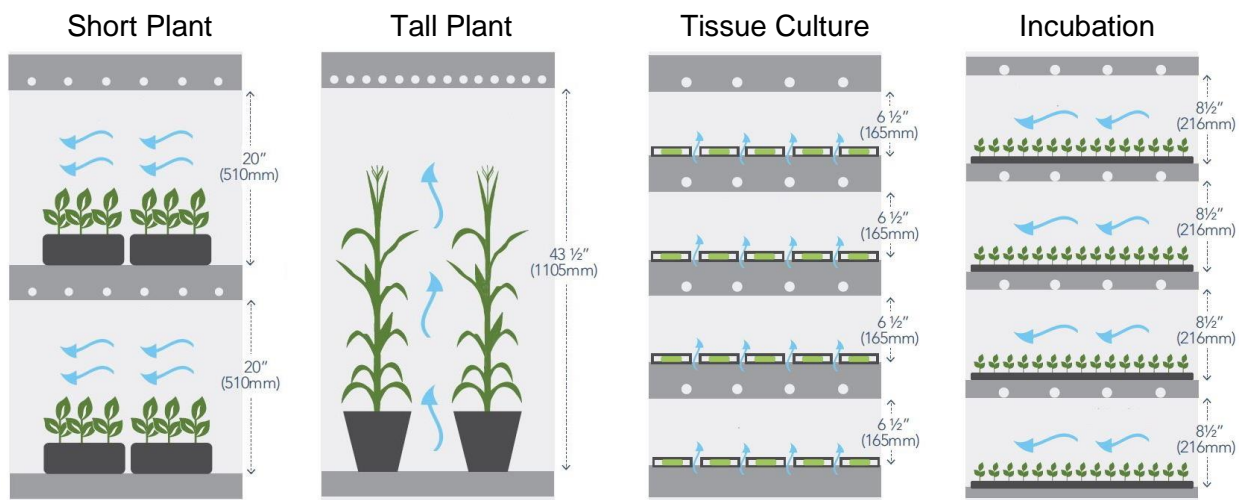


Figure 3-13 GEN2000 Shelf Spacing

#### 3.11.1 Installing Lamp Canopies

##### *To install the lamp canopies:*

1. Referring to Figure 3-13 as a general guide to shelf spacing, install the canopy support brackets (Figure 3-14) 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

**Correct****Incorrect****Figure 3-14 Install the Canopy Support Brackets**

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.

1. Line up the canopy cables with the closest ports on the rear wall (Figure 3-15). Repeat for the other canopy(ies).

**Figure 3-15 Install the Canopies****Figure 3-16 Control Connection****Figure 3-17 Power Connection**

2. Plug the yellow canopy control cable into the small port on the center wall (Figure 3-16).
3. Unscrew the black protective cover and plug the black canopy power cable plug into the large port (Figure 3-17).

### 3.11.2 Installing Wire Shelves

***To install the wire shelves:***

1. Starting at the bottom of the chamber, install the shelf clips (Figure 3-18) 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 3-18 Install the Shelf Clips**



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 painted white finish (Figure 3-19).



**Figure 3-19 Shelf Installed onto Clip**

3. Repeat steps 1 and 2 for the remaining clips and shelves.

### **3.12 Removing the Lamp Canopies, Shelves, and the Unifloor**

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

#### **3.12.1 Removing a Lamp Canopy and Lamp Canopy Supports**

Refer to Section 3.11.1 Installing Lamp Canopies and reverse the steps to remove a lamp canopy and lamp canopy supports.

#### **3.12.2 Removing a Wire Shelf and Wire shelf Clip**

Refer to Section 3.11.2 Installing Wire Shelves and reverse the steps to remove the shelves and shelf clips.

#### **3.12.3 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.

#### **3.12.4 Removing an Air Shelf Bracket**

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

#### **3.12.5 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.



### 3.13 Replacing the Back-Wall Plenum

All GEN2000 chambers are constructed with one piece back-wall plenums. Each configuration kit contains a three piece back-wall plenum and the required canopy(ies), canopy supports, shelves and shelf clips.



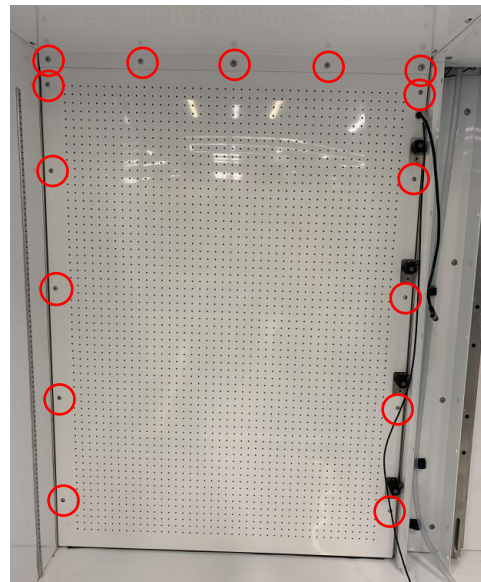
Images used in these back-wall replacement installation instructions are for an SH kit. However, the installation steps and procedures for installing the back-wall plenum of the other kits are the same.

#### ***To replace the back-wall plenum:***

1. Remove all lamp canopies, canopy support brackets, shelves, and shelf clips from the chamber (Figure 3-20). Refer to Section 3.12 Removing the Lamp Canopies, Shelves, and the Unifloor on page 21.
2. Using a Phillips screwdriver, or a drill with a Phillips bit, remove all the screws from the perimeter of the plenum (Figure 3-21).



**Figure 3-20 Remove All Canopies & Shelves**



**Figure 3-21 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 3-22).





Figure 3-22



Remove The Plenum



Do not allow the cables to become trapped or pinched between the plenum and the chamber wall while removing the back-wall plenum. The cables could become damaged, causing decreased performance.

The replacement plenum consists of three panels. Install the panels, starting at the top of the back wall, in the following order:

- The top panel with rivnuts installed in the plate (Top Panel, Figure 3-23).
- The middle panel, similar to the top panel, but without rivnuts (Middle Panel, Figure 3-23).
- The bottom panel with a gasket along the bottom edge (Bottom Panel, Figure 3-23).
- Align the top panel with the top of the frame of the chamber and hold it in position loosely with screws.



Top Panel



Middle Panel



Bottom Panel

Figure 3-23

Replacement Plenum Installation Order



Install the screws loosely to temporarily hold the panel in place. Do not tighten the screws until all three panels are installed and correctly aligned.

4. Position the middle panel along the bottom groove of the top panel and hold it in position loosely with screws.
5. Position the bottom panel along the bottom groove of the middle panel, and hold it in position loosely with screws.
6. Ensure the bottom panel rests completely on the gasket, and then ensure the middle and top panels are resting in their lowest possible position.
7. Secure the panels in place when they are all properly positioned.



*Do not* overtighten the screws. Overtightening a screw will distort the panel and potentially damage the fasteners.

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

8. Reinstall all shelf clips and shelves. Refer to Section 3.11.1.

### 3.14 Connecting the Communication, Central Alarm Contact , and Condensate Pump

Connect the communication, customer alarm, and condensate pump connectors to the ports on the rear of the chamber as shown in Figure 3-24 and described in Table 3-2.

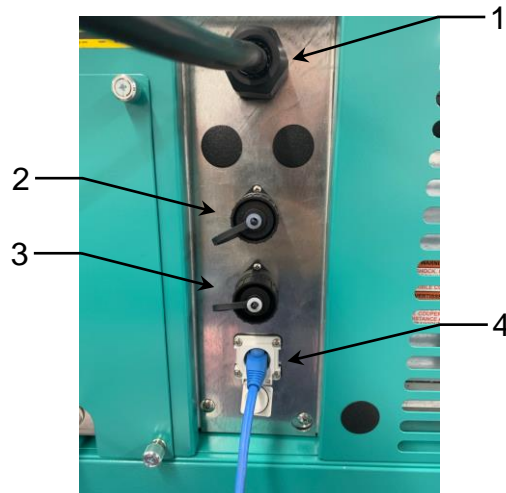


Figure 3-24 Back Panel Connections

Table 3-2 Back Panel Connection Descriptions

Item	Description	Usage
1	Power Cord	Connect the power cord to a dedicated circuit in the mains distribution panel after all other connections have been made.
2	Central Alarm Contact (CAC)	The receptacle is dedicated for the CAC connection. The receptacle is mated with the plug and then screwed tightly together.
3	Optional Condensate Pump Connection	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
4	Optional RJ-45 Communications Port	Connect an RJ-45 terminated cable to the facility network.



The Central Alarm Contact is rated for 230VAC at 0.5 amperes.

### 3.15 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.



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## 4 START UP

Once the cabinet is assembled, leveled, and all connections have been made, the cabinet can be powered on. Ensure that the cabinet is operating properly before introducing any research material.

### 4.1 Start Up Procedure



Before powering ON, ensure all mechanical, fluid, 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 before powering ON.



Ensure the chamber is level and stable before operating.

1. Ensure the mains breaker is ON.
2. Ensure that all drain, water, and CO<sub>2</sub> lines are connected.
3. 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.
4. Turn the power switch on the front of chamber to ON.



Do not turn the control system off during boot up.

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

## 4.2 Visual Checks

1. Check 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.

Refer to the *Convion Chambers Maintenance & Troubleshooting Manual* for more information.



Operate your Convion 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.

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## 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 GEN2000 comes equipped with Convion'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 Convion Central Management™. CMPLink allows integration with an Argus Control System.

### 5.2 Fluorescent and LED Lighting



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 burned out tubes. Refer to the lamp manufacturer's specifications.

The standard lighting systems for the GEN2000 use high efficiency T5 LED lamps configured to suit the intensity required for each application and kit. Lamp combinations have been designed to ensure uniform light distribution. Lighting can be adjusted via open or closed loop dimming through the controller.

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.

### 5.3 Lighting 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.



Contact Conviron for LED tube replacement.

#### 5.3.2 Fluorescent Lighting – Optional

Optional T5 fluorescent lamps provide a balanced spectrum for plant growth. The lighting is programmable, dimmable from 10% to 100% of maximum output.

If required, the fluorescent tubes are individually replaceable

#### 5.3.3 Open and 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 fluorescent and 10% for LED.

The open loop dimming option provides a readout of the percentage of the maximum light fixture output from 10% to 100%. The user sets the desired lighting level as a percentage.

The closed loop dimming options uses a light sensor and the light meter reading is displayed on the HMI display. The user sets the desired lighting level as a light measurement.

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 Aspirator

Located on the center wall between the growth areas, the aspirator houses the sensors used to monitor temperature and humidity levels within the chamber. The aspirator receives an air sample from the chamber to measure and control conditions.



Figure 5-1 Aspirator

## 5.5 Instrumentation Port

The instrumentation port with a flexible foam plug 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 of extension cords inside the chamber.



Exterior View



Interior View

Figure 5-2 Instrumentation Port Location

## 5.6 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 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

## 5.7 Fan Speed Control

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

### ***To adjust the fan speed:***

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

## 5.8 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 directly 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.

### 5.9 Bypass Dehumidification – BDH Option

Bypass Dehumidification (BDH) is an optional 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 excess capacity in the cooling system, moisture is removed from the remaining air by cooling and reheating.

The bypass dehumidification is achieved by the cabinet refrigeration system.

### 5.10 Additive Carbon Dioxide Control – CO<sub>2</sub> Option

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.

#### 5.10.1 Setting up the Additive CO<sub>2</sub> Control

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



Do not adjust this setting.

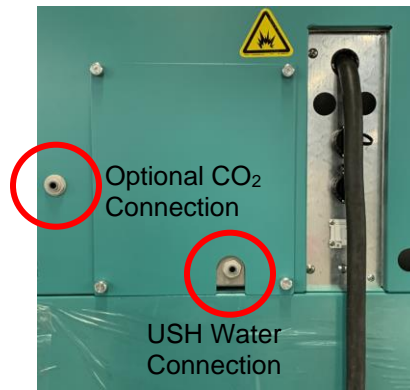
The high-pressure regulator is located on the customer-supplied CO<sub>2</sub> line. The customer supplies the high-pressure regulator due to different thread sizes on the CO<sub>2</sub> line in different countries.



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**

### 5.10.2 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 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 Convion 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.

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

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

### 5.1 Central Management System – CMS Option

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

## 5.2 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 growth area, and clean the unit as described in the *Convion Chambers Maintenance & Troubleshooting Manual*. Open the fresh air inlet and exhaust ports and leave the chamber and observation doors slightly open to reduce moisture buildup.



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## 6 CLEANING AND MAINTENANCE

The GEN2000 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: - High voltage – Electrocution hazard during maintenance or service. Serious personal injury or death could result from contacting live electrical circuits. Before removing the machine compartment access panel of this chamber to perform maintenance, ensure the electrical power is locked out/tagged out in accordance with facility policy.



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

Contact the responsible party, or Convicon, 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 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 panel are replaced and secure before operating the chamber after service.

## 6.1 Disconnecting the Mains Power

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

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



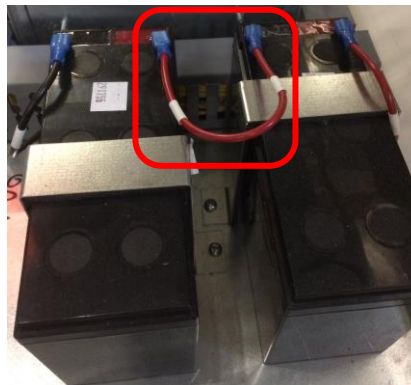
24 VDC from the UPS optional battery backup will still be present with the mains disconnected.

### 6.1.1 Disconnecting the Optional UPS 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.

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 6.11.
3. Remove the jumper between the two backup batteries (Figure 6-1).



**Figure 6-1** Disconnecting UPS Battery Backup Power



## 6.2 Cleaning the Chamber

The GEN2000 chamber requires regular cleaning and maintenance in order to continue performing to specifications.

For a thorough cleaning, for example when changing the interior configuration or before beginning a new experiment, disconnect power at the mains and at the UPS battery backup. Refer to Section 6.1 Disconnecting the Mains Power and Section 6.1.1 Disconnecting the Optional UPS Backup 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.

Refer to the *Convion Chambers Maintenance & Troubleshooting Manual* for more information on which cleaning solutions are appropriate for which chamber surface.

## 6.3 Replacing Lamps

Inspect the lamps daily to ensure that all lamps are functioning properly and replace poorly lit or flickering lamps to ensure unit performance. The frequency of lamp changes will be 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.

### **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 on page 38 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 6-2).



**Figure 6-2 LED Tube Orientation**



Polarized LED tubes will not light up if installed incorrectly.

5. Secure the tube in place by rotating it one quarter turn.
6. Dispose of the used tube(s) following local requirements, or contact the local authorities for proper disposal procedures.

***To replace a fluorescent 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 on page 38 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 by inserting it fully into the correctly oriented lamp holders.
5. Secure the tube in place by rotating it one quarter turn.
6. Dispose of the used tube(s) following local requirements, or contact the local authorities for proper disposal procedures.

**6.4 Calibrating the Temperature and Humidity Sensor**

Convion recommends that the temperature and humidity sensors be calibrated yearly. Contact Convion Service for more information.

## 6.5 Maintaining the Ultrasonic Humidity System (USH)

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

Clean the USH box every month and replace the ceramic discs every six months. 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.

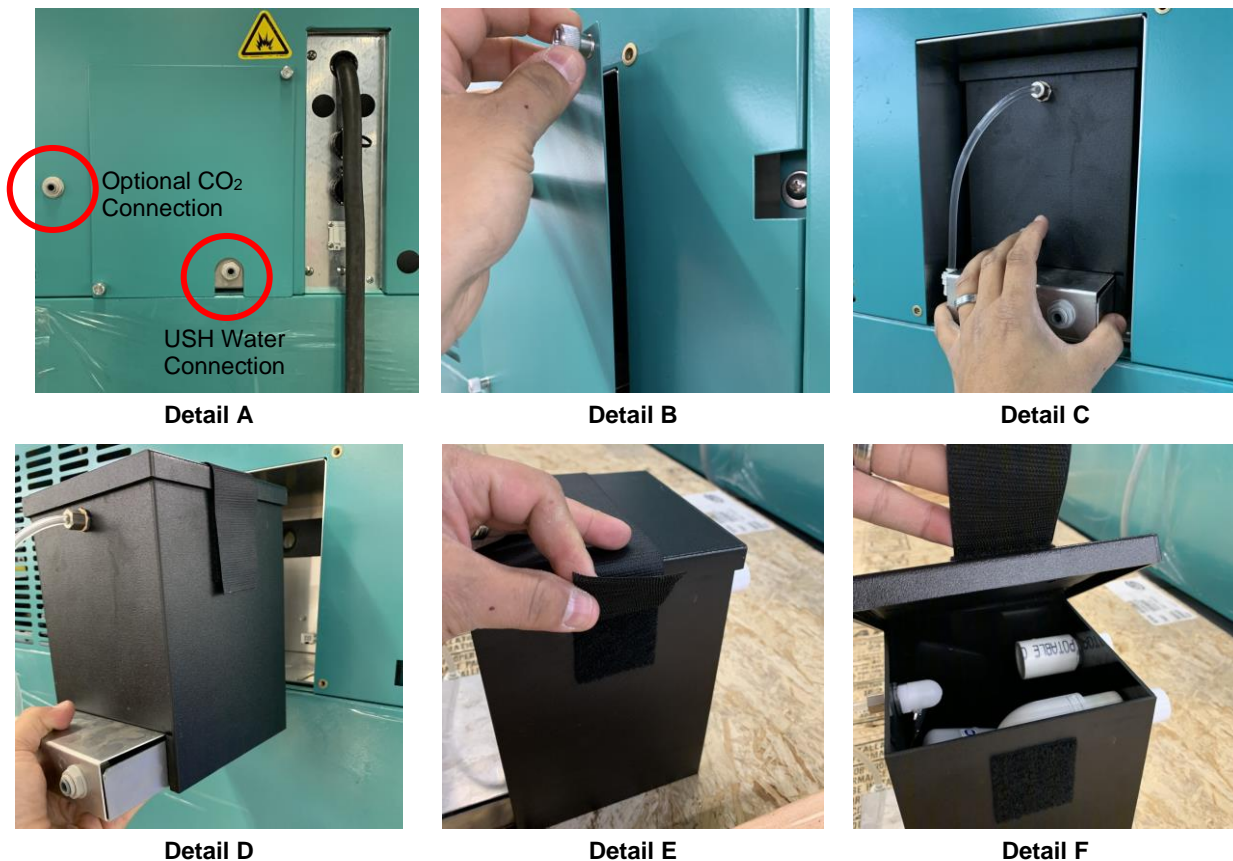
Convion recommends setting a moderate RH value in all programs to keep the USH feature operable without significantly affecting the experiment.

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



The images used in the following set of instructions show the USH on the left side of the chamber. The procedures to remove and clean the USH on the right side of the chamber are identical.

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 loosening the screws (Detail B).
3. Gently pull the USH tank out of the back of the chamber (Detail C), being careful not to tip the box (Detail D).
4. Detach the Velcro™ side straps and remove the USH box lid (Details E and F).



**Figure 6-4 Remove the USH Box from the Chamber Sequence**

5. Pour the water out of the box and wipe the interior surfaces of the USH box (Figure 6-5, Detail A) with a damp cloth to remove biological residue and particulate matter.



**Figure 6-5 USH Interior Details**

6. Ensure there is no water residue or particulate on the ceramic discs (Figure 6-5, Detail B).

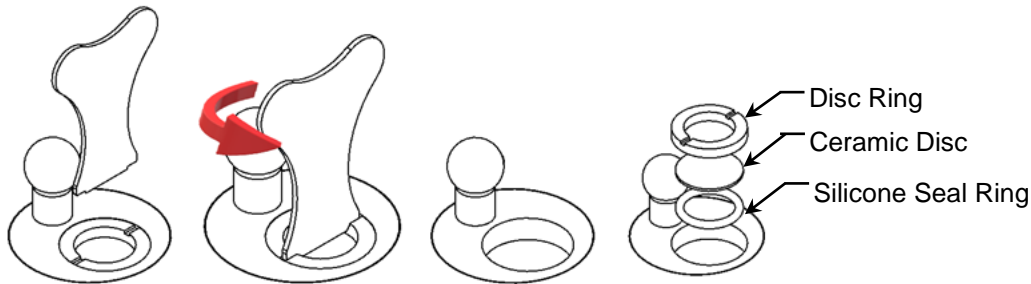


Pay particular attention to the surface of the ceramic discs, which must be free of deposits in order to function properly. Stubborn buildup may be removed with a cleaner capable of removing mineral deposits, such as a diluted vinegar solution.

7. Dry the interior surfaces.

**To replace the ceramic discs:**

1. Contact Convion 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 (PN 236411), 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 into the chamber by reversing the removal steps above.

## 6.6 Calibrating the Temperature and Humidity Sensor

Calibrate the temperature and humidity sensors yearly. Contact Convion 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.

During regular operation the condensate pump and condensate pan should be inspected once per month and cleaned as required.

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

1. Unplug the pump from the power receptacle at the rear of the chamber and remove the plastic hose from the pump.
2. Remove the pump and pan.
3. Clean the pump and pan with fresh running water.
4. Run water over and through the pump until the water runs clear.
5. Reinstall the pump and pan.

## 6.9 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



### 6.10 Cleaning the Fresh Air Filter

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

Refer to the *Convion Chambers Maintenance & Troubleshooting Manual* for more information on cleaning and washing the fresh air inlet filter.

### 6.11 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.

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

1. Turn the power to the chamber OFF. Refer to Section 6.1 Disconnecting the Mains Power on page 38 for instructions to turn off the power.
2. Use a ladder to access the top of the chamber. Do not stand on the chamber.
3. Remove the screws from the perimeter of the machine compartment access panel (Figure 6-8).



New Image

**Figure 6-8 Machine Compartment Access Panel Screws**



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

4. Lift the front edge of the access panel, using the handle provided.
5. Carefully lower the access panel down to the floor.
6. Perform the required maintenance.
7. Reposition the machine compartment access panel.
8. Replace the screws to secure the access panel to the chamber.





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## 7 TROUBLESHOOTING



Convicon 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 rear of the chamber, available when requesting Service.

Even if service is close by, a few 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.



The compressor in this 60 hertz chamber is a Scott-T design. The compressor amperage will not be balanced like a standard 3 phase compressor. Carefully compare measured motor resistance values to the two different published resistance values for a given compressor model before replacing the compressor as being defective. Due to the nature of the Scott-T construction there is an inherent current imbalance in the motors that is much larger than what is seen in a standard 3-phase motor. Effectively you will have two terminals draw similar currents while the third will draw a higher current. Contact Convicon before replacing this compressor.

### 7.1 Troubleshooting the Chamber

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#### 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.

**Still won't start**                      Contact service or Convicon.

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#### 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 ports are closed.
4. Ensure that the temperature sensor is in the correct position.

**Still won't cool**                      Contact service or Convicon.

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**Chamber won't heat**

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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.

**Still won't heat**                      Contact service or Convion.

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**Chamber won't make humidity**

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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.

**Still no humidity**                      Contact service or Convion

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**Chamber lamp won't light up after replacement**

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Possible defective ballast

Contact service or Convion

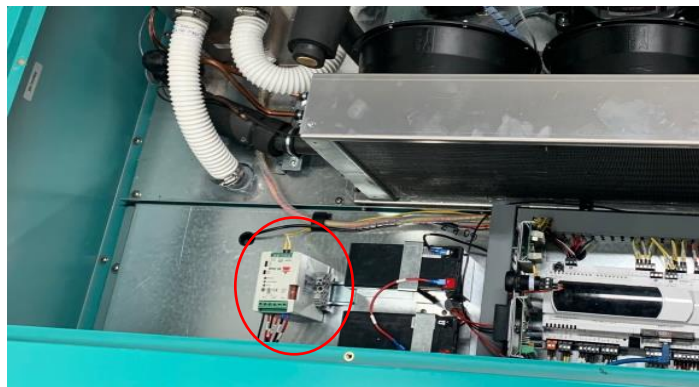
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**Optional UPS doesn't work**

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1. Refer to Section 6.1 Disconnecting the Mains Power on page 38 to turn off the power to the chamber.
2. Refer to Section 6.11 Performing Maintenance Inside the Machine Compartment on page 45 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 Convion.
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## 7.2 Fuse Schedule

Fuse	Description	Convion 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



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## 8 TECHNICAL SPECIFICATIONS

Convion maintains a policy of continual improvement and reserves the right to change the technical characteristics of the GEN2000 without prior notice.

Specifications	GEN2000			
	Short Plant (SH)	Tissue Culture (TC)	Tall Plant (TA)	Incubator (IN)
Chamber Crated Weight (lbs / kg)	~1100 / 499			
Exterior Dimensions				
Height (in. / mm)	77 / 1955			
Width (in. / mm)	82.5 / 2095			
Depth (in. / mm)	32.5 / 825			
Interior Dimensions				
Height (in. / mm)	52.5 / 1330			
Width (in. / mm)	77/ 1955			
Depth (in. / mm)	24.25 / 620			
Volume (ft <sup>3</sup> / L)	55.2 / 1562			
Power Requirements				
The chamber will tolerate ±10% voltage fluctuation from the rated voltage on the serial plate. Use a voltage stabilizer if the fluctuation is greater than ±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 GEN2000 chamber rating plates, located on the left side of the chamber. Please have the Serial Number available when requesting service.

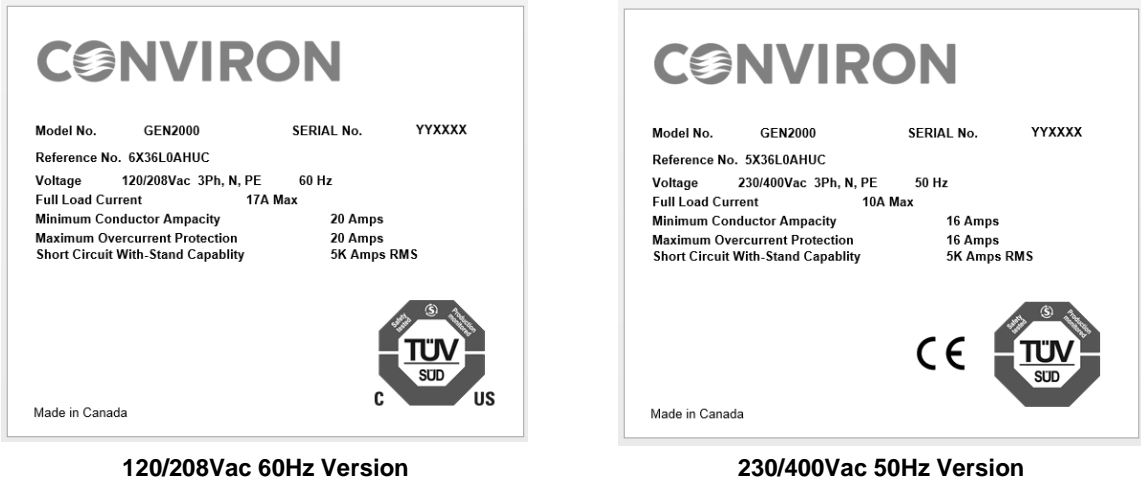


Figure 8-1 Sample GEN2000 Rating Plates

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## 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**

Term	Definition
%RH	Humidity level expressed as a percentage of the maximum humidity level
Ø	Greek letter Phi – SI prefix for electrical phase
μ	Greek letter Mu – SI prefix for micro
°C	degrees Celsius
A	Amperes
AC	Air-cooled Condenser unit
AR	Arabidopsis
BTU/h	British Thermal Units per hour
CFC	Chlorofluorocarbon
CM	Central Management System
COMM	Connection to LAN
EMI	Electro Magnetic Interference filter
ESD	Electrostatic Discharge
EU	European Union
Flex	Flexible canopy configurations for use with either tall or short plants
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

Term	Definition
PPE	Personal Protective Equipment
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
VDC	Volts, Direct Current
WC	Water Cooled condenser unit
WEEE	Waste Electrical and Electronic Equipment

## 9.2 Product Updates

Product lifecycle is a key development consideration at Convion, whereby products are developed using high quality materials and component parts. Consequently, Convion 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. Convion also provides retrofit systems for competitive products. For example, Convion offers a control system retrofit that is compatible with competitive products and that, once installed, works with Convion's Central Management System (CMS).

Contact Convion for more information.









[info@conviron.com](mailto:info@conviron.com)

[www.conviron.com](http://www.conviron.com)

  Management System Certified to ISO9001

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