CONVIRON®

GEN1000-GE

OPERATOR MANUAL

291180-ENG R03

GEN1000-GE

OPERATOR MANUAL

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

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PREFACE

Welcome to the GEN1000-GE Operator Manual.

This manual describes the features and use of Conviron's GEN1000-GE chamber and is designed to provide sufficient detail for installation and operation, 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.

Latest Manual Versions and Languages

For the latest version of this and other manuals, please visit 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 seed germination and scientific experiments including, but not limited to, plant science, biotechnology, and entomology.

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 chamber 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 control system 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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Please visit 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.

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 due to slippery 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 indicates that service personnel must disconnect the chamber supply plug from the electrical outlet before servicing this equipment.

Symbol	Description
	The **"DO NOT DISCONNECT UNDER LOAD"** symbol indicates that the user must shut off the chamber power before removing the canopy plug from the receptacle.
	The "**ROTATING FAN BLADE**" symbol is used to identify a potential hazard of injury from a rotating fan blade.
	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.

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

Warning: Electrical shock 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: Broken fluorescent tube hazard Possible health risk due to mercury exposure from a broken fluorescent lamp. Personal injury could result from coming in contact with broken glass or other parts. Wear appropriate personal protection equipment when dealing with a broken fluorescent lamp. Possible shock hazard from touching live electrical contacts inside an energized broken fluorescent lamp. Ensure electrical power to the chamber is OFF *before* removing a broken fluorescent lamp.
	Warning: Hot surface hazards Personal injury could result from contacting hot surfaces within the chamber. The user 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: Arc flash 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 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 operation of the chamber relative to user-defined set points. 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™ or CMP-Link.

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

2.2 Air Intake and Exhaust

The chamber includes manually adjustable fresh air intake and exhaust ports to provide chamber air exchanges. Exhaust air flows to ambient with no additional connection required.

2.3 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 98% RH, 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.

2.4 Instrumentation Ports

One 2″ (50mm) access port with a light-tight plug 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 levelers to stabilize the chamber in its final location and compensate for variations in the finished floor.

2.6 Central Alarm Contact

The Central Alarm Contact (CAC) (Figure 3-9) 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, 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.

The connection point to the BMS is a receptacle on the back panel of the chamber. 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.

2.7 Central Management System (Optional)

For use in conjunction with the 6000 series controllers, the Conviron Central Management™ (CM) system provides a comprehensive suite of time-saving, 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 *Conviron Central Management Operator`s Manual* for complete instructions.

2.8 CMP-Link (Optional)

The CMP-LINK feature enables Argus Titan 900 full interaction of any Conviron 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

The GEN1000-GE can be ordered with the following factory installed options:

- RJ45 connection port and network card - provides connection to the facility network.
- Autodialer - an automatic telephone dialing system to notify user of chamber alarm.
- Observation Window – allows a clear view inside the chamber without opening the door through a 38″ high by 9.5″ wide (650mm by 240mm) window in the door.
- Phenolic Coated Refrigeration Coil – available for use in insect research.
- Uninterruptable Power Supply (UPS) – Provides surge protection for the controller hardware, aspirator and data during power outages, surges and spikes. Visually and audibly alarms when the battery is in use, when battery is low, when not available to

provide back up, or overloaded. Battery back-up time is between 5 to 30 minutes, approximately 5 minutes with all system running an approximately 30 minutes with only the controller running.

- 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.

The following options may be ordered and installed by the customer:

- Condensate Pan – collects chamber condensate when direct plumbing to the floor drain is not available or desirable.
- Condensate Pan and Pump - collects chamber condensate and pumps the condensate from the condensate pan to the floor drain when direct plumbing is not available or desirable.
- Polymeric Stacking Trays – any amount up to 15 trays measuring 20.5″ x 35″ (52cm x 89cm) with 75ft^2 (6.97m^2) of usable area.
- Powder Coated Steel Wire Shelf – non-rusting and easy to clean shelving option.

3 INSTALLATION

GEN1000-GE units must be placed in ventilated areas. The ideal temperature around the equipment is 70°F (21ºC). Although it will perform at higher ambient temperatures, it is recommended that the product be placed in areas that have circulating air.

3.1 Chamber Placement

Install the chamber in a dry, well-ventilated area with circulating air and maintain the operating environment between a minimum temperature of 59°F (15°C) and a maximum temperature of 95°F (35°C).

It is important to ensure that the room in which the chamber is placed adheres to these environmental conditions.

The GEN1000 chambers dissipate up to 1850W to ambient.

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

3.1.1 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 starting on page 37 for details of the power requirements.

This unit will tolerate ±10% voltage fluctuation from the rated voltage on the serial plate. A voltage stabilizer must be used if the fluctuation is greater than ±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
Connectivity	¼" Quick Connect
Flow	0.26 gallons / hour (1 Liter / hour) reverse osmosis
Pressure	Max. – 115 psi (7.9 bar), Min. – 5 psi (0.3 bar)
pH	7.0 ± 0.5
Filtration	< 0.00008 inch (2 microns)
Resistance	0.01 to 0.02 Megaohm-cm (MΩ-cm)
Conductivity	2.0 to 0.2 µS

3.1.4 Condensate Drain

A 3/4″ (19 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, the optional condensate pan may be used to collect the condensate and the optional condensate pump may be used to pump the condensate to the drain.

3.2 Remove the Chamber from the Shipping Pallet

The GEN1000 chamber is designed to be removed from the shipping pallet with a fork lift. In smaller facilities without access to a fork lift, the shipping pallet may be ordered with an optional built-in ramp to unload the chamber.

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

1. Remove the metal shipping bracket (Figure 3-1) from both sides of the pallet.
2. Position the forks of the fork lift truck as shown in Figure 3-2.

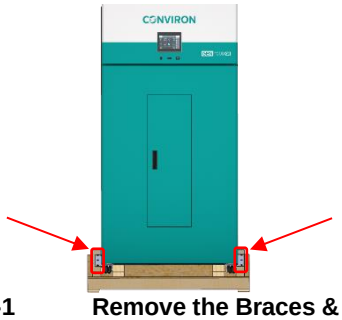

Figure 3-1 Remove the Braces & Brackets

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 chamber is secured to the forklift 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.

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).

Warning: Personal injury hazard

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

1. Remove the wooden brace and metal shipping bracket (Figure 3-3, Panel 3 & 4) from both sides of the pallet.
2. Ensure the locks on the front casters are in the unlocked position (Figure 3-3, Panel 5).
3. 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

3.3 Move 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 transport.

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.

3.4 Level the Chamber

The GEN1000 is equipped with four levelers (Figure 3-4) 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.

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 due to misalignment.

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

3.5 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 enters the interior of the chamber thought a rigid metal plenum in the rear wall of the chamber. Air is then directed horizontally from the rear plenum, providing uniform environmental conditions.

3.6 Adjustable Wire Shelves

Wire shelves are supported by two metal support brackets attached to the four pilaster strips inside the chamber (Figure 3-5). The chamber comes with five wire shelves to be spaced evenly. An additional 10 shelves may be ordered to expand the shelving area to 15 shelves with a minimum gap between shelves of 3″ (7.62cm). Optional seedling trays (Figure 3-5) may also be ordered.

Figure 3-5 Wire Shelves, Support Brackets, and Seedling Tray

3.6.1 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.

To install wire shelves:

Starting at the bottom of the chamber, install the shelf-support brackets (Figure 3-6) 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.

Correct

Incorrect

Figure 3-6 Install the Shelf Support Brackets

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

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

3. Install a wire shelf on top of the shelf brackets. Be careful not to scratch the painted white finish (Figure 3-7).

Figure 3-7 Shelf Installed onto Support Bracket

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

To install the optional seedling tray:

Slide the seedling tray over the top of the wire shelf (Figure 3-8).

Figure 3-8 Seedling Tray

To remove a wire shelf:

1. Lift the shelf up away from the shelf support bracket.
2. Remove it from the chamber.

To remove a wire shelf support bracket:

1. Tilt the support bracket upwards to remove the bottom tab from the pilaster.
2. Continue tilting the support bracket upwards to unhook the top of the clip from the pilaster.

3.7 Connect the UPS, Communication, and Central Alarm Contact

Connect the UPS, communication, customer alarm, and condensate pump connectors to the ports on the rear of the chamber as shown in Figure 3-9 and described in Table 3-2.

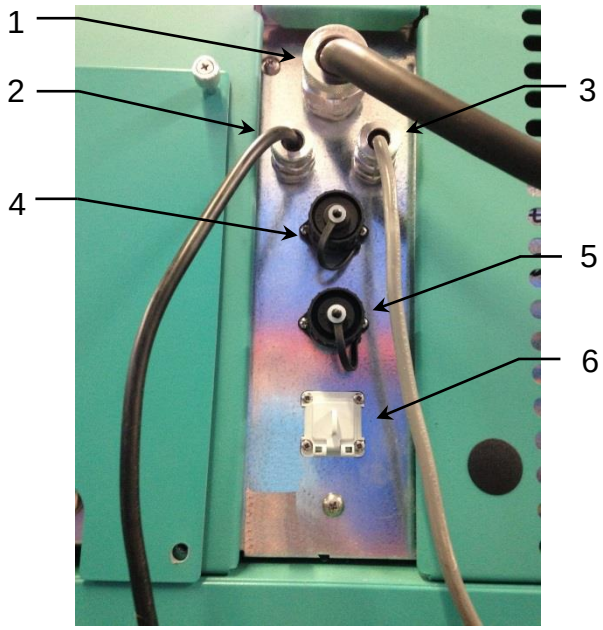

Figure 3-9 Back Panel Connections

Table 3-2 Back Panel Connection Descriptions

Item	Description	Usage
1	Power Cord	Plug the power cord into a receptacle on a dedicated circuit after all other connections have been made.
2	A/C Power to UPS	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 and should not be used for any other
3	Backup A/C Power From UPS	
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.
5	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
6	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.

3.8 Connect 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.

4 START UP

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

4.1 Start Up Procedure

Chambers shipped by air freight will include 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.

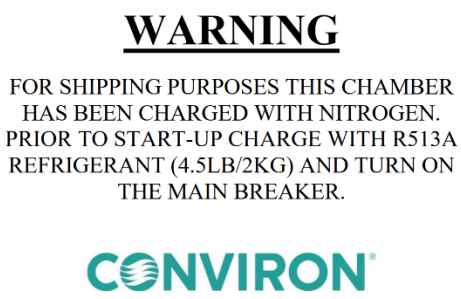

Figure 4-1 Nitrogen Warning Label

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, and electrical connections are secure.

Before powering ON, 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.

4.1.1 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. Ensure that all drain and water lines are connected.
4. 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.
5. Turn the power switch on the front of chamber to ON.

Do not turn the control system off during boot up.

6. 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.

4.2 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.

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

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.

5.1 Control and Monitoring

The GEN1000-GE comes equipped with Conviron'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 Conviron Central Management™. CMPLink allows integration with an Argus Control System.

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-GE use high efficiency T5 LEDs. Lamp positioning is designed to ensure uniform light distribution. The chamber may be equipped with optional fluorescent lamps.

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.

5.3 Lighting Options

The chamber can be equipped with either LED or fluorescent fixtures. The fixtures are compatible with either type of lamp.

5.3.1 LED Lighting

The standard lighting configuration consists of LED lamps to provide a broadband spectrum for plant growth. The LED tubes are individually replaceable, as required

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 – Fluorescent Option

The fluorescent option uses T5 fluorescent lamps to provide a balanced spectrum for plant growth. The fluorescent tubes are individually replaceable, as required.

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 3.6 Adjustable Wire Shelves, starting on page 13, 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 5.1 Fresh Air Inlet and Exhaust Ports starting on page 23, for port adjustment details.

Conditioned air is drawn down from the refrigeration coil and enters the interior of the chamber thought 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

5.1 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^3/min (0.57m^3/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 5-2).

Figure 5-2 Fresh Air Inlet and Exhaust Port Location

5.2 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.

5.3 Instrumentation Port

The instrumentation port with a rubber plug is located on the lower-right side of the chamber (Figure 5-3). 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. Conviron does not recommend the use of extension cords inside the chamber.

Exterior View **Interior View**

Figure 5-3 Instrumentation Port Location

5.4 Central Management System – CMS Option

Refer to the supplied optional *Central Management* manual for a complete description and operating instructions.

5.5 Shutdown

In the event that the chamber will not be used for a period of up to and including 14 days, 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, shut down the chamber to minimize unnecessary electricity consumption. Refer to Section 6.1 Disconnecting the Power before Maintaining or Servicing the Chamber, on page 26.

Ensure all plants and soil are removed from growth area, and clean the unit as described in the *Conviron 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.

6 MAINTENANCE

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

Refer to the *Conviron Chambers Maintenance & Troubleshooting Manual* for more information on cleaning solutions, cleaning procedures, and maintenance schedules.

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 and following accepted 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 panel are replaced and secure before operating the chamber after service.

6.1 Disconnecting the Power before Maintaining or Servicing the Chamber

To maintain or service this chamber, it is necessary to disconnect it from power.

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.

6.2 Cleaning the Chamber

For interior cleaning, dampen a clean towel or rag outside the unit, and carefully wipe the unit down. Do not use abrasive cleaners. Mild detergents 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 *Conviron 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.

The following instructions show the steps to remove one of the door mounted lamp tubes. The steps are the same to remove the rear mounted tubes.
Remove all the trays and shelves before accessing the rear lamps.

Warning: Burn hazard
Do not touch the ends of the lamp tubes. Fluorescent lamps operate at high temperatures and represent a burn hazard.

The LED bulbs and the fluorescent bulbs are physically similar with the same sockets. When replacing lamps, ensure the original lamp is replaced with an identical lamp with the same part number and markings.

Do Not Disconnect Under Load
Shut off the power to the chamber before disconnecting the power connector from the receptacle.

To remove the lamp fixture and access the lamp tube:

1. Identify the tube(s) to be replaced.
2. Turn the power to the chamber OFF. Refer to Section 6.1 Disconnecting the Power before Maintaining or Servicing the Chamber on page 26 for instructions to turn off the power.

3. Unscrew and remove the power connector from the receptacle of the fixture assembly containing the lamp to be changed (Figure 6-1).
4. Use a Phillips screwdriver to loosen the top and bottom bracket screws (Figure 6-2).

Figure 6-1 Power Cable

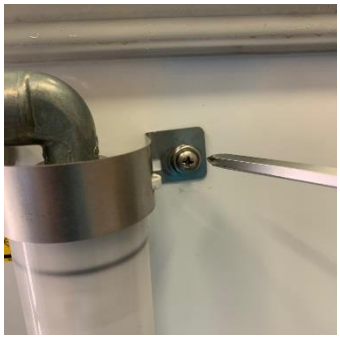

Figure 6-2 Loosen the Screws

5. Remove the brackets. The lamp fixture assembly should remain in place (Figure 6-3).
6. Use a 1/4″ wrench to loosen the hex-head cap screws (Figure 6-4) on the top and bottom of the lamp fixture assembly, and remove the end caps.
7. Empty the contents of the lamp fixture assembly (Figure 6-5).

Figure 6-3 Remove the Brackets

Figure 6-4 Remove the Hex-Head Screws

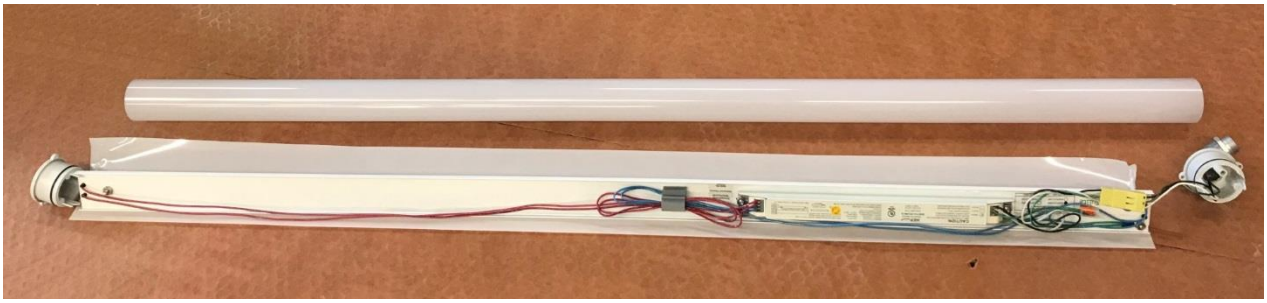

Figure 6-5 Remove the Lamp Fixture Contents

To replace a fluorescent or an LED lamp:

1. Unlock the tube by rotating it one quarter turn and then carefully remove the used lamp.
2. Install the new lamp by carefully inserting it into the receptacle and secure it in place by rotating it one quarter turn.
3. Dispose of the used lamp(s) following local requirements, or contact the local authorities for proper disposal procedures.

To re-install the lamps:

1. Slide the plastic cover into the tube, ensuring that the cover does not twist during insertion.
2. Slide the fixture into the tube with the bulb facing the plastic cover.

Figure 6-6 Slide the Lamp Fixture Into the Tube

3. Align the slots on the bottom end cap with the fixture (Figure 6-7), and press the end cap into the tube (Figure 6-8).
4. Tighten the bottom end cap screws (Figure 6-9).

Figure 6-7 Align the Slots

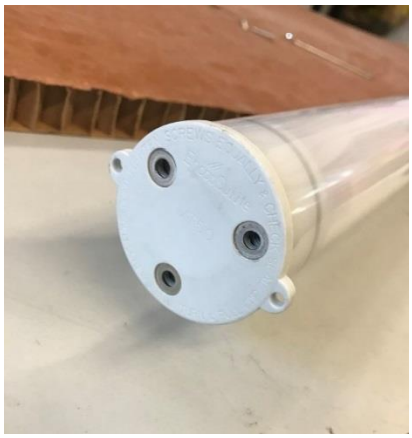

Figure 6-8 Press On the Caps

Figure 6-9 Tighten the Screws

5. Align the slots on the top end cap with the fixture (Figure 6-10) and press the top end cap into the tube.

6. Tighten the top end cap screws (Figure 6-11).

Figure 6-10 Align the End Cap with the Fixture

Figure 6-11 Tighten the End Cap Screws

7. Insert the lamp fixture assembly back into the clamp on the wall or door (Figure 6-12).
8. Secure the fixture in place with the brackets (Figure 6-13).
9. Reconnect the power cable (Figure 6-14).

Figure 6-12 Install the Fixture

Figure 6-13 Install the Brackets

Figure 6-14 Connect the Power

10. Turn on power to the chamber and test the light.

6.4 Calibrating the Temperature and Humidity Sensor

Conviron recommends that the temperature and humidity sensor be calibrated yearly. Contact Conviron Service for more information.

6.5 Performing Maintenance in the Machine Compartment

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

To perform maintenance in the machine compartment:

1. Turn the power to the chamber OFF. Refer to Section 6.1 Disconnecting the Power before Maintaining or Servicing the Chamber on page 26 for instructions to turn off the power.
2. Use a ladder to access to the top of the chamber. Do not stand on the chamber.
3. Remove the screws from the perimeter of the top compartment cover.

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.

4. Lift the front edge of the cover, using the handle provided.
5. Slide the cover off and carefully lower the cover down to the floor.
6. Perform the required maintenance.
7. 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.

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

6.6 Maintaining the Optional 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.

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 6-15, Detail A).
2. Remove the USH access panel at the back of the chamber by loosening the four captive thumb screws (Figure 6-15, Detail B).
3. Gently pull the USH tank out of the back of the chamber, being careful not to tip the box (Figure 6-15, Detail C and D).

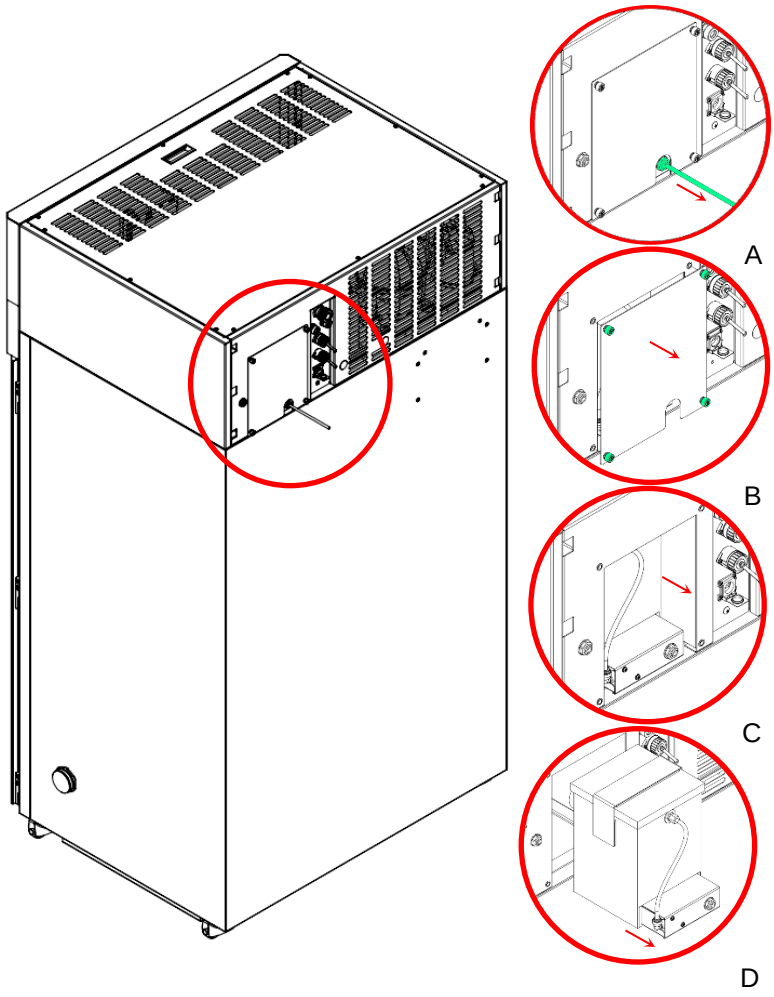

Figure 6-15 Remove the USH Box from the Chamber

4. Detach the hook and loop side straps and remove the USH box lid (Figure 6-16).

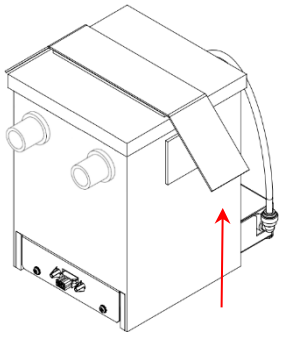

Figure 6-16 Remove the USH Box Lid

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 diluted vinegar solution.

7. Dry the interior surfaces.

To replace the ceramic discs:

1. Contact Conviron to order the USH disc replacement kit (PN 291617).
2. Place USH puck key into the corresponding slots of the disc ring (Figure 6-17) 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.

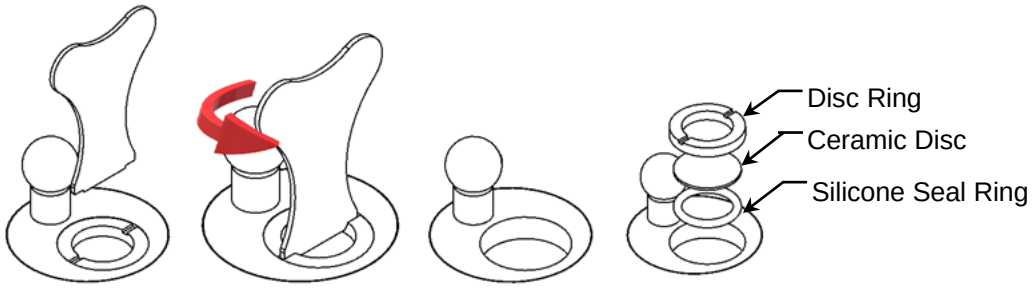

Figure 6-17 Ceramic Disc Replacement

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.

6.7 Adjusting the Door

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

The door gaskets must seal completely and the door hinges must be properly aligned to maintain conditions within the chamber.

Refer to the *Conviron Chambers Maintenance & Troubleshooting Manual* for more information on testing the door and adjusting the door gasket.

6.8 Cleaning the Optional 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 Fresh Air Inlet Filter

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

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

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 label on the left-hand side of the chamber, available when requesting Service.

7.1 Troubleshooting the Chamber

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 to determine the cause of the problem.

Chamber won't start	
1. Check that the mains breaker for the chamber is ON.	
2. Check the circuit breaker at the building electrical panel.	
3. Ensure the program is set and running in the controller and the start/stop switch is ON.	
4. Check the temperature limit settings and ensure they are outside the program range.	
Still won't start	Contact service or Conviron.

Chamber won't cool	
1. Check that the ambient temperature is below 35°C.	
2. Ensure that the door is firmly closed.	
Still won't cool	Contact service or Conviron.

Chamber won't heat	
1. Check that the ambient temperature is above 20°C.	
2. Ensure that the door is firmly closed.	
Still won't heat	Contact service or Conviron.

Chamber won't make humidity	
1. Ensure that the door is firmly closed.	
2. Ensure that the fresh air and exhaust ports are closed.	
3. Check the water supply to the rear of the chamber.	
Still no humidity	Contact service or Conviron

Chamber lamp won't light up after replacement
Possible defective ballast
Contact service or Conviron

7.2 Fuse Schedule

Fuse	Description	Conviron 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

8 TECHNICAL SPECIFICATIONS

Conviron maintains a policy of continual improvement and reserves the right to change the technical characteristics of the GEN1000 without prior notice.

Specifications	**GEN1000-GE**
Chamber Crated Weight (lbs. / kg)	700 / 318
Exterior Dimensions	
Height (in. / mm)	77 / 1956
Width (in. / mm)	41 / 1040
Depth (in. / mm)	32.5 / 825
Interior Dimensions	
Height (in. / mm)	52.5 / 1330
Width (in. / mm)	37.5 / 953
Depth (in. / mm)	24.3 / 617
Volume (ft^3 / L)	27.6 / 78
Power Requirements	
The chamber will tolerate ±10% voltage fluctuation from the rated voltage on the serial plate. A voltage stabilizer must be used if the fluctuation is greater than ±10%.	
60 Hz, fixed cord with plug	120Vac, 1Ph, N, PE, 60Hz, 20A, NEMA 5-20 plug
50 Hz, fixed cord without plug	230Vac, 1Ph, N, PE, 50Hz, 16A
Customer Alarm Contact	230Vac, 0.5A

Environmental Requirements	
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-GE chamber rating plate, located on the left-hand side of the chamber. Please have the Serial Number available when requesting service.

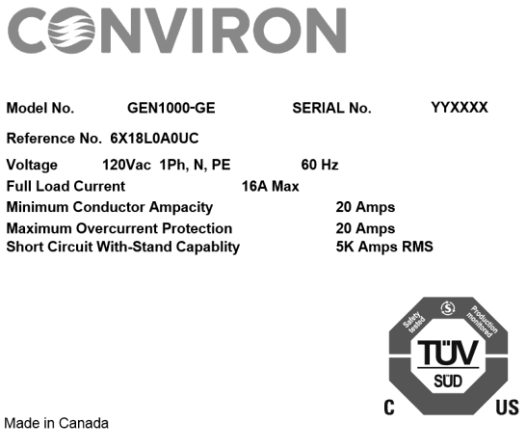

Figure 8-1 Sample GEN1000-GE Rating Plate

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
∅	Greek letter Phi – SI prefix for electrical phase
µ	Greek letter Mu – SI prefix for micro
°C	Celsius degrees
A	Amperes
AR	Arabidopsis
CFC	Chlorofluorocarbon
CM	Central Management System
COMM	Connection to LAN
EMI	Electro Magnetic Interference
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^2/s	Light intensity
mm	Millimeter
OD	Outside Diameter
PE	Protective Earth – mandatory ground connection
PG	Plant growth, for use with tall plants
ppm	Parts per million - used a unit of measurement for CO_2 concentration
psi	Pounds per square inch
PVC	Poly Vinyl Chloride

Term	Definition
RH	Relative Humidity
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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