CONVIRON®

PGW40

OPERATOR MANUAL

296742-ENG R00

PGW40

OPERATOR MANUAL

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

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PREFACE

Welcome to the PGW40 Operator Manual.

This manual describes the features and use of PGW40 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.conviron.com.

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

Functional Description

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

WEEE and RoHS Compliance Statements

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

RoHS Compliance

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

Document Conventions

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

- Wherever possible, textual descriptions are accompanied by photographs or line drawings of the 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.

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 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 rear 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/contact-us 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 list precautions intended to help guide the user 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 "**ELECTROSTATIC DISCHARGE**" symbol is used to identify equipment which is sensitive to electrostatic discharge.
	The **"BURN HAZARD/HOT SURFACE"** symbol is used to identify surfaces which are hot enough to cause personal injury.
	The "**SLIPPERY SURFACE**" symbol is used to identify a potential hazard caused by a slippery surface.
	The "**MOVING PARTS**" symbol is used to identify a potential hazard from moving parts inside the machine compartment.
	The **"PROTECTIVE EARTH-GROUND"** symbol is used to identify the protective earth connection.

Symbol	Description
	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.
	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 "**WEAR EYE PROTECTION-MANDATORY ACTION**" symbol is used to identify areas where eye protection is mandatory.
	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 Safety Warnings

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.

Only authorized personnel, who have been trained on the proper operation and/or operation and maintenance of the equipment and who have read and understood this manual set, should operate and maintain this equipment.

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

1.3 Operational Safety Warnings and Precautions

	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 cabinet. Operate your Conviron equipment for a minimum of 5 days BEFORE introducing any research material to ensure proper and stable operation. Avoid direct contact with any broken fluorescent lamps. Fluorescent lamps are extremely fragile and may emit harmful vapors when broken. Follow all applicable local environmental regulations and guidelines for disposal of hazardous material. If in doubt, contact local authorities for proper disposal procedures. DO NOT allow water or liquids to contact any electrical components. Ensure that there are no obstacles in the path of the canopy before moving it.
	DO NOT touch the lamps. Lamps operate at high temperatures and present a burn hazard. DO NOT touch the lamp holders. The heated metal and glass present a burn hazard. Ceramic metal halide and high-pressure sodium lamps operate at very high temperatures. DO NOT touch the heaters. The hot surface presents a burn hazard.
	DO NOT look directly at the ceramic metal halide lamps while in operation. Use adequate eye protection for the concerned wavelengths of Actinic UV, Blue Light and Infrared. Also wear protective clothes and gloves. Alternatively, the operator may turn off the ceramic metal halide lamps through the control panel user interface while accessing the cabinet.
	Keep all body parts out of the path of any canopy in motion.
	Operate your Conviron equipment for a minimum of five days before introducing any research material to ensure proper and stable operation.

1.4 Maintenance Safety Warnings

	Only qualified trades-people, i.e. electricians, plumbers, refrigeration mechanics, etc. should perform installation work as required, according to local codes and regulations. DO NOT attempt to install or maintain this equipment without the appropriate knowledge and expertise. DO NOT over-tighten the cam locks. The cam locks could be rotated to the point where they no longer properly engage their receptacles. Ensure that the drain connections are secure BEFORE operation if the cabinet is equipped with a separate coil dehumidifier. Inspect all connections in the machine compartment BEFORE connecting the equipment to the building utilities.
	Conviron recommends waiting at least 10 minutes after powering off the equipment before servicing the heater elements or related components.
	DO NOT service the control panel without using proper ESD procedures, including the use of a grounding strap and/or anti-static mat.
	Use only original replacement parts when maintaining and servicing the equipment.
	Follow all applicable local environmental regulations and guidelines for disposal of hazardous material. If in doubt, contact local authorities for proper disposal procedures.

2 CHAMBER FEATURES

2.1 Cabinet Details and Features

Figure 2-1 shows an oblique view of the fully assembled PGW40 chamber.

Exterior
Enamel baked on galvanized steel
Interior
White enamel baked on smooth galvanized steel
Highly reflective, easy to clean

Counterbalanced Light Canopy
Fluorescent, CMH, and LED options available

Side Mounted Machine Compartment

Touch Screen Controller

Fresh Air/Exhaust Air Ports

Figure 2-1 PGW40 Chamber Details & Features

2.2 Control System

The CMP6060 control system provides advanced programming capabilities, allowing ramping or stepping of environmental conditions to match research requirements. User programmable “set and forget” alarms track the chamber’s operation relative to user defined setpoints. Visual and audible notifications provide a further level of protection. For remote monitoring and control, the chamber comes ready to communicate with Conviron’s Central Management System.

Alternatively, you may have an Argus control system. The Argus system brings together all monitoring and control of research compartments, greenhouses, growth chambers, and related areas under a unified central command complete with intelligent integration of shared resources such as water and energy systems. The technology provides a unique mix of advanced climate control, irrigation, and nutrient management capabilities to support agricultural and horticultural research activities.

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

2.3 Airflow and Ventilation

The units include fresh air intake and exhaust ports which are adjustable to allow up to 55 ft^3/min (1.55m^3/min) of air exchange. The standard chamber configuration exhausts air to ambient, with no additional connection required. Chambers with the CO_2 or the LT/ULT option have automatic dampers

2.4 Instrumentation Port

Two 2” (50mm) access ports with light-tight caps are provided in the front door of the chamber. These ports allow 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 Communications

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

2.6 Central Management System (Optional)

For use in conjunction with the CMP6060 controller, the Conviron Central Management™ (CM) system provides a comprehensive suite of time-saving, value-added features for remote control and monitoring of chambers equipped with the CMP6060 controller, such as:

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

Refer to the Central Management manual for complete instructions.

3 OPERATION

Read and understand all included user manuals completely before attempting to operate this equipment.

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

3.1 Fluorescent and Incandescent Combination Lighting

A typical lamp canopy includes fluorescent and incandescent lamps. However, other types of lamp configurations are available. Fluorescent lamps should be changed regularly, as intensity diminishes with use.

Figure 3-1 shows an example of the fluorescent lamp intensity loss over time. Refer to the lamp manufacturer's specifications for more detailed information.

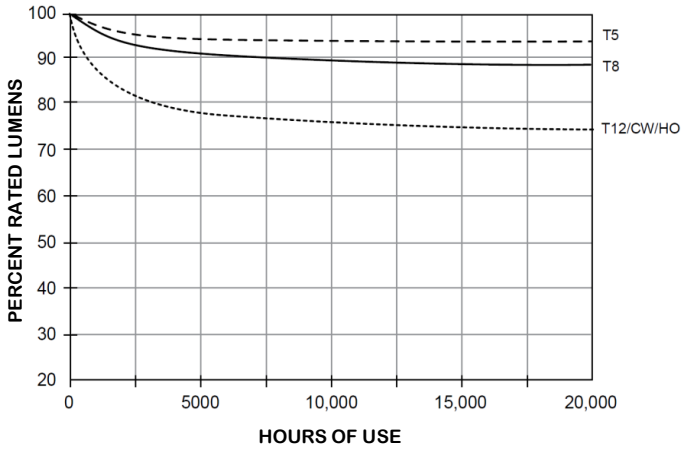

Figure 3-1 Fluorescent Lamp Life Comparison

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

3.2 Counterbalanced Canopy

PGW40 chambers incorporate a counter-balanced lamp canopy (Figure 3-2) for ease of height adjustment between the lamp canopy and the plants.

The counterbalanced system with pulleys allows a single person to manually adjust the height of the canopy.

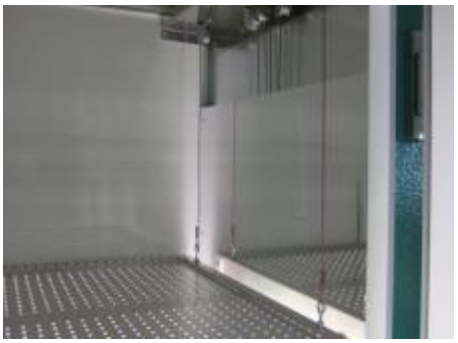

Figure 3-2 Counterbalanced Lamp Canopy

Keep all body parts out of the path of the canopy when it is being adjusted.
Ensure the canopy path is clear before moving the canopy.
Obstacles present in the path of the moving canopy can cause damage to the lamps, canopy, sensors, cabinet, and valuable experimental material.

3.3 Plant Placement on the Unifloor®

Plant materials, in pots or trays, are placed directly on the Unifloor® (Figure 3-3) and do not need to be moved during the experiment. Excess irrigation water will drain into the drain pan below the Unifloor and be channeled out of the chamber to the floor drain.

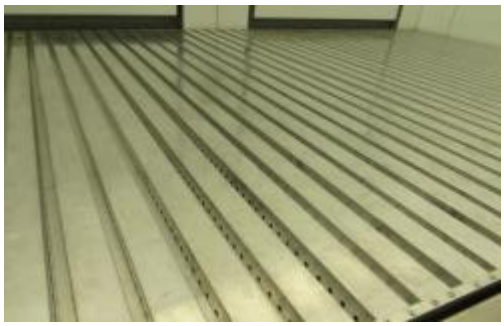

Figure 3-3 Unifloor

3.4 Instrumentation Ports

The instrumentation ports with threaded closures are located on the doors of the chamber. The ports enable 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 ports are intended for low-voltage wires only.
Conviron does not recommend the use of extensions cords inside the chamber.

3.5 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 threaded collar is located on the front of the machine compartment and can be adjusted from fully closed (no fresh air) to fully open to allow up to 55 ft^3/min (1.55m^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 front of the chamber through the intake port located in the machine compartment and then exhausted through the exhaust port (Figure 3-4). An optional variable speed fan is available.

Figure 3-4 Fresh Air Inlet and Exhaust Ports

3.6 Airflow

Continuous airflow is critical to the efficient operation of the chamber.

Air is channeled through internal ducting to the Unifloor® into the chamber space. A circulating loop of conditioned air can also be established to maintain precise environmental conditions within the chamber. Air is drawn over the refrigeration coil, or heaters and circulated throughout the chamber. Fresh air may also be introduced, if required.

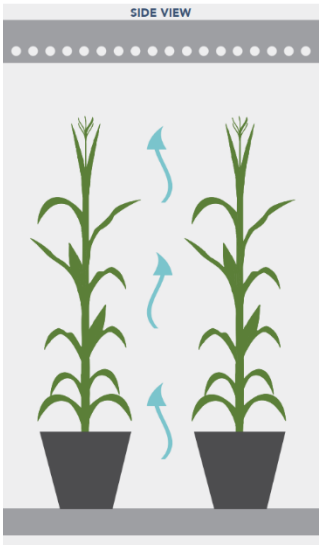

Figure 3-5 Chamber Airflow

3.7 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.

3.8 Lighting Options

The chamber can be equipped with many different lighting configurations. Programmable settings are in micromoles and the maximum setpoint values will depend on the selected type of light.

3.8.1 Fluorescent Lighting

The standard lighting configuration consists of a combination of fluorescent and halogen incandescent lamps to provide a balanced spectrum for plant growth. Both lighting types are independently programmable in steps.

The fluorescent tubes and halogen incandescent lamps are individually replaceable, as required.

3.8.2 LED Lighting - LED Option

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

- Decreased wattage consumption 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 light bar replacement.

3.8.3 Ceramic Metal Halide Lighting – CMH Option

DO NOT look directly at the ceramic metal halide lamps while in operation.

High intensity light can be harmful to your eyes. Use caution when working with high intensity light equipped chambers.

Use adequate eye protection for the concerned wavelengths of Actinic UV, Blue Light and Infrared. Also wear protective clothes and gloves.

Alternatively, the operator may turn off the ceramic metal halide lamps through the control panel user interface while accessing the cabinet.

Ceramic metal halide (CMH) lamps are commonly used to provide an optimal spectrum including abundant far red.

3.9 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, 10% for LED, or 40% with CMH lamps, to the maximum intensity. Incandescent lamps are controlled in light levels.

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 the during manufacturing process.

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

3.10 Fan Speed Control (Optional)

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

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

3.11 Additive Humidification – Spray Nozzle Humidification (SNH Option)

The optional additive humidification uses the pressure from the water supply to atomize the water through a small orifice in the spray nozzle. The spray nozzles are located within the air handling system of the chamber and the water is directly injected into the air stream before it is introduced to the chamber.

A minimum of 60 psi (4.2 bar) is required to operate spray nozzles. If this water pressure is not available, the CPSNH option is required to achieve the required pressure.

A 1/4" compression fitting OD 'Quick Connect' fitting is supplied on the chamber for connection to the mains purified water supply.

The humidification system needs reverse osmosis filtered water.

DO NOT add potentially irritating disinfectants or anticorrosive compounds to the water.
DO NOT use well water, industrial water, cooling circuit water, or any potentially chemically or bacteriologically contaminated water.

The SNH controls the relative humidity inside the cabinet when the operator-selected relative humidity setpoint is above the actual relative humidity level displayed by the controller, within the following parameters:

- A relative humidity setpoint of 0 will turn OFF humidification/dehumidification devices.
- The highest achievable relative humidity setpoint is determined by two factors:
  - Resultant of ambient conditions moisture load within the cabinet from plant transpiration and watering or misting.
  - Capabilities of the SNH.

Complete product specifications are available upon request.

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

3.12 Chemical Dryer Dehumidification – (CD Option)

Chamber air is passed over a desiccant to remove moisture. The dry air is re-introduced into the chamber at very low humidity. Chemical dryers offer the greatest degree of dehumidification.

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

3.13 Carbon Dioxide Additive Control (CO_2 Option)

The CO_2 option package includes CO_2 sensor, CO_2 regulator (North America only), control valve, and injection system, CO_2 tank not included. Mounted on the interior wall, an independent CO_2 detector connects to a horn strobe that will provide an audible and visual alert in the event of elevated $C0_2$ levels. The detector is also wired into Conviron's control system for alarm enunciation. Threshold alarm point for this redundant detector is user-settable to match local regulatory standards for notification of excessive CO_2 levels. Option allows for range from ambient up to 2,900ppm. Maximum sensor reading range of 3,000ppm.

CO_2 exhaust is adjusted using the exhaust damper control in one of the following three modes:

- Automatic—the position of the exhaust damper is based on the CO_2 setpoint.
- Open (override) mode—the damper remains open.
- Closed (override) mode—the damper is closed.

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

3.13.1 Setting Up the CO_2 Control

CO_2 control requires a high-pressure and a low-pressure regulator. In most chambers the low-pressure regulator and the solenoid assembly are located in the machine compartment and are factory set at 2 psi (0.14 bar).

The high-pressure regulator is located on the customer-supplied CO_2 line. This regulator comes in two styles of flow meters, a dial gauge or a glass tube and ball style. In North America, Conviron provides the high-pressure regulator. Outside North America, the customer supplies the high-pressure regulator due to different thread size on the CO_2 line.

DO NOT adjust the regulator on the CO_2 tank once it's been set up.
Close the main valve on the CO_2 tank when it's not in use.

3.13.2 Adjusting the CO_2 Control

There are two variables to consider: programming desired CO_2 concentration and control of air flow through the chamber.

Programming the CO_2 setpoint is as easy as programming temperature or relative humidity. Values are entered in parts per million (PPM) in the CO_2 zone on the Main Status Program Screen of the Controller. The Vaisala™ CO_2 monitor operates in two ranges, up to 2000 ppm and up to 3000 ppm.

Ambient CO_2 levels are usually at least 350 ppm and can be higher depending on proximity to other CO_2 sources such as human beings or automobiles. The CO_2 concentration in the chamber can never be less than the ambient concentration because CO_2 control is additive only.

The exhaust damper also serves to purge CO_2 in the event of a high-level CO_2 alarm. If the high CO_2 limit is set below the CO_2 setpoint, the exhaust damper will open to purge CO_2 to the surrounding space.

Closing fresh air into and exhausting air out of the chamber is important to achieving desired CO_2 concentrations. Failure to consider this will lead to undesired results. New chambers with CO_2 control are equipped with an automated damper to control airflow, older chambers will have manual ports. These units will also typically have a manual fresh air inlet and exhaust outlet for running programs without CO_2 control. Some chambers are only equipped with the manual inlet and outlet.

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

3.14 Central Management System – CMS Option

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

3.15 Shutdown

In the event that the chamber will not be used for two weeks or less, it is best to keep it running, with the temperature at or near ambient and only the fans running.

If experiments will not be run for more than two weeks, to minimize unnecessary electricity consumption, ensure all plants and soil are removed from growth area, clean the unit as described in Section 4 Maintenance, starting on page 15, and leave the chamber and observation doors open slightly to reduce moisture buildup.

4 MAINTENANCE

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

Ensure reliable performance from your Conviron equipment by following the recommended maintenance routines and minimize the need for service.

Refer to the included *Conviron Chambers Maintenance and Troubleshooting Manual* for complete information on recommended cleaning solutions and frequency, and for the maintenance procedures listed in Table 4-1.

4.1 Maintenance Schedule

Table 4-1 identifies the frequency of required maintenance.

Table 4-1 Maintenance Schedule

Standard Features	Prior to New Experiment	Daily	Monthly	Semi-Annual
Temperature, Humidity, CO_2 Processes & Lamps	•	•		
Circulating Fans, Intake and Exhaust Ports, Fresh Air Inlet Filter	•		•	
Interior	•		•	
Sight Glass			•	
Drain Pan & Strainer, Canopy Cables	•			•
Refrigeration Faults, Water Supply & Drain, Door Gaskets				•

Optional Equipment	Before New Experiment	Daily	Monthly	Semi-annual
SNH Additive Humidity System	•		•	
Separate Coil Dehumidifier	•		•	
Air Cooled Condenser	•		•	
CO_2 System	•		•	
Humidity Sensing Unit, Dry Humidity Sensor, Humidity Transmitter Calibration, Additive CO_2 System				•

4.2 Machine Compartment Access

The machine compartment is located on the side of the chamber and, when open, allows access to the refrigeration, electrical, and optional humidity control components.

Figure 4-1 shows the side view of the machine compartment.

Figure 4-1 Machine Compartment

4.3 Maintenance Precautions

Only authorized personnel, who have been trained on the proper maintenance of the equipment and who have read and understood this manual set, should maintain this equipment.
Contact the responsible party, or Conviron, immediately if in doubt about safe operation and/or maintenance of the equipment.

Disconnect and lock out the main power BEFORE servicing the equipment.
Conviron recommends waiting at least 10 minutes after powering off the equipment before servicing the heater elements or related components.

Take all appropriate safety precautions when using and maintaining this equipment – including wearing appropriate safety apparel, using appropriate tools, and fall protection equipment if working on elevated areas.

Electrical power remains at the main terminals. Use extreme caution during maintenance procedures to prevent injury.

Controller may come equipped with an optional Uninterrupted Power Supply (UPS) such that power will remain live for a period of time even if the main power supply is disrupted or turned OFF.

Use extreme caution to prevent injury. If your unit comes equipped with a UPS, it will be located inside the control panel.

DO NOT service the control panel without using proper ESD procedures, including the use of a grounding strap and/or anti-static mat.

Use only original replacement parts when maintaining and servicing the equipment.

4.3.1 Cleaning

Regular and thorough cleaning will help to ensure best performance.

- Clean the chamber and machine compartment drain pans and drain lines regularly.
- Clean the lamps regularly for maximum lighting efficiency.
- Clean the internal walls regularly for maximum reflectance.
- On air-cooled, self-contained chambers inspect to ensure the air-cooled condenser fins are free of dust and debris, use a fine brush and vacuum to clean the fins or use nitrogen or compressed air to clean the fins.
- Avoid using high-pressure washers or high-pressure gases as this could cause damage to the aluminum fins. Use maximum pressure 60 psi (4.14 bar).

5 ADDITIONAL INFORMATION

5.1 Terms & Definitions

Table 5-1 lists the terms and their definitions used throughout this manual.

Table 5-1 Terms and Definitions

Term	Definition
%RH	Humidity level expressed as a percentage of the maximum humidity level
°C	Celsius Degrees
CMH	Ceramic Metal Halide lamp
CMS	Central Management System
ESD	Electrostatic Discharge
EU	European Union
LT	Low temperature
MH	Metal Halide
mm	millimeter
ppm	Parts per million - used a unit of measurement for CO_2 concentration
psi	Pounds per square inch
RoHS	Restriction of Hazardous Substances Directive
ULT	Ultra-low temperature
UPS	Uninterruptable Power Supply
USH	Ultrasonic humidifier
V	Volts
WEEE	Waste Electrical and Electronic Equipment

CONVIRON®

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CE Management System Certified to ISO9001

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