



GEN1000

OPERATOR MANUAL

287960-ENG R00

GEN1000

OPERATOR MANUAL

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

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PREFACE

Welcome to the GEN1000 Operator Manual.

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

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

Latest Manual Versions and Languages

For the latest version of this and other manuals, please visit www.convirion.com.

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

Functional Description/Intended Use

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

WEEE and RoHS Compliance Statements

CONVIRON is committed to meeting all requirements of the WEEE directive (2012/19/EU).



Products labeled with the WEEE symbol (a crossed out "waste bin") indicate that the final user should not discard this product along with other household waste, but that it must be collected and treated separately.

Please contact Conviron, or your Conviron distributor, for proper handling and disposal instructions.

Conviron is committed to meeting all requirements of the RoHS directive (2011/65/EU). The RoHS directive requires that manufacturers eliminate or minimize the use of lead, mercury, hexavalent chromium, cadmium, polybromated biphenyls, and polybromated biphenyl ethers in electrical and electronic equipment sold in the EU after July 1, 2006.

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 "PLEASE NOTE" symbol is used to draw attention to additional information which may assist in the operation of the equipment.

SERVICE & TECHNICAL SUPPORT

Before contacting Convion, 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 Convion:
 - 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.convion.com for global service contact information.

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1 PRECAUTIONS



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

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

1.1 Hazard Identification Symbols


Table 1-1 Hazard Identification Symbols

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

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




1.2 General Precautions

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



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

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

	<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>Warning: Hot surface hazards</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>



Warning: Slip and fall hazard

Personal injury could result.

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



Warning: Optical radiation hazard

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

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

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



Warning: Electrical Shock Hazard

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

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



Water splash hazard

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

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

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

2 CHAMBER FEATURES

2.1 Configurations

The base GEN1000 chamber can be fitted with any of the following specially configured kits and each kit is also available with an LED lighting option:

- An SH kit is either a two-tier or an SH-XTIER three-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 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 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 IN kit is a four-tier configuration using horizontal airflow and 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 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™ or CMP-Link.

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

2.3 Air Intake and Exhaust

The chamber includes manually adjustable fresh air intake and exhaust ports to allow for chamber air exchanges. 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 Network Connectivity

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

2.6 Levelers

The unit is supplied with levelers to stabilize the chamber in its final location and compensate for variations in the finished floor.

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 Central Alarm Contact

The Central Alarm Contact (CAC) (Figure 3-49) 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 wire connections of the receptacle must be completed 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.

2.10 Options

The GEN1000 can be ordered with the following options:

- Additive Humidity – adds moisture to the chamber above the ambient level.
- CO₂ Additive – increases the chamber CO₂ level above ambient.
- CO₂ Monitoring – indicates the CO₂ level without controls or limits.
- 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.
- Dehumidification – removes excess humidity from the chamber.
- Lighting Options
 - SH – Fluorescent lighting for the Short Plant configuration.
 - SH LED – LED lighting for the Short Plant configuration.
 - TA - Fluorescent lighting for the Tall Plant configuration.
 - TA LED - LED lighting for the Tall Plant configuration.
 - TC - Fluorescent lighting for the Tissue Culture configuration.
 - TC LED - LED lighting for the Tissue Culture configuration.
 - IN – Fluorescent lighting for the Incubation configuration.
 - IN LED – LED lighting for the Incubation configuration.
- Light Sensor – allows for closed loop control of lighting intensity, measured in micromoles.
- Low Temperature – Low temperature operation of 2°C with the lights ON (No fresh air below 8°C.) A defrost cycle will occur resulting in a temperature increase for temperatures set below 10°C with the lights ON, 4°C with the lights OFF. Temperature spikes and defrost time are dependent on the chamber operating temperature. During this cycle, the lights will be turned off. When using fluorescent lighting, specified light intensity will diminish when the chamber is operating at low temperatures.



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

- 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 as an addition to the IN kit when used for insect research.
- SH-XTIER – additional canopy and shelf for the Short Plant configuration.

- Uninterruptable Power Supply (UPS) - provides surge protection and emergency power to the controller only in the case of a facility power interruption.
- 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.

3 INSTALLATION

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

3.1 Install the Chamber

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 2600W to ambient with the dehumidification option, and up to 2100W without dehumidification.

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

3.1.1 Chamber Clearance

- At least 1 ft. (300mm) must be left clear behind the back wall of the chamber.
- At least 1 ft. (300mm) must be left clear above 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 55 for details of the power configuration.

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



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

The overcurrent protection must be sized and installed by a 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	1/4" 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 forklift. In smaller facilities without access to a forklift, the shipping pallet may be ordered with an optional built-in ramp to unload the chamber.

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

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

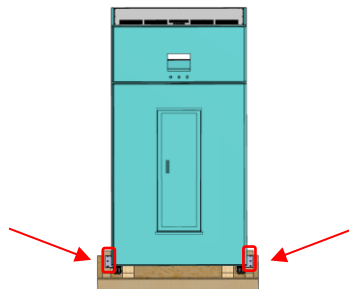


Figure 3-1 Remove the L-Brackets

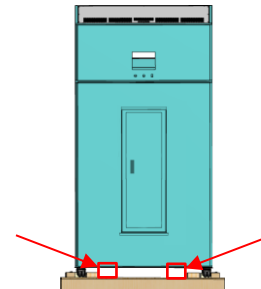


Figure 3-2 Position the Forks

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



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.

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



Warning: Personal injury hazard
Do not lose control of the chamber speed while removing it from the pallet.
At least two people are required to control the speed of the chamber while rolling it off the shipping pallet and down the ramp.



Panel 1



Panel 2



Panel 3



Panel 4



Panel 5



Panel 6

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

3.3 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, Panel B) to prevent the unit from rolling on its casters once installed, and to compensate for any variations in the floor level.



Panel A



Panel B

Figure 3-4 Chamber Levelers

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

To adjust the levelers:

1. Use a $\frac{3}{4}$ " (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 $\frac{1}{8}$ " (3mm) and no more than $\frac{1}{4}$ " (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 Configuration Kit Overview

The base GEN1000 chamber can be fitted with one of four specifically configured kits, each with airflow, lighting, and shelving designed to suit specific plants and applications. Each kit 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 enters the interior of the chamber through a rigid metal plenum in the rear wall of the chamber.

The SH and IN kits both use a perforated cover plate that distributes airflow from the plenum horizontally across multiple shelves.

The TA kit uses solid cover plates and distributes uniform upward airflow through the chamber floor.

The TC kit incorporates individual air-shelves that distribute air vertically to minimize condensation within petri dishes and containers. Figure 3-5 shows airflow, light intensity, and growth height comparisons between the four configurations.

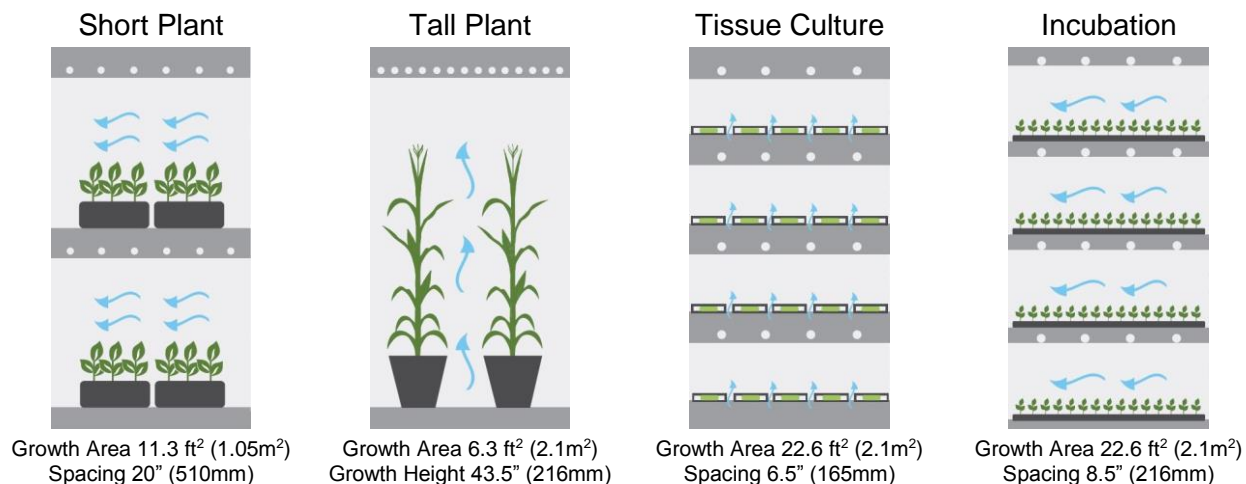


Figure 3-5 Chamber Airflow

3.5.2 Adjustable Wire Shelves and Lamp Canopies

Wire shelves are supported by four metal clips attached to the four pilaster strips inside the chamber (Figure 3-6).

Lamp canopy supports (Figure 3-7) are two long metal brackets attached between the 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 right side of the chamber interior. Control and power cables are color coded and equipped with unique connector plugs (Figure 3-7).

Light Canopy Control - Four small receptacles are used to control the lighting fixtures. The yellow plugs are mated with the receptacles and then pushed firmly together.

Light Canopy Power - Four large receptacles provide power to the lighting fixtures. The black plugs are mated with the receptacles and then screwed tightly together.

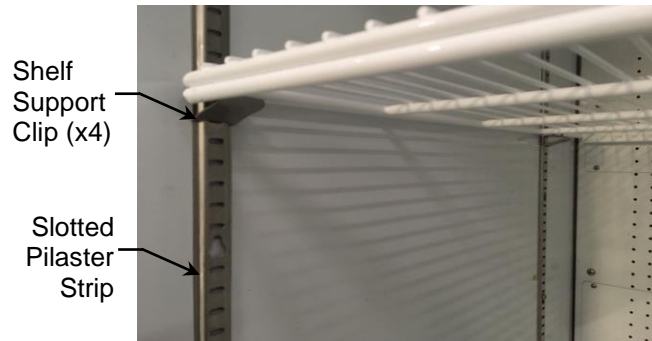


Figure 3-6 **Wire Shelf Supports**



Figure 3-7 **Canopy Supports and Connections**

3.5.3 Unifloor® (TA Kit)

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



Figure 3-8 Unifloor



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

3.6 Install the Light Canopies and Shelving Configuration Kits

Conviron chambers are configured onsite using one of four pre-packaged lighting and shelving kits; SH for short plants, TA, for tall plants, TC for tissue culture, or IN for incubator configuration.



Images used in the installation instruction may differ from the actual kit. However, the installation steps and procedures are the same.

3.6.1 SH Configuration

Horizontal airflow (Figure 3-5) across shelves optimizes growth area for shorter plants by forcing the air through the perforated interior rear wall of the chamber. Cover plates are installed over the opening in the rear wall to provide an even airflow.

The SH configuration may include an optional extra shelf and light canopy. The optional LED lighting canopies are installed the same way as fluorescent light canopies.



Figure 3-9 SH Configuration



Figure 3-10 SH X-TIER Configuration

To install the SH configuration kit:

The SH configuration may include an optional extra shelf and fluorescent light canopy (Figure 3-10).

These basic installation instructions apply to all SH configuration shelf and lighting combinations.

1. Confirm that air flow through the plenum is open (Figure 3-11). The plenum must be open for air to flow correctly in the SH configuration.



The chamber is shipped with the plenum open by default. To confirm that the plenum is open, do one of the following;

Confirm that the center locking knob (Figure 3-11) on the rear wall of the chamber is in the down position.

OR

Look through the perforated holes. If you can see through them, the plenum is open. If not, the plenum is closed.

2. Use 12 screws to attach each perforated cover plate to the rear wall, covering the openings in the rear wall (Figure 3-13).

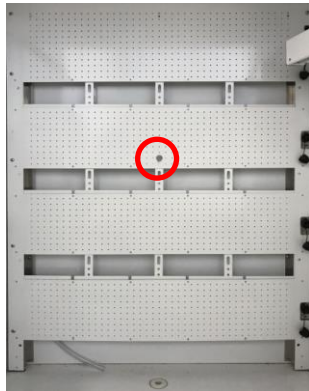


Figure 3-11 Open Plenum

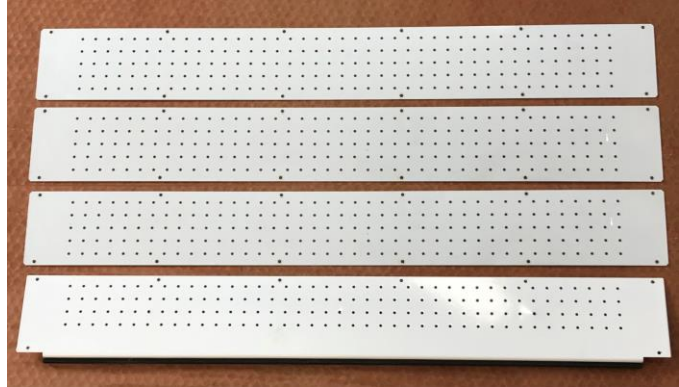


Figure 3-12 Perforated Cover Plates



The cover plates are not all interchangeable. The three flat plates, shown at the top of Figure 3-12, must be installed over the top three openings. The cover plate with the bottom flange and gasket, shown at the bottom of Figure 3-12, must be installed over the bottom opening.

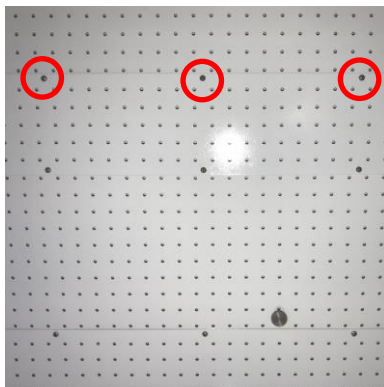


Figure 3-13 Cover Plate Screw Detail



To create equidistant growth height on each tier, 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.

3. Starting at the bottom of the chamber, install the shelf-clips (Figure 3-14) 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 3-14 Install the Shelf Clips



Ensure the 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.

4. Install a wire shelf on top of the wire shelf clips. Be careful not to scratch the painted white finish (Figure 3-15).



Figure 3-15 Shelf Installed onto Clips

5. Repeat steps 3 and 4 for the remaining clips and shelves.
6. Install the canopy support brackets (Figure 3-16) 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 3-16 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.

7. Place the canopy onto the canopy support brackets. Ensure the connection cables are on the right-hand side of the chamber (Figure 3-17). Repeat each additional canopy as required.
8. To ensure safe and efficient operation of the canopy, the control and power cables must be plugged into the correct receptacles, as shown in Figure 3-18 and Figure 3-19.



Figure 3-17 **Install the Canopies**

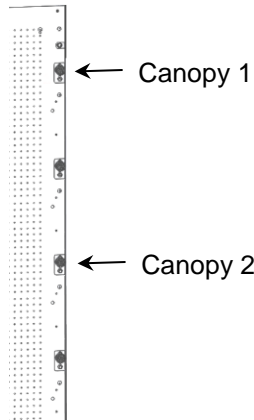


Figure 3-18 **SH Canopies**

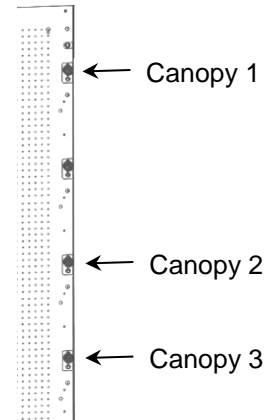


Figure 3-19 **SH X-Tier**



Figure 3-20 **Control Connection**



Figure 3-21 **Power Connection**

9. Plug the yellow canopy control cable into the small receptacle on the right-hand side of the chamber (Figure 3-20).
10. Unscrew the receptacle protective cover and plug the black canopy power cable plug into the large receptacle on the right-hand side of the chamber (Figure 3-21).

3.6.2 TA Configuration

The TA configuration uses solid plenum cover plates and a perforated floor to direct the airflow upward through the plant material.



Figure 3-22 TA Configuration

To install the TA configuration kit:

1. Close the air flow from the plenum.
 - a. Loosen the 12 bolts around the perimeter of the plenum, and then turn the center locking knob counter-clockwise to loosen it.
 - b. Use the knob to slide the plenum up, tighten the knob, and then re-tighten the 12 bolts around the perimeter.
2. Use 12 screws to attach each solid cover plate to the rear wall, covering the openings in the rear wall.



The cover plates are not all interchangeable. The three large plates, shown at the top of Figure 3-23, must be installed over the top three openings. The small cover plate, shown at the bottom of Figure 3-23, must be installed over the bottom opening.



Figure 3-23 Solid Cover Plates

3. Install the Unifloor. Air will flow upward through the unifloor into the chamber.
4. Install the canopy support brackets (Figure 3-24) 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 3-24 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.

5. Place the canopy onto the canopy support brackets. Ensure the connection cables are on the right-hand side of the chamber (Figure 3-25).
6. To ensure safe and efficient operation of the canopy, the control and power cables must be plugged into the correct receptacles, as shown in Figure 3-26.



Figure 3-25 **Install the Canopies**

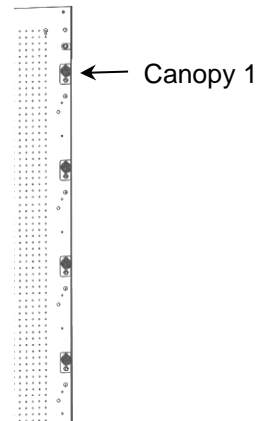


Figure 3-26 **TA Canopy Connection**

7. Plug the yellow canopy control cable into the small receptacle on the right-hand side of the chamber (Figure 3-27).
8. Unscrew the receptacle protective cover and plug the black canopy power cable plug into the large receptacle on the right-hand side of the chamber (Figure 3-28).



Figure 3-27 **Control Connection**



Figure 3-28 **Power Connection**

3.6.3 TC Configuration

The TC kit distributes air vertically through the individual air-shelves to minimize condensation within petri dishes and containers. Arrange the air-shelves and light canopies to provide a growth height of 6.5" (16.5cm).



Figure 3-29 TC Configuration

To install the TC configuration kit:

1. Close the air flow from the plenum.
 - a. Loosen the 12 bolts around the perimeter of the plenum, and then turn the center locking knob counter-clockwise to loosen it.
 - b. Use the knob to slide the plenum up, tighten the knob, and then re-tighten the 12 bolts around the perimeter.
2. Use 12 screws to attach each slotted cover plate to the rear wall, covering the openings in the rear wall.



The cover plates are not all interchangeable. The three flat plates, shown at the top of Figure 3-30, must be installed over the top three openings. The cover plate with the bottom flange and gasket, shown at the bottom of Figure 3-30, must be installed over the bottom opening.



Figure 3-30 Slotted Cover Plates

3. Install an air shelf.
 - a. Starting at the bottom, place the bottom-rear lip into the slats in the cover plate. Line up the holes by shifting the shelf left/right as needed.
 - b. Hold the shelf level and place the left and right brackets into the appropriate slots in the pilaster.
 - c. Using a ratchet, and working from underneath the shelf, fasten the brackets to the shelf.



Figure 3-31 Air Shelf Bracket

4. Secure the air shelf to the cover plate.
5. Install wire shelf clips into the pilaster using the notch immediately above the air shelf.
6. Secure a wire shelf on top of the wire shelf clips. Be careful not to scratch the white finish.



Figure 3-32 Shelf Installed onto Clips

7. Repeat steps 3 through 6 for the remaining shelving units.
8. Install the canopy support brackets (Figure 3-33) 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 3-33 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.

9. Place the canopy onto the canopy support brackets. Ensure the connection cables are on the right hand side of the chamber (Figure 3-34). Repeat for each additional canopy as required.
10. To ensure safe and efficient operation of the canopy, the control and power cables must be plugged into the correct receptacles, as shown in Figure 3-35.



Figure 3-34 **Install the Canopies**

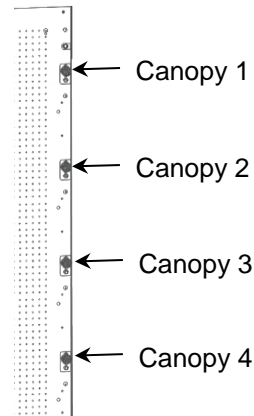


Figure 3-35 **TC Canopy Connection**



Figure 3-36 **Control Connection**



Figure 3-37 **Power Connection**

11. Plug the yellow canopy control cable into the small receptacle on the right-hand side of the chamber (Figure 3-36).
12. Unscrew the receptacle protective cover and plug the black canopy power cable plug into the large receptacle on the right-hand side of the chamber (Figure 3-37).
13. Repeat steps 8 through 11 for each remaining canopy.

3.6.4 IN Configuration

The IN kit uses perforated cover plates to distribute airflow horizontally across multiple shelves from back to front.



Figure 3-38 IN Configuration

To install the IN configuration kit:

1. Confirm that air flow through the plenum is open (Figure 3-39). The plenum must be open for air to flow correctly in the IN configuration.



The chamber is shipped with the plenum open by default. To confirm that the plenum is open, do one of the following;
Confirm that the center locking knob (Figure 3-39) on the rear wall of the chamber is in the down position.

OR

Look through the perforated holes. If you can see through them, the plenum is open. If not, the plenum is closed.

2. Use 12 screws to attach each SH cover plate to the rear wall, covering the openings in the rear wall (Figure 3-41).

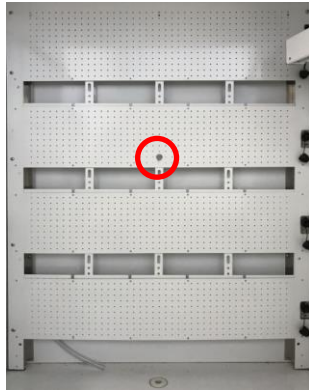


Figure 3-39 **Open Plenum**

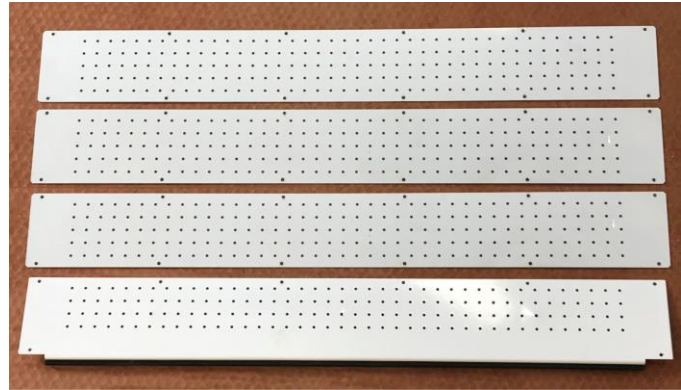


Figure 3-40 **Perforated Cover Plates**



The cover plates are not all interchangeable. The three flat plates, shown at the top of Figure 3-40 must be installed over the top three openings. The cover plate with the flange and the gasket, shown at the bottom of Figure 3-40 must be installed over the bottom opening.

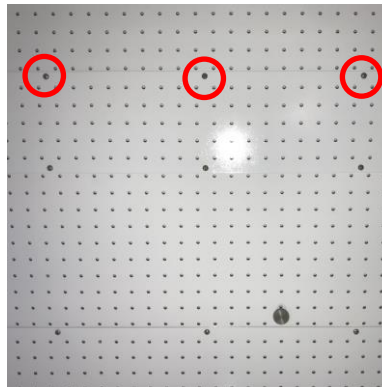


Figure 3-41 **Cover Plate Screw Detail**

3. Starting at the bottom of the chamber, install the shelf clips (Figure 3-42) for the appropriate number of shelves 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 3-42 Install the Shelf Clips



Ensure the 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.

4. Install a wire shelf on top of the wire shelf clips. Be careful not to scratch the painted white finish (Figure 3-43).



Figure 3-43 Shelf Installed onto Clips

5. Repeat steps 3 and 4 for the remaining clips and shelves.
6. Install the canopy support brackets (Figure 3-44) for the appropriate number of canopies 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 3-44****Install the Canopy Support Brackets**

Ensure the canopy support brackets clips 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.

7. Place the canopy onto the canopy support brackets. Ensure the connection cables are on the right-hand side of the chamber (Figure 3-45). Repeat for each additional canopy as required.
8. To ensure safe and efficient operation of the canopy, the control and power cables must be plugged into the correct receptacles, as shown in Figure 3-46.

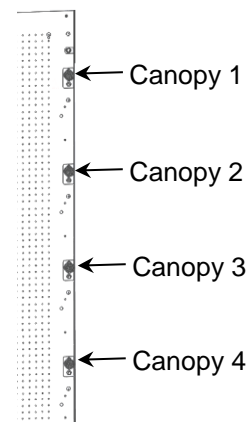
**Figure 3-45****Install the Canopies****Figure 3-46****IN Canopy Connection**



Figure 3-47 Control Connection



Figure 3-48 Power Connection

9. Plug the yellow canopy control cable into the small receptacle on the right-hand side of the chamber (Figure 3-47).
10. Unscrew the receptacle protective cover and plug the black canopy power cable plug into the large receptacle on the right-hand side of the chamber (Figure 3-48).
11. Repeat steps 8 through 10 for each remaining canopy.

3.7 Remove the Light Canopies and Shelves

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

3.7.1 Remove a Wire Shelf

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

3.7.2 Remove a Wire Shelf Clip

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

3.7.3 Remove an Air Shelf

1. Use a #2 Phillips screwdriver to 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.

3.7.4 Remove an Air Shelf Bracket

1. Use a #2 Phillips screwdriver to remove the screws from the clips.
2. Tilt the clip upwards to unhook the top of the bracket.

3.7.5 Remove 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.

3.7.6 Remove a Cover Plate

1. Using a Phillips bit, remove the screws that secure the cover plate to the plenum.
2. Remove the cover plate from the chamber.

3.8 Connect the UPS, Communication, and Central Alarm Contacts

Connect the UPS, communication, customer alarm, and condensate pump connectors to the ports on the rear of the chamber as shown in Figure 3-49 and described in Table 3-2.

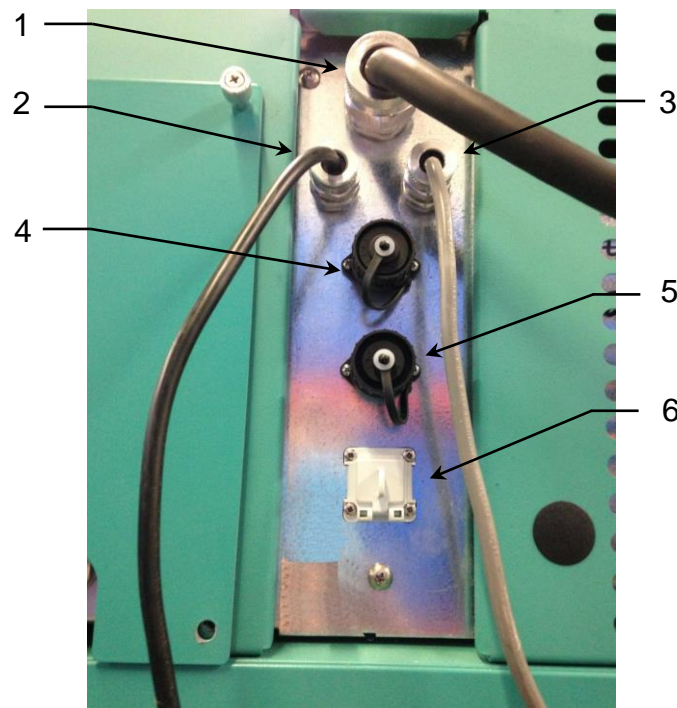


Figure 3-49 Back Panel Connections

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 are not be used for any other purpose.
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	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.

3.9 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 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 60 Hz power cord:

- Handle the power cord carefully and protect it from damage.
- Hold 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 to the chamber. Ensure that the chamber is operating properly before introducing any research material.

4.1 Power ON



Before powering ON, ensure all mechanical, fluid, communication, 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, water, and CO₂ 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.

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 *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.

5 OPERATION

The following description and instructions provide an overview of basic operation of the chamber.

5.1 Control and Monitoring

The GEN1000 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 Fluorescent and LED Lighting

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

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

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



Warning: Optical radiation hazard

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

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

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

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

**Warning: Burn hazard**

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

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

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

5.3 Lighting 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 Fluorescent Lighting

The standard lighting configuration consists of fluorescent lamps to provide a balanced spectrum for plant growth. The lighting is programmable in steps, dimmable from 10% to 100% of maximum output.

The fluorescent tubes are individually replaceable, as required.

5.3.2 LED Lighting – LED Option

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

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



LED tubes are not compatible with GEN1000 fluorescent canopies. Conversely, fluorescent lamps are not compatible with GEN1000 LED canopies.



Contact Conviron for LED tube replacement.

5.3.3 Closed Loop Dimmable Lighting System

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

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 manufacturing process.



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

5.4 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

5.5 Instrumentation Port

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



The instrumentation port is intended for low-voltage wires only. Conviron does not recommend the 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 ft³/min (0.57m³/min) of air exchange.

The fresh air inlet assembly contains a foam filter to help prevent light, dust, and larger particulate matter from entering the growth area. This filter should be cleaned monthly to prevent a build-up of foreign material that could restrict airflow. Refer to the *Convicon Chambers Maintenance & Troubleshooting Manual* for more information.

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. Refer to Section 3.6 Install the Light Canopies and Shelving Configuration Kits, starting on page 15 for installation instructions.

5.9 Bypass Dehumidification – BDH Option

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

5.10 Additive Carbon Dioxide Control – CO₂ Option

The Carbon Dioxide control option provides additive control of CO₂. It includes a sensor connected to the control system and a solenoid controlled injection system to elevate CO₂ levels in the chamber.

The level of CO₂ in the chamber is displayed in parts per million (ppm) on the control screen and is programmed the same way as temperature and humidity. CO₂ is monitored continuously as long as the control system is active.

5.10.1 Set up the Additive CO₂ Control

CO₂ control requires a high-pressure and a low-pressure regulator. In most chambers, the low-pressure regulator and the solenoid assembly are located above in the machine compartment and are factory set at 2 pounds per square inch (psi).



Do not adjust this setting.

The high-pressure regulator is located on the customer-supplied CO₂ line. This regulator comes in two styles of flow meters, a dial gauge or a glass tube and ball style. In North America, Convicon provides the high-pressure regulator. Outside North America, the customer supplies the high-pressure regulator due to different thread sizes on the CO₂ line.



Do not adjust the regulator on the CO₂ tank once it has been set up.

Close the main valve on the CO₂ tank when it's not in use.

5.10.2 Adjust the CO₂ Control

There are two variables to consider: programming desired CO₂ concentration and control of air flow through the chamber.

Programming the CO₂ setpoint is as easy as programming temperature or relative humidity. Values are entered in parts per million in the CO₂ zone on the Main Status Program Screen of the control system. The Vaisala™ CO₂ monitor operates in two ranges, up to 2000 ppm and up to 3000 ppm.



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

Ambient CO₂ levels are usually at least 350 ppm and can be higher, depending on proximity to other CO₂ sources such as human beings or automobiles. The CO₂ concentration in the

chamber can never be less than the ambient concentration because CO₂ control is additive only.

Closing fresh air into and exhausting air out of the chamber is important to achieving desired CO₂ concentrations. Failure to consider this will lead to undesired results.

To adjust the CO₂ control:

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

5.11 Central Management System – CMS Option

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

5.12 Shutdown

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, to minimize unnecessary electricity consumption, ensure all plants and soil are removed from the 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.

6 MAINTENANCE

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



Warning: Read and understand the product manuals before moving, installing, operating, or servicing this equipment.
Failure to follow these instructions could result in equipment damage, serious personal injury, or death.
The manual contains safety information that must be understood and followed before working with the product.



Warning: Electrical shock hazard during maintenance or service.
Serious personal injury or death could result from contacting live electrical circuits.
Turn the power to the chamber OFF at the mains panel before performing maintenance or service on this chamber.



Warning: Rotating blade hazard
Opening the access panel results in exposure to rotating fan blades. Serious personal injury could result from contact with the rotating fan blades.
Remove power from the chamber before servicing. Do not perform maintenance within the machine compartment with the power connected. The condenser fans on air-cooled units have exposed fan blades which are a hazard when the top cover of the machine compartment is open and power is connected.



Only qualified trades or facility personnel, who have read and completely understand these instructions, should perform the required installation work following acceptable safety standards.
Contact the responsible party, or Convion, immediately if in doubt about safe operation and/or maintenance of the equipment.



Warning: Potential hand injury
The machine compartment, which is not user accessible, may include a fan without a guard. Contact with the sharp edges of the fan could result in lacerations.
Do not contact the sharp edges of the fan compartment.



Warning: Burn hazard

Personal injury could result from contacting hot surfaces within the chamber. The refrigeration system components and heater element become hot during normal operation. Allow the hot refrigeration components and heater elements to cool to the touch before service.



Warning: Potential user injury after service

Personal injury to the users could result from not replacing the access panels after service. Ensure the access panels are replaced and secure before operating the chamber after service.

6.1 Disconnect 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 Clean 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.

6.3 Replace Fluorescent or LED 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 a fluorescent tube:

1. Identify the tube(s) to be replaced.
2. Turn the power to the chamber OFF. Refer to Section 6.1 Disconnect the Power Before Maintaining or Servicing the Chamber on page 46 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.

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 Disconnect the Power Before Maintaining or Servicing the Chamber on page 46 for instructions to turn off the power.
3. Unlock the tube by rotating it one quarter turn, and then carefully remove it from its receptacle.
4. Install the new tube. Orient the positive end of the tube as described on the label on the canopy (Figure 6-1).



Figure 6-1 **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.

6.4 Perform 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 Disconnect the Power Before Maintaining or Servicing the Chamber on page 46 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 12 screws, three on each of the four sides, from the perimeter of the top compartment cover (Figure 6-2).



Figure 6-2 Remove the Screws from the Top 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.
8. Re-install the cover screws to secure the cover to the chamber.

6.5 Maintain the Ultrasonic Humidity System (USH)

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

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

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

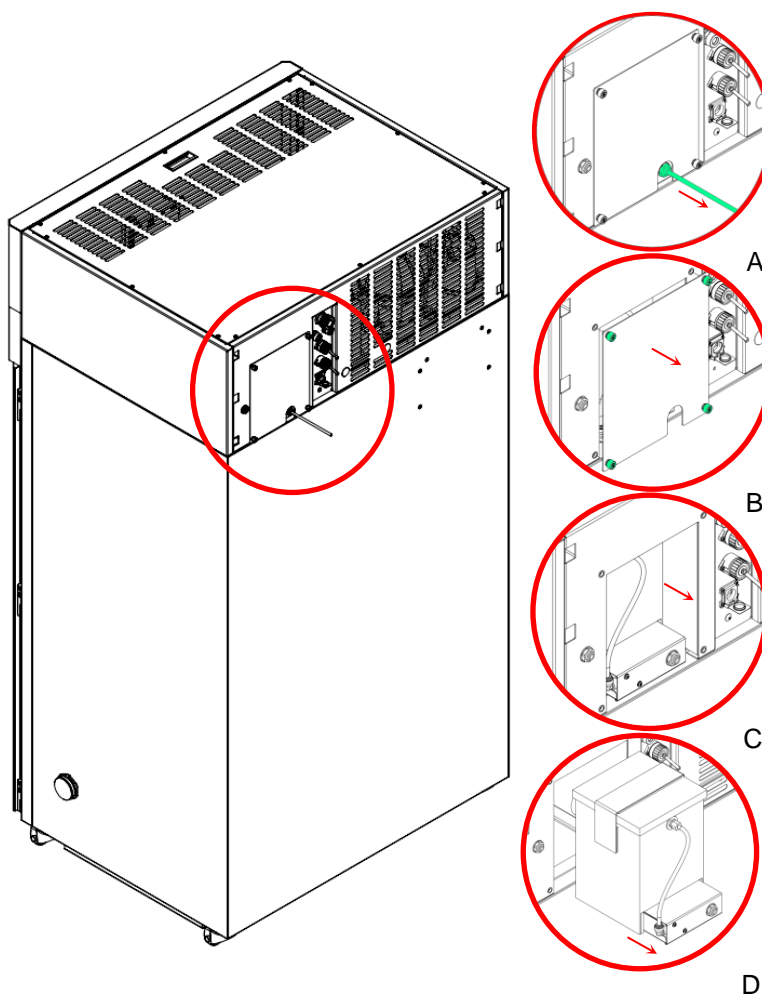


Figure 6-3 Remove the USH Box from the Chamber

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

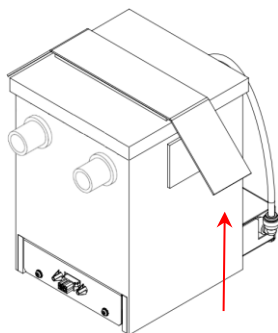


Figure 6-4 Remove the USH Box Lid

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 discs replacement kit (PN 236411).
2. Place USH puck key into the corresponding slots of the disc ring (Figure 6-5) 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.

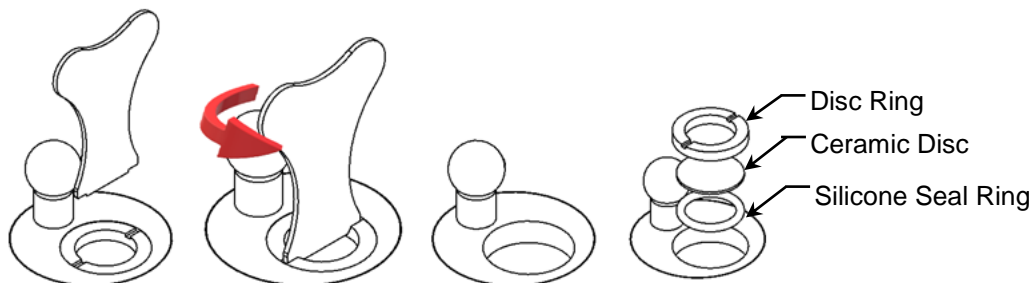


Figure 6-5 Ceramic Disc Replacement



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

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

6.6 Calibrate the Temperature and Humidity Sensor

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

6.7 Adjust the Door



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

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

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

6.8 Clean the Condensate Pump and Condensate Pan



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

Clean the optional condensate pump and condensate pan regularly.

To clean the condensate pump and pan:

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

7 TROUBLESHOOTING



Convion 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.

7.1 Troubleshooting Steps

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 Convion.

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 Convion.

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 Convion.

Chamber won't make humidity

1. Ensure that the door is firmly closed.
2. Ensure that the fresh air ports are closed.
3. Check the water supply to the rear of the chamber.

Still no humidity Contact Convion.

Chamber lamp won't light up after replacement

Possible defective ballast

Contact Convion

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 - 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

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

Specifications	GEN1000			
	Short Plant (SH)	Tissue Culture (TC)	Tall Plant (TA)	Incubator (IN)
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	120Vac, 1Ph, N, PE, 60Hz, 20A			
60 Hz dehumidification	120Vac, 1Ph, N, PE, 60Hz, 30A			
50 Hz	230Vac, 1Ph, N, PE, 50Hz, 16A			
Customer Alarm Contact	230Vac, 0.5A maximum			

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

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

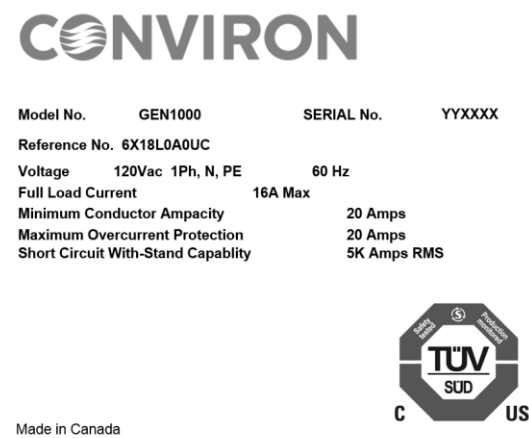


Figure 8-1 **Sample GEN1000 Rating Plate**

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 relative humidity level
Ø	Greek letter Phi – SI prefix for electrical phase
μ	Greek letter Mu – SI prefix for micro
°C	Celsius degrees
A	Amperes
AC	Air-cooled Condenser unit
AR	Arabidopsis
CFC	Chlorofluorocarbon
CM	Central Management System
COMM	Connection to LAN
EMI	Electro Magnetic Interference filter
ESD	Electrostatic Discharge
EU	European Union
Gph	Gallons per hour
GR	Ground
Hz	Hertz
ID	Inside Diameter
L/hr	Liter per hour
Lpm	Liter per minute
micromole/m 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

Term	Definition
psi	Pounds per square inch
PVC	Poly Vinyl Chloride
RoHS	Restriction of Hazardous Substances Directive
TC	Tissue Culture
UPS	Uninterruptable Power Supply
USH	Ultra Sonic Humidifier
V	Volts
WC	Water Cooled condenser unit
WEEE	Waste Electrical and Electronic Equipment

9.2 Disposal



The chamber is made up of metal and plastic parts, fluids, and electronic components. In compliance to the European Union directive 2012/19/EC issued on July 4th, 2012, please contact Conviron, or your Conviron distributor for proper handling and disposal instructions.



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Management System Certified to ISO9001

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