BioChambers FLEX series chambers and rooms provide maximum flexibility to meet your changing research requirements. All shelving modules can be easily changed, without tools, from tall plant mode (upward airflow, adjustable height canopy, high light intensity) to short plant mode (side plenum airflow, multiple adjustable light tiers of shelving). When your research requirements change, so does your BioChamber!

**Features:**

- 1.8m² (20ft²) of plant growth area per tier
- 545mm (21½") to 1805mm (71") of growth height from 3 tier to 1 tier mode
- 500µmoles/m²/s to 1100µmoles/m²/s P.A.R. of lighting from 3 tier to 1 tier mode
- Ideal for flexible research requirements - short plant to tall plant conversion
- Converts from 3 tier to 2 tier to 1 tier - no tools required
- No kits required, all hardware included
- 760mm (30") deep shelf
FLEX Chambers and Rooms can be reconfigured to match your research (with no tools and on site) in three simple steps:

1. Hang shelves where they’re required
2. Plug in equipment
3. Select airflow method

Quality product.
Excellent service.
Innovative designs.
**INTRODUCTION**

BioChambers’ plant growth chamber model FXC-19 was specifically designed to provide maximum flexibility with shelving modules which can be configured for tall plant research (single tier maximizing growth height, upward airflow providing uniform conditions on a horizontal plane, and a counterbalanced adjustable height lamp canopy maximizing the light intensity) or configured for short plant research (three tiers of shelving maximizing the plant growth area and a perforated back wall delivering horizontal airflow ensuring each tier is under the same environmental conditions). BioChambers’ plant growth chambers provide tight uniform control of temperature, a balanced lighting spectrum using a mixture of fluorescent and halogen lamps, and adjustable airflow.

**1.0 CONTROLLER**

1.1 **Controller Version:** BioChambers VNET.

1.2 **Interface:** Fanless panel PC with a 305mm (12") color touch screen.

1.3 **Ethernet Connection:** Remote secure access using a unique site specific webkey allowing the chambers/rooms to be connected to a facility supplied local area network (LAN)/internet.

1.4 **Security:** Multiple levels of password security for researchers, administrators, service technicians, and BioChambers’ factory technicians.

1.5 **VNET Viewer:** Instantly view the status of all your experiments. Single or multiple chambers/rooms can be remotely monitored and operated from a central location via use of the LAN/internet. VNET Viewer can be installed at up to three existing computer stations.

1.6 **Schedule:** Multi-line schedule can be created for temperature, lighting, and fan speed using the touch screen interface or remotely using the facility provided LAN/internet. Available options: humidity, carbon dioxide, auxiliary circuits primarily for automatic watering, light intensity, etc… can also be scheduled.

1.7 **Multi-Day:** Simulation of multi-day changing environmental conditions can be scheduled.

1.8 **Ramping:** Temperature ramping from setpoint to setpoint. Available options: humidity, carbon dioxide, and dimmable lighting can also be ramped.

1.9 **Astronomical Clock:** Researchers can produce photo-period schedules for locations worldwide by simply entering the latitude and longitude.

1.10 **Graphing:** Controlled parameters such as temperature and the following available options: humidity, carbon dioxide, and light intensity can be graphed to show setpoint versus actual conditions.

1.11 **Research Data:** Controller equipped with a compact flash memory card to store multiple schedules and logged data such as temperature, alarms, etc… Log rate and duration can be set by the user.

1.12 **Data Export:** Data can be exported to the researchers/administrators computer for further analysis.

1.13 **Start-up:** Provisions for chamber/room start-up delay in facilities with multiple chambers/rooms helping to reduce the initial inrush current after a power outage.

1.14 **Alarms:** Notification via e-mails sent to a cell phone or laptop PC, building alarm contacts connected to a facility supplied building security system, and on chamber/room audible alarm with red indicator light.

1.15 **Service Data:** Refrigeration system pressures and temperatures along with other service parameters are logged. Log rate and duration can be set independently of the research log.

1.16 **Service Screen:** Displays compressor discharge and suction pressures and temperatures, facility water supply and return temperatures, automatic setting temperature safety limits status, lamp hours, sensor calibration hours, temperature control valve position, and more.

1.17 **Service:** Two manual toggle switches with a 10 minute schedule bypass are provided for the service technician to place the chamber/room into full cooling or heating and all lights on or off. This enables faster and easier service work as the technician does not need to learn how to use the control system.
2.0 CONSTRUCTION

2.1 Exterior Dimensions: 2540mmW x 890mmD x 2820mmH (100"W x 35"D x 111"H) assembled. Add 230mm (9") to the height to assemble the chamber (custom heights are available).

2.2 Assembly: Chamber splits at a height of 2005mm (79") for easy installation in the facility.

2.3 Interior Dimensions: 2425mmW x 755mmD (95½"W x 29¾"D).

2.4 Growth Area: Short plant mode 5.31m² (57.3ft²) total on three tiers, two tier mode 3.57m² (38.5ft²) total on two tiers, tall plant mode 1.83m² (19.7ft²).

2.5 Growth Height: Short plant mode 545mm (21½") each of the three tiers, two tier mode 865mm (34") each of the two tiers, tall plant mode 1805mm (71").

2.6 Growth Capacity: Short plant mode 2.9m³ (103ft³) total on three tiers, two tier mode 3.1m³ (109ft³) total on two tiers, tall plant mode 3.3m³ (117ft³).

2.7 Interior: Pre-painted white smooth aluminum.

2.8 Exterior: Powder coated painted green aluminum.

2.9 Lamp Canopies: Non-barriered measuring 730mmD x 1195mmW (28¾"D x 47"W) providing 0.87m² (9.4ft²) of area on each shelf. Top lighting canopies: counter balanced with ball bearing style pulleys allows fingertip adjustment of the lights vertically. Center lighting canopies: cantilevered from the wall, adjustable height in 75mm (3") increments, and removable.

2.10 Drain Pan: Constructed of stainless steel for superior corrosion resistance.

2.11 Insulation: 38mm (1½") CFC free, high-density expanded polystyrene.

2.12 Electronics: Filtered air blown into the control panel, providing cooling to the electronics and positive pressure in the control panel keeping dust out, extending the life of the electronics.

2.13 Service: Easy access from the front to electronics and mechanical components located on the roof of the chamber.

2.14 Instrument Ports: Two 50mm (2") with light tight covers.

2.15 Reach-In Doors: Two 840mmW x 1700mmH (33"W x 67"H) with light tight magnetic gaskets and self closing cam-lift hinges.

2.16 Observation Window: One 380mm x 280mm (15" x 11") dual pane glass window with light tight cover.

2.17 Control Panel: Display mounted on the center of the chamber when facing the doors.

2.18 Aisle/Vestibule: N.A.

3.0 TEMPERATURE

3.1 Ambient: Designed for a maximum ambient of 35°C.

3.2 Range: 4°C to 40°C all lights off, 10°C to 40°C all lights on (extended temperature options are available).

3.3 Control: PID control, +/-0.5°C at the aspirated sensor.

3.4 Temperature Limits: Automatically set when the researcher runs a schedule. One high/low and one lamp safety temperature limit sensor independent of the main temperature sensor.

3.5 Aspirator: Adjustable, aspirated, and shielded from the lights sensing of temperature.

3.6 Temperature Sensor: High precision fast responding thermistor sensor.

4.0 LIGHTING

4.1 Lighting: T5HO with energy efficient electronic ballasts (other lighting options are available).

4.2 Intensity: Short plant mode 500µmoles/m²/s each of the three tiers, two tier mode 750µmoles/m²/s each of the two tiers, tall plant mode 1,100µmoles/m²/s measured at 150mm (6") from the lamp canopy at 20°C and averaged on a 150mm (6") grid. Top, middle, and bottom canopies supplied with all hardware (eg. lamps, ballasts, cables, etc…) required to meet the lighting specification above. No additional kits required.

4.3 Lamps: Combination of 1220mm (4ft) T5HO fluorescent lamps and halogen lamps.

4.4 Programming: Via VNET controller.

4.5 Lighting Levels: 3 Levels of fluorescent lighting and 1 level of halogen lighting per tier, total of 12 lighting levels.

4.6 Lamp Heat: Refrigeration system sized to remove all heat generated by the lights.

4.7 Lighting Relays: 100% solid state for increased reliability.
5.0 REFRIGERATION

5.1 Condenser: Self-contained water-cooled condenser (other options are available).
5.2 Temperature Valve: No maintenance electronic proportional hot gas bypass system for close temperature control and continuous compressor operation.
5.3 Compressor: Scroll compressor.
5.4 Refrigerant: HFC-404A.
5.5 Evaporator: Copper tube and aluminum fin construction.
5.6 Refrigeration Analysis: Compressor discharge and suction pressures as well as temperatures, and facility water supply and return temperatures are provided and logged for ease of service.
5.7 Safety: One suction pressure switch and one discharge pressure switch with a manual reset is provided on the refrigeration system to prevent short cycling and compressor burn out.
5.8 Bariered Lamploft: N.A.
5.9 Defrost Cycle: N.A.

6.0 AIR DISTRIBUTION

6.1 Air Flow: Short plant mode and two tier mode horizontal back-wall airflow through shaped plenums and perforated walls to provide uniform conditions on each tier of shelving, tall plant mode vertical upward airflow through an aluminum open channel floor providing uniform conditions on a horizontal plane.
6.2 Fan Speed: Adjustable from 60% to 100% (85% or higher recommended, temperature gradients increase at lower fan speeds). Fan speed can be programmed in the VNET controller enabling researchers to vary the airflow through the plants.
6.3 Fresh Air: Filtered fresh air with a manually adjustable vent: 1.7m³/min (60ft³/min).

7.0 RESEARCH SAVER

7.1 Surge Protector: Over voltage protection of the controller and control circuit from electrical surges.
7.2 Uninterruptible Power Supply (UPS): Protects the controller and control circuit from brown outs, surge conditions, and momentary loss of power.
7.3 Power Phase Detector: Loss of power phase alarm protects the compressor and other components.
7.4 Factory Diagnostics: Via a facility supplied LAN/internet connection a technician at the factory can access the chamber/room to analyze the mechanical, electrical, and control systems.
7.5 Testing: 100% assembled, tested and run-in at the factory before being disassembled for shipment to the site reducing on-site assembly time and disruptions.

8.0 WARRANTY

8.1 Duration: Two years parts and labor.
8.2 Diagnostics: Additional years three to five remote diagnostics service.

9.0 ELECTRICAL

9.1 Service: 120/208V/3-phase/60Hz/4 Wire + ground (50Hz option: 240/415V/3-phase/50Hz/4 Wire + ground). Electrical service to be provided by others (contact BioChambers for utility requirements).
9.2 Electrical Safety: Chamber/Room is CSA inspected (CE where applicable).

10.0 INSTALLATION & CUSTOMER TRAINING

10.1 Manuals: Controller manual, operation & maintenance manual, and electrical schematics provided.
10.2 Training: On-site training on the controller, electrical, and refrigeration system by a factory technician. (Extra charges may apply to chambers/rooms shipped outside of Canada or the U.S.A.)
10.3 Installation: Installation not included. Please consult with BioChambers for installation options.
Biochambers Rooms and Chambers are available with a variety of options and accessories. If your research has specific requirements, BioChambers can outfit your equipment to meet your needs. These are just a few of the standard options Biochambers has available. Ask for more information.

### Available Options

A variety of options and accessories are available for Biochambers Rooms and Chambers. If your research has specific requirements, BioChambers can outfit your equipment to meet your needs. Here are some of the standard options available:

<table>
<thead>
<tr>
<th>LIGHTING</th>
<th>HUMIDITY SENSORS</th>
<th>WARRANTY</th>
<th>ADDITIVE CO₂</th>
<th>CO₂ SCRAMBER</th>
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<tr>
<td>Dimmable Lighting</td>
<td>Relative Humidity</td>
<td>Extended Warranty</td>
<td>Additive CO₂</td>
<td>CO₂ Scrubber</td>
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- **Additive Humidity**
- **Spray Nozzles**
- **Dehumidification**
  - By Desiccant
  - By Refrigeration

- **Construction**
- **Containment**
- **Display**
- **Receptacle**
  - Long Life
  - Programmable

- **Condenser**
- **Remote Air Cooled Condenser**
- **Remote Air Cooled Condenser with EC Motor**

- **Refrigeration**
- **Evaporator Coating**

- **Temperature**
- **Low Temperature Defrost**
- **Extended Temperature Range**
- **High Ambient Panel Cooling**
- **Irrigation**
- **Programmed Output**
- **Hose Bib Manual**
BIOCHAMBERS CAN MANUFACTURE THIS PRODUCT AT CUSTOM HEIGHTS TO ACCOMMODATE CEILING OBSTRUCTIONS.

- Ethernet connection
- Purified water connection (if Humidity option selected)
- Electrical connection
- Ø1-1/8" Drain Location
- Cooling water or refrigeration line connections for condenser
- Electrical line connections for air-cooled condenser (if option selected)

1. Control Panel
2. VNET View or VNET Touch Display
3. Door Opening 840 [33] x 1700 [67]
4. Fresh Air
5. Exhaust Air
6. Refrigeration System
7. Instrument Ports
8. Ballasts
9. Viewing Window
10. Adjustable Height Lamp Canopy
11. Counter Weight
12. Air Plenum

MINIMUM DOOR SWING 979 [38.1/2]