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) to 13.2m² (142ft²) of plant growth area per tier
- 610mm to 2030mm (24” to 80”) of growth height from 3 tier to 1 tier mode
- 475µmoles/m²/s to 1000µmoles/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
- Available in 760mm (30”) and 915mm (36”) deep shelves
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 room series FXR 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 perforated side walls delivering horizontal airflow ensuring each tier is under the same environmental conditions). BioChambers’ plant growth rooms 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 (FXR-19 specification, for other models see tables 1 and 2)

2.1 Exterior Dimensions: 2945mmW x 1780mmD x 2800mmH (9'8"W x 5'10"D x 9'2¼"H) assembled. Add 915mm (36") to the height for the refrigeration system (custom width, depth and height are available).

2.2 Assembly: Room disassembles for easy installation in the facility. Panel assembly: posi-loc cam type locking action.

2.3 Interior Dimensions: 2540mmW x 1575mmD x 2415mmH (8'4"W x 5'2"D x 7'1 1/8"H).

2.4 Growth Area: Short plant mode 5.3m² (57ft²) total on three tiers, two tier mode 3.6m² (38ft²) total on two tiers, tall plant mode 1.8m² (20ft²).

2.5 Growth Height: Short plant mode 610mm (24") each of the three tiers, two tier mode 965mm (38") each of the two tiers, tall plant mode 2030mm (80").

2.6 Growth Capacity: Short plant mode 3.2m³ (114ft³) total on three tiers, two tier mode 3.4m³ (120ft³) total on two tiers, tall plant mode 3.7m³ (133ft³).

2.7 Interior: 24ga. Smooth galvanized steel with factory baked white enamel finish.

2.8 Exterior: 26ga. Stucco galvanized steel with factory baked white enamel finish.

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. In short plant mode each of the two shelving modules has three lighted tiers for a total of six shelves. In two tier mode each of the two shelving modules has two lighted tiers for a total of four shelves. In tall plant mode each of the two shelving modules has one lighted tier for a total of two shelves. Maximum weight carrying capacity of 90Kg (200lb) per shelf.

2.10 Drain Pan: Constructed of stainless steel for superior corrosion resistance. Insulated floor not supplied (see options).

2.11 Insulation: 100mm (4") of foamed in place urethane insulation.

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 to electronics through lockable doors and mechanical components located on the roof of the room.

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

2.15 Walk-In Door: One 865mmW x 2135mmH (34"W x 84"H) door with light tight magnetic gaskets, self closing cam lift hinges, closure device, and interior safety door release.

2.16 Observation Window: One 320mm x 320mm (12½" x 12½") dual pane glass window with light tight cover.

2.17 Control Panel: Display mounted on the left side of the room when facing the door (right side available upon advanced request).

2.18 Aisle/Vestibule: 1015mmW (40"W) enables research work to be performed on the plants within the conditioned space.

3.0 TEMPERATURE

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

3.2 Range: 5°C to 35°C all lights off, 15°C to 35°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 475µmoles/m²/s each of the three tiers, two tier mode 700µmoles/m²/s each of the two tiers, tall plant mode 1000µmoles/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 side, total of 8 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.
<table>
<thead>
<tr>
<th>Model #</th>
<th>Exterior Dimensions: Width x Depth x Height</th>
<th>Interior Dimensions: Width x Depth x Height</th>
<th>Growth Area:</th>
<th>Model #</th>
</tr>
</thead>
<tbody>
<tr>
<td>FXR-19</td>
<td>2945mmW x 1780mmD x 2800mmH (9’8”W x 5’10”D x 9’2¼”H)</td>
<td>2540mmW x 1575mmD x 2415mmH (8’4”W x 5’2”D x 7’11”H)</td>
<td>5.3m² (57ft²)</td>
<td>FXR-22</td>
</tr>
<tr>
<td>FXR-37</td>
<td>2945mmW x 2945mmD x 2800mmH (9’8”W x 9’8”D x 9’2¼”H)</td>
<td>2540mmW x 2745mmD x 2415mmH (8’4”W x 9’0”D x 7’11”H)</td>
<td>10.6m² (114ft²)</td>
<td>FXR-45</td>
</tr>
<tr>
<td>FXR-56</td>
<td>2945mmW x 4405mmD x 2800mmH (9’8”W x 14’5½”D x 9’2¼”H)</td>
<td>2540mmW x 4205mmD x 2415mmH (8’4”W x 13’9½”D x 7’11”H)</td>
<td>15.9m² (172ft²)</td>
<td>FXR-67</td>
</tr>
<tr>
<td>FXR-74</td>
<td>2945mmW x 5720mmD x 2800mmH (9’8”W x 18’9¼”D x 9’2¼”H)</td>
<td>2540mmW x 5520mmD x 2415mmH (8’4”W x 18’1¼”D x 7’11”H)</td>
<td>21.2m² (229ft²)</td>
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</tr>
<tr>
<td>FXR-93</td>
<td>2945mmW x 7180mmD x 2800mmH (9’8”W x 23’6¾”D x 9’2¼”H)</td>
<td>2540mmW x 6980mmD x 2415mmH (8’4”W x 22’10¼”D x 7’11”H)</td>
<td>26.5m² (286ft²)</td>
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</tr>
<tr>
<td>FXR-111</td>
<td>2945mmW x 8495mmD x 2800mmH (9’8”W x 27’10½”D x 9’2¼”H)</td>
<td>2540mmW x 8295mmD x 2415mmH (8’4”W x 27’2½”D x 7’11”H)</td>
<td>31.8m² (343ft²)</td>
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<td>3240mmW x 1780mmD x 2800mmH (10’7½”W x 5’10”D x 9’2¼”H)</td>
<td>2830mmW x 1575mmD x 2415mmH (9’3½”W x 5’2”D x 7’11”H)</td>
<td>6.4m² (69ft²)</td>
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<td>2830mmW x 2745mmD x 2415mmH (9’3½”W x 9’0”D x 7’11”H)</td>
<td>12.8m² (138ft²)</td>
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</tr>
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<td>FXR-67</td>
<td>3240mmW x 4405mmD x 2800mmH (10’7½”W x 14’5½”D x 9’2¼”H)</td>
<td>2830mmW x 4205mmD x 2415mmH (9’3½”W x 13’9½”D x 7’11”H)</td>
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<td>2830mmW x 5520mmD x 2415mmH (9’3½”W x 18’1¼”D x 7’11”H)</td>
<td>25.6m² (273ft²)</td>
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<td>2830mmW x 6980mmD x 2415mmH (9’3½”W x 22’10¼”D x 7’11”H)</td>
<td>32.0m² (344ft²)</td>
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<td>3240mmW x 8495mmD x 2800mmH (10’7½”W x 27’10½”D x 9’2¼”H)</td>
<td>2830mmW x 8295mmD x 2415mmH (9’3½”W x 27’2½”D x 7’11”H)</td>
<td>38.4m² (413ft²)</td>
<td>FXR-134</td>
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*Custom sizes are available, contact BioChambers to discuss your requirements.
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<td>Aisle</td>
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<td>Short Plant Mode</td>
<td>Two Tier Mode</td>
<td>Tall Plant Mode</td>
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<td>Lamp Canopy Dimensions:</td>
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<td>1015mmW (40&quot;W)</td>
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<td>3.7m² (133ft²)</td>
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<td>FXR-37</td>
<td>6.5m³ (228ft³)</td>
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<td>FXR Series - 915mm (36&quot;) Lamp Canopy</td>
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<td>26.8m³ (947ft³)</td>
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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 Barriered Lamploft: N.A.
5.9 Defrost Cycle: N.A.

6.0 AIR DISTRIBUTION (FXR-19 specification, for other models see tables 1 and 2)
6.1 Air Flow: Short plant mode and two tier mode horizontal side 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.

11.0 OTHER
11.10.b CONSTRUCTION
11.10.1 Door access to plant growth area is lockable.
11.15.b RECEPTACLE
11.15.1 One interior wall mounted GFI receptacle located at the center of the back wall and 460mm (18”) above finished floor: 120V/1 phase/6 amp circuit (50Hz option: 240V/1 phase/6 amp circuit).
11.15.2 Consult with engineering for additional receptacles on separate/larger circuits.
**Available 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.

<table>
<thead>
<tr>
<th>LIGHTING</th>
<th>HUMIDITY SENSORS</th>
<th>ADDITIVE HUMIDITY</th>
<th>ADDITIVE CO₂</th>
<th>CO₂ SCRUBBER</th>
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<tbody>
<tr>
<td>DIMMABLE LIGHTING</td>
<td>RELATIVE HUMIDITY DATA LOGGING</td>
<td>ADDITIVE HUMIDITY SPRAY NOZZLES</td>
<td>ADDITIVE CO₂</td>
<td>CO₂ SCRUBBER</td>
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<tr>
<th>DISPLAY</th>
<th>DEHUMIDIFICATION</th>
<th>WARRANTY</th>
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<tr>
<td>LONG LIFE DISPLAY</td>
<td>DEHUMIDIFICATION BY DESICCANT</td>
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<tr>
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<th>CONTAINMENT</th>
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<tr>
<td>CUSTOM GROWTH HEIGHT</td>
<td>INSULATED FLOOR</td>
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<th>CONDENSER</th>
<th>REFRIGERATION</th>
<th>RECEPTACLE</th>
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<tr>
<td>REMOTE AIR COOLED CONDENSER</td>
<td>REMOTE AIR COOLED CONDENSER WITH EC MOTOR</td>
<td>PROGRAMMABLE RECEPTACLE</td>
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<th>TEMPERATURE</th>
<th>IRRIGATION</th>
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<td>LOW TEMPERATURE DEFROST</td>
<td>EXTENDED TEMPERATURE RANGE</td>
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</table>
FXR Series - 915mm (36") Lamp Canopy Models

FXR-22, FXR-45, FXR-67, FXR-89, FXR-112 and FXR-134

**Metric (Imp)**

- Ethernet connection
- Deionised water connection (if option selected)
- Electrical connection
- Floor Drain Location
- Cooling water or refrigeration line connections for condenser
- Electrical line connections for condenser (if option selected)
- Air supply (required for humidity option)

1. Control Panel
2. VNET View or VNET Touch Display
3. Door Opening 864 [34] x 2135 [84]
4. Fresh Air
5. Exhaust Air
6. Refrigeration System
7. Instrument Ports
8. Ballast
9. Viewing Window
10. Adjustable Height Lamp Canopy
11. Counter Weight
12. Air Plenum
13. Receptacle

CUSTOM SIZES AVAILABLE. CONTACT BIOCHAMBERS TO DISCUSS YOUR REQUIREMENTS.

BIOCHAMBERS CAN MANUFACTURE THIS PRODUCT WITH THE CONTROL PANEL MOUNTED ON THE RIGHT SIDE UPON ADVANCED REQUEST.

**SHORT PLANT MODES**

- **FXR-22**
  - 1 Module Deep
- **FXR-45**
  - 2 Modules Deep
- **FXR-67**
  - 3 Modules Deep
- **FXR-89**
  - 4 Modules Deep
- **FXR-112**
  - 5 Modules Deep
- **FXR-134**
  - 6 Modules Deep

**TALL PLANT MODES**

- **FXR-22**
  - 1 Module Deep
- **FXR-45**
  - 2 Modules Deep
- **FXR-67**
  - 3 Modules Deep
- **FXR-89**
  - 4 Modules Deep
- **FXR-112**
  - 5 Modules Deep
- **FXR-134**
  - 6 Modules Deep

**SHORT PLANT MODE**

- **FXR Series - 915mm (36") Models Diagram**

**TALL PLANT MODE**

- **FXR-22**
  - 1 Module Deep
- **FXR-45**
  - 2 Modules Deep
- **FXR-67**
  - 3 Modules Deep
- **FXR-89**
  - 4 Modules Deep
- **FXR-112**
  - 5 Modules Deep
- **FXR-134**
  - 6 Modules Deep

**SECTIONED FRONT VIEW**

**SECTIONED SIDE VIEW**